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Moving beyond theories of neighborly emulation: Energy policy information channels are plentiful among American states

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ABSTRACT

The American states are prolific energy policymakers. Over the past two decades, they have adopted a variety of policies aimed at technology innovation and carbon reductions. These policy decisions, however, are not made within a vacuum. States share peer relationships through which they exchange policy relevant information. Research on energy policy has recognized the existence of these networks, but measured them only indirectly, typically with a measure of geographic proximity. This approach likely provides an incomplete picture of the ways in which states share information in this important domain. Based on a pilot survey of expert informants in state energy policy, in this Perspectives article we show that policy information networks extend beyond geographic proximity. Our results reveal that measures used in studies of energy policy diffusion are overly simplistic, underestimate the importance of states sharing information, and fail to capture the actual reasons states look to one another. We argue that it is important to account for these alternative channels in future policy diffusion scholarship.

1. Introduction

Scholars, pundits, and politicians have argued that, in the absence of comprehensive federal action, state governments must act in their role as "laboratories of democracy" to address pressing questions of energy sustainability in this country (see, e.g., [1,2]). During periods of minimal national leadership as well as significant political gridlock over climate and energy policy over the past two decades, states have been immensely active in crafting such policies, and thus filling this laboratory role [3–5]. States have been responsible for fostering renewable energy markets across the country, including wind farms and solar photovoltaic panels in both large and small rooftop applications. These policy activities have contributed to significant greenhouse gas emission reductions [6,7].

We know from a half-century of research that state governments rarely act in isolation when developing innovative policies. Rather, states learn from one another about which policies offer viable solutions to the problems they face [8,9]. They look to each other not only for cues about which policies fit specific problems, but also for guidance on the design of policies [10–12]. Studying such interactions among key stakeholders, and the manner in which these interactions shape fundamental policy decisions, is important in advancing the field of energy research [13].

Yet, we lack a comprehensive view on the dynamic interchange of energy policy information at the state level. Prior policy diffusion studies emphasize the importance of similarities among states, where states with historical, cultural, or economic similarities are more likely to emulate each other [14]. In the vast majority of studies, these similarities are assumed to exist among neighbors or those within a certain geographic proximity (see, e.g., [15–20]). These studies use measures of geographic proximity to represent state policymaking information channels. A much smaller subset of others have found that similarities in political ideology [21,22], shared preferences of economic elites [23], coordination among policy entrepreneurs or interest groups [14,18,24–26], or economic competition (See [27] for a review) can dictate which states share policy information. Many scholars acknowledge that peer relations among states must be more extensive than these few measures (see [28]) but no scholar, to date, has tried to identify *a priori* the range of these relationships.

Previous studies have tested some of these peer relationships as they relate specifically to energy policy (see, e.g., [29–36]). Although the results are not always consistent, most find that neighborly influence is an important predictor of renewable portfolio standards (RPS), which is a mandate for renewable energy and one of the most common renewable energy policies across the states. This idea remains speculative, however, in the sense that such relationships can only be inferred post-

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policy adoption based on empirical calculation of the degree of similarity between states with the same policies. With some exceptions [11,29] this literature also does not consider a broader range of possible peer relationships such as those based on political ideological similarities or policymaker interactions at annual conferences.

We argue in this Perspectives article that, through the use of simplified measures of state relations, the literature on energy policy diffusion lacks an understanding of the wide range of state information channels and, in doing so, has overly inflated the role of geographic proximity and underestimated the importance of other types of relationships. Here, we propose an alternative approach for extracting information on peer relationships and policy learning, which is to ask key decision-makers about these relationships directly, rather than inferring relationships ex-post through statistical techniques. Based on a national pilot survey of expert informants on state-level energy policy, as administered in 2014 to a sample of 112 energy policy-makers and -implementers, we analyze what information channels exist among state policymakers and upon what basis these relationships have been established. As a proof-of-concept, we also use the stated information channels from our survey to predict the adoption of state renewable portfolio standards. Our results of this effort not only confirm that simplified measures of state information channels miss important types of peer relationships, and reduce predictive power, but our results also lend additional valuable insights about information exchange and state leadership in the energy policy realm.

2. Methods

The pilot data presented in this analysis were gathered via an online survey designed by the authors and administered by the Indiana University Survey Research Center. The instrument was administered in February through April 2014, during a time that included legislative sessions in all states. We administered the survey to only those individuals who were involved at that time in energy policy making or implementation in their respective state.

A list of potential respondents was first gathered via the internet, through an intensive search of all public officials who are involved extensively within the energy or climate policy arena. Legislators were drawn from state Senate and House of Representatives websites and selected based on their participation in energy and climate committees. Bureaucrats were drawn by visiting state energy, environment, or natural resources office websites that were listed on the website for the national association of state energy officials.

Potential respondents were invited to participate in the survey via email, with background information on the project and a link that connected to the survey instrument. Those who did not take the survey were subsequently sent up to two more email invitations. Our original email survey invitation was sent to 1878 potential respondents whom we had some reason to believe might be involved in energy policy in their state in some way, but 66 bounced back. Of the remaining 1812 individuals who presumably received our email, 143 of them began the survey, with a response rate of approximately 8 percent. A screening question that asked if the respondent had direct involvement in energy policy formulation or implementation led to a final sample size of 112 respondents. Although this response rate is small, it is consistent with response rates obtained through similar studies that also survey state-level policymakers via internet surveys: 5% [37], 7% [38], and 11.5% [39].

The final respondent sample represents 42 different states. We received no responses from experts in the states of Arizona, Maryland, Pennsylvania, or South Carolina. Individuals in Alabama, Mississippi, Rhode Island, and South Dakota began our survey but did not meet the conditions of our screening criteria. This lack of response from eight states, of course, limits the validity of our findings and the degree to which we can make strong claims. As we show below, however, even with missing information, the survey results that we obtained from the 42 states adds significant information beyond those measures that diffusion studies typically use currently.

Any respondents from the same state were combined to collectively represent that state. Table A1 in the Appendix (in Supplementary material) provides statistics on the sample, broken down by state, and includes several measures of overlap among responses within the same state. The final respondent sample has significant insight into energy and climate policy, as demonstrated in the respondent characteristics presented in Table B1 in Appendix B (in Supplementary material).

In this Perspectives article, we are primarily interested in the types of relationships reported through survey responses. We present these findings through visuals. In addition, as a proof-of-concept, we also estimate a regression model for which we gather secondary state-level data that have been used in previous studies and use the pilot survey data responses to measure the role of reported peer relationships in policy adoption. To do so, we create a new indicator of whether a state shares an information exchange relationship of any sort with another state. All variables used in the regression analysis are defined in Table C1 in Appendix C (in Supplementary material).

The statistical models are estimated using dyadic data composed of pairs of states. A dyadic approach is increasingly common for policy diffusion studies (see, e.g., [11,22,40,41]) as an alternative to standard event history analysis because it allows one to directly measure state-by-state influence, rather than a measure of average influence across many states. In a dyadic format, one can measure whether an action such as policy adoption taken in $state_i$ aligns with actions already taken by statej, controlling for relevant characteristics in both $state_i$ and statej. This format is especially appropriate for the present analysis because we need to control directly for information channels between each set of states and our dependent variable is specifically about the dyadic-pair interaction (i.e., whether $state_i$ adopts the energy policy after statej already has), which a dyadic format can do but a panel data format cannot.[1]

As is common in event history analysis models, the dataset begins after the first state adopts. The dependent variable is coded 1 if $state_i$ adopts an RPS policy after the other state in the pair, statej, has already done so. Dyads only enter the dataset when at least one has adopted (see [42] for a discussion of how this approach improves dyadic model performance) and drop out when both have done so. As is also common with this type of analysis, the models deal with the underlying influence of time on policy adoptions with the inclusion of three cubic splines of time. It also deals with within-dyad similarities over time by clustering

[1] Dyadic models are not without limitations. In fact, there is a deep debate within the international relations literature on the validity of dyadic models (see, e.g., [48–50]). Although this debate is not settled, here we highlight several important points from both sides of this debate: 1) like any model, a dyadic model has a number of assumptions that must be met to claim validity; 2) the most challenging of these assumptions is independence between cases (i.e., the relationship between $state_i$ and $state_j$ is not influenced by the relationship between $state_i$ and $state_k$); and, yet, 3) dyadic models can still lend important insights, and may in fact be the most appropriate model despite its limitations if the research question fits a dyadic format. As Diehl and Wright notes, "the key is the degree to which a particular level or model proves *useful* for the purposes of answering a given research question" (206, p. 363). In the present case, we are interested specifically in the information relationships between states; and our dependent variable also pertains to state-interactions. Thus, we argue that a dyadic model is the most appropriate for our research question and research conditions. We attempt to maximize the statistical validity of our modeling by: 1) relying on previous literature to inform the choice of controls, so as to minimize omitted variable bias; 2) including control variables that pertain not solely to the dyadic pair but also to the state of interest; 3) bootstrapping the standard errors; and 4) running alternative specifications for robustness that cluster standard errors at the state level and control for state fixed effects. We also note that our primary objective is not causal inference but, rather, it is to assess the improvement of model performance with the inclusion of a new independent variable.