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How Energy Industry Special Interests Affect Renewable Portfolio Standard Adoption Rates: an Empirical Study

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Abstract

This study explores how special interest spending from the oil and gas industry affects the adoption of Renewable Portfolio Standards. These energy policies have been adopted in 29 states across the US, making them a popular policy choice for promoting renewable energy development. I created a hazard model including both spending variables as well as political and energy potential variables to see if oil and gas industry spending would influence the adoption of these renewable portfolio standards between 1998 and 2010. The model showed no effect on adoption rates due to oil and gas industry spending, but rather significant effects came from the party of the state legislature, and how much wind energy potential was in the state. While measuring direct effects of campaign spending is always difficult, in this case it was clear that direct industry spending on gubernatorial races did not have an effect on adoption, but that doesn't rule out other methods of spending on the issue of renewable portfolio standards.

Introduction

With global CO_2 levels rising above 400 ppm (parts per million) there are potentially disastrous consequences looming on the horizon unless action is taken (NASA). With the burning of fossil fuels being such a key contributor to this rise in global CO_2 levels, countries are looking for different forms of energy. The change from fossil fuels will not be easy, global economies rely on the cheap energy generated by burning of fossil fuels such as coal and natural gas. For wide scale adoption of renewable energy, such as wind and solar energy, there must be some sort of policy change, not just changing attitudes.

Renewable energy is gaining ground both in terms of policies supporting it and in actually energy capacity developed. Since Iowa in 1983 (DSIRE), states have been adopting Renewable Portfolio Standards (RPSs) to ensure renewable energy is developed within their borders. These RPSs usually designate a certain percentage of the state's energy that must come from renewable sources. The plans vary widely across state lines, from how large of a percentage must come from renewables to how the policies are enforced. While simply having an RPS in place doesn't necessarily predict if a state will produce more renewable energy, the length of time a state has an RPS increases future renewable energy development (Carley, 2009). This implication of this is that if the US decides renewable energy production is desirable, it's better for states to enact RPSs as soon as possible.

During the 2000s especially, there was a wave of states adopting RPSs. By 2007, 29 states had adopted an RPS (Lyon, 2010); however this number has remained stagnant to this day (DSIRE). Some states have adopted renewable portfolio goals, but without the regulatory enforcement found in RPSs these are simply resolutions rather than actual commitments. The stagnation in RPSs has occurred with the majority of states still lacking an RPS coming from the

Southeastern United States (DSIRE). This isn't surprising, as RPS adoption is more fueled by political interests and parties rather than other state factors like environmental quality (Lyon, 2010). This is an interesting dynamic for the adoption of RPSs. It indicates a decentralized (state-based) approach to a global problem (climate change) rather than a focus on local environmental quality. These states then can act as policy vehicles for standards which may be tough to pass at higher levels, making it important to find why these states adopt RPSs.

Literature Review

A Decentralized Approach

Despite the issue of climate change being global, it is difficult to fix on that scale. Part of the difficulty comes from extreme differences between states, let alone countries. The United States has historically been one of the largest emitters of greenhouse gasses in the world. In 1999, the United States emitted 1526.1 Million Metric Tons (MMT) of greenhouse gasses, coming in second was China at 792.1 MMT and even the state of Texas alone stood at number 7 on the list, surpassing many large developed countries (Rabe, 2004). These massive differences in emissions bring up difficult questions. Should all countries reduce emissions by a certain percentage to reach an emissions goal? Should countries that produce the greatest emissions reduce more? What about a measure of emissions per capita? When creating a top-down policy approach, each actor has an interest to support policies that make it easiest upon themselves. Oates (2001) delves into this issue in his work on environmental federalism. Theoretically in a mobile world, localities would want the most relaxed environmental regulations in order to encourage economic progress. A state that doesn't adopt an RPS can still enjoy the benefits of renewable energy development, but also isn't hampered by being forced into any decisions.

Oates doesn't place complete faith in the idea that this "race to the bottom" will occur, especially since local decision makers can factor in future results to their decision making. However with the issue of climate change, decentralized policy won't necessarily affect local environmental quality.

Why then would any state adopt an RPS? When studying RPS adoption, it's seen that political factors more-so than local environmental factors drive states to adopt these policies (Lyon, 2010). Since the adoption is not based on local environmental factors, it could be inferred that states might adopt RPSs to achieve loftier national goals in the face of difficulty enacting national policy. As discussed earlier, agreeing to a national or global standard for fighting climate change is extremely difficult. Throughout recent history, the US government has been unable to adopt strong renewable policy goals, and thus the process has begun to turn to the states (Rabe, 2004). As states have become more involved in the renewable energy policy arena, their policy of choice has continued to be the adoption of RPSs. Despite this seemingly accepted solution to fighting the problem, the policy solution must still be questioned in its ability to actually solve the problem.

Effectiveness and Design of Renewable Portfolio Standards

It would be extremely easy to discuss RPSs if there was a simple answer to the question: do RPSs cause real developments in renewable energy? Unfortunately the question isn't so simple, and there are an extreme number of variables to explore. The literature on the topic is split, with some articles claiming that RPSs have a significant effect on renewable energy development while others claim just the opposite. For example Michaels' (2007) paper suggests that RPSs are simply statement of affirmation rather than effective policy, citing that only one state is in line with their RPS goals. On the other hand Menz and Vachon (2005) found that

states with an RPS had significantly larger expansions in wind capacity compared to those without an RPS. Of course when looking at findings like this neither tell the full story. Just because states aren't currently in compliance with their RPS goals doesn't mean they couldn't meet the goals by the target year. Also states that implement an RPS could simply be more invested in renewable energy already, especially for states adopting an RPS before 2003 as explored in Menz and Vachon's study. These conflicting views suggest not only an incomplete literature but also that there are more details to explore.

While it's tough to capture the entirety of a study without completely re-writing the author's work, there are much more nuanced applications for studying these RPSs. Similar to Menz and Vachon, Carley (2009) found that years having an RPS is an important factor, and that renewable energy generation increases with each additional year having an RPS. Despite this, the same study notes that simply the implementation of an RPS doesn't indicate the total percentage of renewable energy generated. This again draws the question to the forefront of states already developing their renewable energy resources adopting RPSs. As Chandler (2009) notes in her title RPSs are "Trendy Solutions" often adopted in part due to policy diffusion amongst states. If this adoption of RPSs continues yet many states fail to meet their standards as previously mentioned, the effectiveness of the RPS to be the driver of development must still be questioned.

To even further complicate the issue, there are differences in specific RPSs between states. Yin and Powers (2009) further explore this issue, even critiquing the methodology commonly used in other studies. They find that when accounting for policy differences that may weaken certain states' RPSs that the stringent RPSs are effective in driving renewable energy development. Even more specifically, they find that allowing trade of Renewable Energy

Credits weakens RPSs, a major flaw that must be considered when designing policy. But considering economic impacts as well as decentralized benefits, do states really want to adopt more stringent RPSs that while effective in driving development, may cause more economic hardship?

Why do States Implement Renewable Portfolio Standards?

The heart of my research question indeed comes down to why states implement RPSs. The environmental benefits of fighting climate change in a state are negligible when compared to the problem on a global scale. Is it that there are other environmental factors at play, perhaps states don't want to deal with pollution from emissions not just CO2. Several studies have taken a look at this issue, particularly Lyon and Yin (2010) in an extremely comprehensive study. Their methodology is extremely similar to that I'll be using, however their paper lays the groundwork for future research. In short, they found that rather than local factors driving the adoption of RPSs that political partisanship and interests within the state have an effect. These factors seem to confirm the idea that states serve as the policy arena for this issue. Rather than trying to enact federal policy that would be difficult to push through, states with favorable political conditions are enacting RPSs in order to accomplish these political goals.

Even more interesting, is that Chandler found the expansion of these policies wasn't significant at a national level. Despite the flurry of states rushing and adopting RPSs in the mid-2000s, this shows that there is still room to study in the field, as there is still either room to grow for these policies, or time to stop them depending on your perspective.

Much of the focus on studying RPS adoption has been on internal factors to states. Lyon and Yin's study in particular focused almost entirely on a wide array of internal factors to a state. However Chandler's work in the field has shown there are significant external effects on RPS

adoption rates. This path of exploring RPS adoption rates is consistent with the benefits of RPSs at addressing a centralized problem though decentralized policy. If a state level approach to renewable energy policy is truly the choice due to a lack of national political feasibility, then out of state influences could play an integral role in state level decision making. Differences resulting from campaign contributions, other states' policies, and more could all have an effect on how each state treats their RPS. In some cases that could push them towards or away from adoption, in other cases in might only affect the specifics of the RPS like how high the goals are or when they must be met. Whether or not the policies are particularly effective, there was a significant push for their adoption that could be further explained, especially by exploring external factors.

Regional Policy Diffusion

There is a significant political science literature exploring the idea of policy diffusion, especially regionally, between states. While generally policy diffusion is thought of as a positive effect, in reality the effects are more complicated. Policy diffusion isn't just an unseen force that encourages states to adopt policy, but can be explained more accurately as a social learning effect (Mooney, 2001). If a state observes neighboring states adopting successful policies it would be encouraged to do the same, however if a policy is having negative impacts it could discourage other states from attempting it. This is particularly important for RPSs considering the debate surrounding their effectiveness at encouraging renewable energy growth. There are also complications about the presence of national compared to regional diffusion effects. Mooney theorizes that certain policies may be more affected by one type of diffusion depending on the type of policy, and whether it has strong national interest from groups like think tanks.

This complicates theories around RPS adoption because there should be regional similarities in renewable energy potential, and yet it also has a strong national interest.

While Mooney and many other scholars (Berry, 1990) approach policy diffusion from a social learning perspective, other factors have also been studied. Boehmke (2004) explores not only the idea of social learning but also economic effects of diffusion. Rather than focusing solely on policy adoption, Boehmke also explores how much a state expands policy through event count data. This could be an important factor in RPSs considering many states end up adopting RPSs then returning to revise them at a later date. Aside from policy expansion, this paper also expands the idea of why a policy would diffuse compared to other research focusing mainly on social learning. Economic diffusion impacts could be a significant force in RPS diffusion due to the major consequences of energy transition in terms of jobs as well as utility structure and pricing. While these works demonstrate many of the basic tenants of policy diffusion literature, the subject as a whole has a massive literature that's difficult to compress. Most differences in literature result from differences in methodology, thus researchers find different strengths of policy diffusion, though most agree upon it's significant in state policy adoption.

Chandler (2009) explores the idea of policy diffusion in respect to RPSs specifically. Chandler looked at policy diffusion as a factor, but not the only one and found significant evidence of regional policy diffusion, but not necessarily national policy diffusion. There were significant geographic effects of neighbors adopting RPSs, even when ideologies differed. This could be indicative of wind or solar energy generation potential. These factors are often similar within regions, and could be contributing to the regional policy diffusion strength despite the national nature of the issue they attempt to address. While not very statistical, this trend can also

be observed on maps (See Figure 1) of what states have adopted RPSs (DSIRE), as almost the entire southeastern US hasn't adopted policies while other geographic regions have.

The Special Interest Influence

If previous literature leads us to believe that external factors will be a major influence on RPS adoption, it's important to discuss how these factors will affect RPS adoption. Lyon and Yin (2010) find that party is an important factor when it comes to RPS adoption rates. However, this study simply leads towards the idea that political factors play a more central role than environmental factors. This makes sense in conjunction with other literature that leads us to conclude states are a decentralized solution due to political difficulties at the federal or global level. This decentralized policy approach leads us to the possibility that influential national political players are attempting to influence state level politics either in favor of or in opposition to the adoption of RPSs.

If special interests from the oil, natural gas, or coal industries were spending against RPSs, or the renewable energy industry was spending for RPSs, they would expect to see a return on their investment. Current literature isn't in agreement about whether they would get a return, and that gets even more complicated with new campaign finance laws put into motion by the Supreme Court in recent years. Ansolobehere and his colleagues (2003) suggest that since the majority of campaign spending comes from individuals, this political spending is just like any normal good rather than an industry investment. They note in their paper dissenting views, including the fact that many individuals spending significant amounts are industry executives who would have the possibility of seeing political spending as an investment rather than form of participation. On the other hand, some studies find political spending is a form of investment for a corporate interest, and a very lucrative one at that (Cooper, 2010). In this study, the authors

found that firms with greater levels of political spending had higher returns. They also found that firms often had even better financial results when they were involved in long term political relationships with members of Congress. While this study suggests that firms do have a financial incentive to be involved in the political arena, it still doesn't deal with data that includes new more relaxed campaign finance laws. With the lack of agreement in the literature and lack of literature concerning new campaign finance regulations, it's tough to definitively say if firms achieve a direct result with political spending.

Despite questions about how much political spending does influence outcomes, there is evidence that suggests a close relationship between energy industries and government, potentially built on the back of political spending. In 2001, the National Energy Policy Development Group (NEPDG) was founded in order to plan for the energy future of the US. This group met primarily with energy industry executives, and rarely took the advice of environmental groups when exploring policy options. In the end, energy companies that donated hundreds of thousands of dollars to candidates would receive benefits worth billions (Vanderheiden, 2008, p. 24-30). The relationship between the oil and gas industry and government as a result of political spending shows us that their spending influences both the theme and outcome of national politics. This link between energy interests and government goes along with Cooper's findings: long term relationships with politicians are even more lucrative than individual donations. If at the national level oil interests have such a strong influence on how policies are discussed in Washington DC, that influence might have forced RPS adoption into the states' political arenas instead. If that is the case, it's also possible that energy interests still drive these policy decisions at the state level. Obviously the fact that some states have adopted RPSs means that their influence isn't as strong across the entire country, but it is

important to explore if their contributions aren't as spread out across the country, or if their influence isn't as strong.

Research Question

Since researchers have previously explored the question "what causes states to adopt an RPS?" it is important to delve further into the research and ask a more specific question. Based on the importance of political factors in other studies, the question can move onto which political factors. Partisanship is important, as it is in many political questions. However in many cases partisanship can be fairly constant within a state, so breaking down other non-partisan factors can give a more interesting point of view. Specifically, how do individuals or groups not in government affect the political process through their political contributions? As previously discussed, energy policy issues in particular have powerful special interests involved. The implications of energy policy on profits give energy industries such as oil, natural gas, coal, and renewable energy large incentives to invest in the political arena. Focused on the topic of RPS adoption, this study's research question can be essentially stated as "does energy interest spending have a significant impact on RPS adoption rates?" Thus, this study will explore spending from the oil and gas industry across the United States and determine its effect on the adoption of RPSs. Other industries, specifically the renewable energy industry, also could have interesting spending, but there are both theoretical and methodological reasons why the models will not include them. First, the literature reviewed suggests that most of the effects of political spending come from long term relationships, and the renewable energy industry hasn't had time to form the same strong relationships as the oil and gas industry. Also, since state campaign

finance data is more difficult to come by, the consistency of the renewable energy industry data was far more questionable than that of the oil and gas industry.

Hypotheses

H_1: Greater proportions of Democrats in state legislatures will result in higher chances of RPS adoption.

H_2: Democratic governors will result in higher chances of RPS adoption.

Of all my hypotheses, this one is the most straightforward. Not only are Democrats generally considered to be the more environmentally conscious party in modern American politics, but other studies have also shown similar results. Lyon's 2010 paper focused on a broad range of hypotheses related to RPS adoption, but found partisanship, particularly in the legislature, to be of extreme importance. Important to note in these hypotheses, is that I believe the overall proportion of Democrats in the legislature will increase chances of RPS adoption rather than just looking for Democratic control of the legislature. Essentially, a larger majority in a Democratic legislature or a smaller minority in a Republican legislature should still increase the chances of adoption. As there is less partisan opposition to the majority, or more support for Democrats in the minority, there should be increased likelihood that these traditionally Democratic policies are pushed through the legislature.

H_3: Greater rates of oil and gas industry political spending will result in lower chances of RPS adoption.

While this is the primary question my study seeks to explore, the reasoning behind my hypothesis is still relatively straightforward. The oil and gas industry has a fundamental self-interest in stopping the adoption of RPSs. While the standards are technically in favor of renewable energy rather than against fossil fuels, they cut into the growth and percentages of energy provided by these industries. It would make sense with such sweeping policies becoming a popular solution, that the oil and gas industry would donate to political candidates. Either they

would donate to candidates they think would be supportive of their position, or they would donate across the board to try and promote political decisions they want. If the oil and gas industry donates with either or both of these in mind, it is reasonable to expect higher levels of donations from the industry would facilitate political environments less accepting of RPS adoption.

H_4: Greater in-state solar and wind energy potential will result in higher chances of RPS adoption.

Since the amount of renewable energy development will differ from state to state, it is important to control for this factor when examining RPS adoption. By passing these policies, states are electing to place strict standards on their utilities. It's reasonable to assume then that states without access to much renewable energy development would be less likely to enact these requirements in their states. While there is this negative incentive towards not adopting policies without resources to support them, there is also a positive incentive. States that have large solar or wind energy resources available will likely start to develop them at some point even without RPS adoption. If the state is already likely to develop the resource, it makes sense then to pass the policy that looks good and also may drive faster development for in state resources, bringing in jobs to both develop and manage these resources.

Data

The key factor I want to explore with this study is the effect of special interest spending on RPS adoption. Thus, the most important and difficult idea to operationalize in this study is that spending level. There are a few key requirements that must be fulfilled when operationalizing this idea into a variable, and some of them come at the expense of one another. Firstly, the data must be consistent enough to study over time. Ideally this would mean using data from national elections, as it would provide state by state differences while still having

consistent reporting requirements. Unfortunately, using national data would give some idea as to how active the fossil fuel industry is in those races, but the races wouldn't have an effect on RPS adoption. This means state government campaign finance data must be used, but it also must be relatively consistent across both different states and periods of time. This rules out state legislature spending data, as the differences in state legislatures across the country would create vastly different types of spending data. Gubernatorial races on the other hand are mostly consistent, with a single governor getting elected to a four year term in almost every state. This fulfills both major factors I want to ensure with my spending data, as the data is consistent as well as represents the state politics that need to be captured.

All of the time series data will span from 1998 to 2010 due to limitations of full data being available for each variable. While this left censors some of the data in my model, it is necessary to ensure complete data and still captures the vast majority of RPS adoptions.

Percentage of Total Spending

The percentage of total spending data will come from the National Institute on Money in State Politics. It will compare the oil and gas industry's spending in each gubernatorial race to the total spending in the race. The total dollar amount of oil and gas industry spending will be divided by the total spending number, giving a final percentage for each race in each state. This will ensure the data isn't affected by the size of each state. While only one candidate will win each election, spending will be examined across the entire election to account for attempted special interest spending even if it wasn't for the victorious candidate. Data will be extrapolated through years when gubernatorial races did not occur in a state in order to allow for a more complete model, essentially making the variable "percentage of total spending in the last gubernatorial election."

Percentage of Democrats in State Legislature

This variable is coded as a 0 to 1 ratio every year based on the percentage of Democrats in a state's House/Senate. The House and Senate will each account for half of the final variable so as to not overvalue the higher number of seats available in State Houses. Thus if a theoretical state had a fully Democratic Senate of 10 seats, and a halfway split of Democrats and non-Democrats in the House, the variable would be .75 regardless of the number of House seats. Like the other partisanship variable, this is coded as a higher value for Democrats because of the positive relationship between Democrats and RPS adoption (Lyon, 2010) so as to avoid confusion. The data to compile this variable comes from Carl Klarner's state legislative data from Indiana State University. The inclusion of this variable will also necessitate the exclusion of Nebraska from the models as their legislature is non-partisan.

Democratic Governorship

This variable is a dummy variable coded as 1 for Democratic governorship and 0 for non-Democratic governorship. Data is taken from the National Governors Association.

Solar/Wind Potential

Unlike the rest of the variables, the energy potential variables will not be gathered across time but rather as a constant for each state. The variables will have values of 1-5 representing their solar and wind power potential compared to other US states. The variable is created by comparing the solar/wind potential of each state as projected by the National Renewable Energy Lab (NREL), and comparing that to the state's overall power capacity in 2010. This data is gathered from the Energy Information Administration (EIA). These numbers were divided to

create a ratio, then the states were ranked in quintiles according to this ratio, with the top 10 states receiving a 5, the next 10 receiving a 4, and so on.

RPS Adoption

The dependent variable of the study will be the year of RPS adoption. This variable will only look at the first year of adoption for an RPS in a specific state, ignoring subsequent changes to the policies. The variable will only include adoption of full RPSs, and not the non-binding Renewable Portfolio Goals some states have adopted. Firstly, this allows the model to capture a single event rather than the series where some states first adopt a Renewable Portfolio Goal then eventually move onto an RPS. Secondly, while these goals set by states might be a step towards RPS adoption in some cases, they lack the regulatory enforcement of RPSs, and thus are essentially different policies. The data is originally recorded as the year of adoption, but then in the model is converted to "years from the beginning of the time period to adoption" in order to meet the requirements of the model. The data is gathered from DSIRE's list of RPS policies.

Descriptive Statistics

-See Table 1-

Most of the descriptive statistics aren't too insightful for understanding the data, but there are some trends that should be pointed out in regards to the data, especially oil and gas industry spending. While the mean across all states and elections studied is only 1.072% of spending coming from the oil and gas industry, this differs greatly across states. While most states do have peaks and valleys over time, for the most part they are consistent in whether or not they have higher or lower than average spending. States like Texas and Wyoming consistently are above the national average, whereas states like New Hampshire and Rhode Island are consistently below average. The data for renewable energy potential (solar and wind potential)

are constant over time, but are fairly regional in their distribution. For example, the northern Mid-west has higher than average wind potential scores, and the South-Eastern region has consistently lower than average scores.

Methods

The model used to analyze this data is a Cox Proportional Hazards model. There a few reasons that this is the best form of analysis for this study. First and foremost, the dependent variable, RPS adoption, is a dichotomous output that is being examined over time. This allows for a hazard model to treat RPS adoption as failure, and measure the influence my independent variables have on the failure rate over time. This model also works well as to allow for changes in my independent variables over time, as the majority of my variables are not independent of time. This model provides an output of a hazard ratio indicating the increase or decrease in probability of failure (RPS adoption) based on changes in the independent variable. A hazard ratio of 1 indicates there is no effect on RPS adoption. Values greater than 1 indicate higher values of that independent variable increase the likelihood of adoption, as well as the inverse for values less than one.

I will be running four models to explore my research question, all of them Cox Hazard Models. These models will include or exclude variables in order to test for significance in my independent variables under a variety of controls. The first model will only include the oil and gas percentage spending variable. The second model will include all political variables, percentage spending, legislative composition, and governor party. The third model will include legislative composition and the two energy potential variables for solar and wind. This model is being run based on the fact that previous research (Lyon, 2010) indicates legislative composition

will be important, and to check if our model will find an effect from only that political variable while accounting for energy potential factors. The final model will run all five variables side by side in order to account for all factors examined in the model at once.

Results

-See Table Two-

The Cox Hazard Models I ran found consistent results regardless of which factors were controlled for in the different models. Despite my hypotheses, the percentage of gubernatorial race spending from the oil and gas industry, the party of the Governor, and solar energy potential were never statistically significant in my models. Even though multiple models excluded specific variables, both state legislature composition and wind energy potential stayed statistically significant. Both the percentage spending and gubernatorial party variables resulted in hazard ratios hovering around 1, but the solar energy potential leaned in the direction of a negative effect even though it was not statistically significant. Both legislative composition and wind energy potential had hazard ratios greater than one, indicating they had positive effects on the rate of RPS adoption.

During my analysis I also checked if the models passed the proportional hazards assumption and found statistical evidence to support the assumption. I created a graphical representation of this for the legislative composition variable comparing the hazard function at both the first and third quartile values of the variable.

-See Figure Two-

Analysis

In the case of my first hypothesis, I'm able to reject the null hypothesis in favor of the alternative hypothesis that a more democratic state legislature increases the adoption rate of RPSs. On my second and third hypotheses, that gubernatorial party and gubernatorial campaign spending from the oil and gas industry affect adoption rates, I'm unable to reject the null hypothesis. Finally my final hypotheses, that wind and solar potential affect the adoption rates, I can reject the null hypothesis and state that wind potential does have a significant effect in the predicted direction whereas solar potential does not. The only two significant effects come from the partisanship of the state legislature, and the states wind energy potential, with all other effects being insignificant in my model.

Partisanship: Only in the Legislature

While previous studies, particularly Lyon's 2010 study, suggested that partisanship would play a major role, my models only showed a significant partisan difference in the legislature, not from the governor's office. The initial thought this suggests is that there is a difference in the processes of creating RPSs and approving them. It would make sense that partisanship would play a greater role in whether or not the legislation is drafted in the first place. Since RPSs are a traditionally more Democratic policy, a Republican led legislature with agenda setting power probably wouldn't rank RPS adoption as a top priority. On the other hand, if a law has been drafted and passed by the state legislature, a governor might pass it even if it wasn't their top priority.

The fact that legislature composition held significant in all models, with or without gubernatorial partisanship included, lends credibility to the idea that RPSs are driven by state legislatures. This also could explain why my primary variable of interest was statistically

insignificant across all models. Since the spending data used came from gubernatorial elections, and governors don't seem to play as essential a role in the adoption of RPSs, the insights into the oil and gas industry spending could be incomplete.

A Closer Look at Individual States

While it may not be statistically important to look at individual states when determining what causes RPS adoption, certain states, or groups of states, can give a glimpse into the nuances of the question. The main interesting comparison of states I want to explore is Texas vs. the Dakotas.

While this is a comparison between three separate states, the conditions in North and South Dakota are similar enough to group together when comparing them to Texas. Fundamentally, these three states represent Republican strongholds with strong renewable energy resources, though their outcomes on RPS adoption are completely different. All three states score very well in both solar and wind energy potential. Both Dakotas received a maximum score of 5 on both indexes, whereas Texas received a score just below that with a 4 in each category. Especially with such high wind potential scores, one might expect all of these states to adopt an RPS at some point. Each state was never home to a Democratic governor throughout the analysis period, but there ends the similarities. Texas' gubernatorial races played host to consistently higher oil and gas industry campaign spending than the national average, whereas the Dakotas were at or below average the entire time excluding North Dakota's 2008 gubernatorial election. The most important difference though comes from the composition of the state legislatures. The Dakotas typically had around legislative composition scores around .35, whereas Texas held steady with a score around .5 before 2002, and .4 after that election.

As expected based on the model's results, Texas was the only state of the three to adopt an RPS, and it adopted it in 2000, just before the legislature's partisan shift. While the model only looks at a range of 12 years, it is interesting to note that Texas' only time with a more Democratic legislature produced an RPS. It's also interesting to note that Texas' adoption in 2000 places it as one of the early adopters of an RPS. Despite this adoption of Texas' RPS, both North and South Dakota have higher percentages of their energy capacity coming from wind power. According to EIA data, in 2010 North Dakota's generation capacity was 23.8% from wind, South Dakota 16.5%, and Texas 12.9%. This falls in line with the idea that Republican legislatures don't place focus on RPS adoption, even if their state could adopt one and reach the standards fairly easily.

Renewable Energy Potential: Solar vs. Wind

While the primary variables I was interested in exploring were political in nature, important insights into RPS adoption come from the solar and wind energy potential variables as well. While the variables were initially included as a control to ensure the significance of political factors, the differences between the solar and wind potential variables are important to discuss. Firstly, both variables were constructed in a way that ensured increased renewable energy production as a result of previous RPS adoption did not affect the variable. Instead, the variables were constructed from measures of potential solar/wind energy production available, and then compared to the state's overall level of energy capacity in order to control for size. When these variables were included in models, solar potential had a slight negative trend on RPS adoption, though it was not significant. On the other hand, wind potential did have a significant effect increasing the likelihood of RPS adoption. This makes sense considering the state of both solar and wind energy industries today. In 2010, solar energy produced 0.126 quadrillion btu of

energy across the US, whereas wind energy produced .923 quadrillion btu (EIA). This massive difference in solar and wind energy production suggests that most renewable energy production required by a newly adopted RPS would come from expansion of wind energy rather than solar. Thus, it only makes sense that states with larger wind energy potential would be more confident in their ability to meet their RPS, whereas states with large solar potential wouldn't have the same assurances.

Lack of Spending Influence

Perhaps most critical of everything coming out of my models was the lack of results from the oil and gas industry spending variable. The first thing that stands out about the variable, before any of the models even ran, is that it had a lower mean value than I would have anticipated. With a mean value of only 1.072% across all states from 1998 to 2010, it feels a lot less impactful than I had anticipated coming into the study. It's quite possible that the necessity of using state election based data created problems with consistent reporting across all states. On the other hand, it's also possible that there just isn't as much special interest spending on the state level compared to perceptions. Whether it was from a lack of reporting or a lack of the spending itself, having such a low mean value for oil and gas industry spending across the US made it far less likely to end up with significant results from that variable.

Another reasonable explanation of why this key variable had insignificant results is that it was measuring the wrong part of the process. As I discussed above, state legislatures had a significant impact on the models whereas governors did not. If governors aren't having as big of an impact on the adoption of RPSs, then perhaps looking at spending in their races is the wrong

way to approach the question. There are many more difficulties with properly studying state legislature campaign spending across the entire country, but it could be a key part of the question that my models left out.

These potential issues with operationalizing oil and gas industry spending through gubernatorial election data do not completely discount the possibility that there just is no effect from special interest spending on RPS adoption. While previous research across multiple fields suggested an influence from spending would be reasonable, my models showed no such relationship. If the data did represent the influence of the oil and gas industry on the state level, then my models suggest a major lack of influence on RPS adoption. This could come from the relatively low levels of spending, as it seems reasonable that governors wouldn't completely support an industry's policy agenda for an average of roughly 1% of their campaign funds. Despite this possibility, the proximity of the hazard ratios to 1 for that variable suggest more of a lack of influence rather than a lack of spending, as many elections did play host to far higher than average oil and gas industry spending.

Conclusion

While the model's rejection of my main hypothesis was unexpected, perhaps the most important takeaway from this study is that the question is not solved either way. The biggest factor contributing to my remaining questions is that my data, mostly out of necessity, looked at campaign finance for gubernatorial elections. At the same time, the models also found the party of the governor had no significant effect on RPS adoption rates. I discussed a few problems in my analysis section, but the next step in the research on this topic depends on which of those explanations is true. If state level campaigns either have less accurate reporting requirements, or just simply don't have as much spending from special interests, then looking at special interest

influences on state legislatures shouldn't make any difference. On the other hand, if my variable operationalizing special interest spending was insignificant because it only looked at gubernatorial elections, then further research on the topic focused on state legislatures would be vital.

Despite this study's inability to definitively say special interest spending doesn't have an effect on RPS adoption, it is quite clear that spending in gubernatorial races does not have an effect. While the study did not look at policy outcomes for the oil and gas industries as a whole, it is quite clear that spending large sums of money on governor's races does not mean the state will stay focused on a fossil fuel focused path towards future energy development. In fact, if there was ever a place to focus spending to influence RPS adoption, it would be on ensuring the legislature is of the party friendly to your side.

Appendix

Figures

Figure 1: United States RPS Map

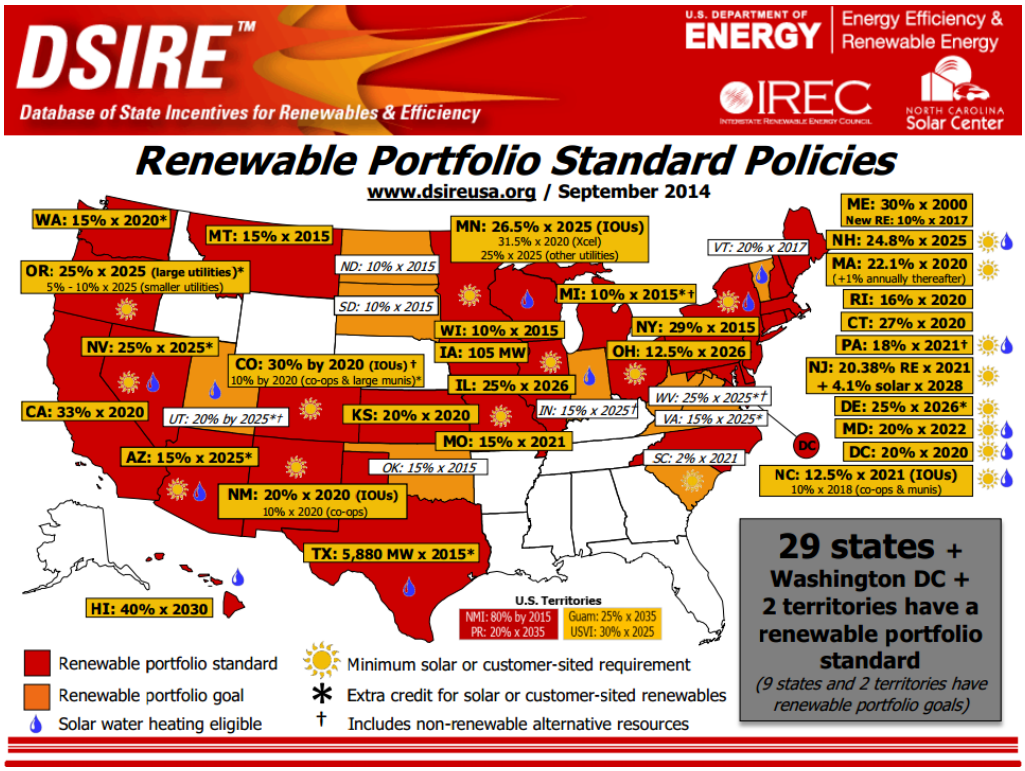
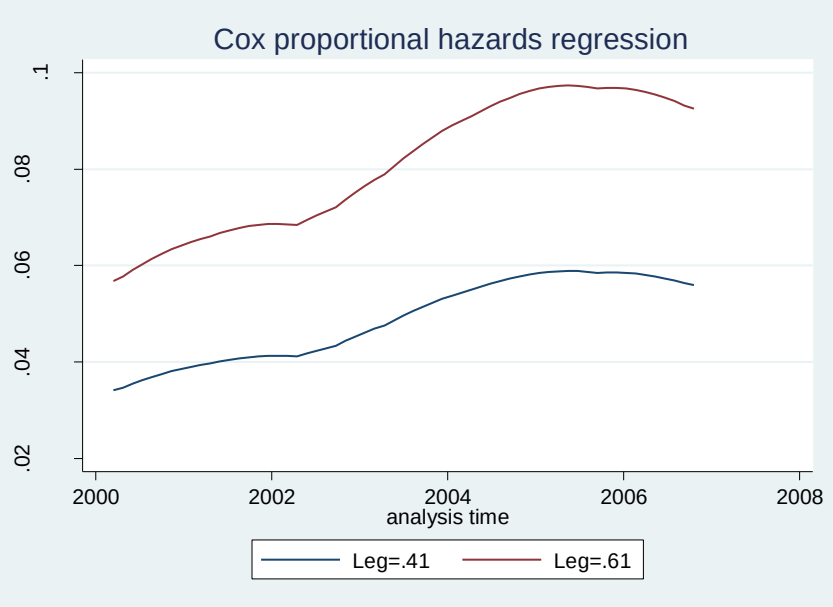


Figure 2: Evidence of proportional hazards



Tables

Table 1: Descriptive Statistics

	Observations	Mean	Standard Deviation	Minimum	Maximum
Percentage Oil and Gas Spending	637	1.072	1.513	0	10.270
Governor Partisanship Dummy	637	.457	.499	0	1
State Legislature Composition	637	.515	.154	.107	.906
Solar Potential	637	2.959	1.400	1	5
Wind Potential	637	2.959	1.400	1	5

Table 2: Cox Proportional Hazard Model Outputs

	Model One	Model Two	Model Three	Model Four
Percentage Oil and Gas Spending	.971 (.136)	.993 (.133)	-	.999 (.141)
Governor Partisanship Dummy	-	.954 (.325)	-	1.032 (.371)
State Legislature Composition	-	14.402* (15.481)	14.277* (17.759)	14.439* (18.434)
Solar Potential	-	-	.767 (.154)	.768 (.164)
Wind Potential	-	-	1.547* (.302)	1.550* (.302)
Observations	428	428	428	428

* P<0.05, (Robust Standard Error)

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