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ORIGINAL ARTICLE

Contextual responsiveness in U.S. local government climate policy

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Abstract

Local governments have led the way on climate action in the United States. While the federal government has largely stood to the side, local governments have made great efforts to adopt policies aimed at reducing greenhouse gas emissions. A large and robust literature in urban politics has explored the variables that influence local government action on climate change in the United States. Issue severity and resident ideological preferences have been identified as two of the most important factors in local climate action. Governments that are more likely to face major impacts from climate, such as coastal communities, and governments serving more liberal residents have both been found to pursue climate policy at higher rates. In this paper we suggest that these relationships are better understood as conditional. We argue that the effect of issue severity will be moderated by ideology. When residents are liberal, issue severity will matter. When residents are conservative, the impact will be muted. We find strong evidence for this hypothesis. Coastal governments and governments that have experienced drought adopt more climate policies, but this is conditional on the ideology of residents.

KEYWORDS
civil society, climate change, environment, governance, urban studies

In the absence of major federal action on climate change in the United States, local governments have taken the lead. From adoption of climate mitigation and adaptation plans (Hughes, 2015; Kalafatis, 2018; Wang, 2013), to joining networks of local governments committed to climate action (Sharp et al., 2011; Zahran et al., 2011), to opposing the United States leaving the Paris Climate Accords during the Trump administration (Arroyo, 2018), local governments have consistently taken policy action to fight climate change and reduce greenhouse gas emissions (GHGs). This effort is all the more impressive given the immense obstacles faced by local governments when confronting climate change, including technical limitations, state constraints, and collective action problems (Betsill, 2001; Yeganeh et al., 2020).

That local governments have continued to pursue climate action despite the obstacles they face has been a subject of much scholarly investigation among local politics scholars in the United States. A large and robust literature has investigated the circumstances under which local governments are likely to pursue climate action. Studies have looked at the adoption of GHG emission reduction targets (Hultquist et al., 2017), mitigation and adaptation plans (Hughes, 2015; Kalafatis, 2018; Wang, 2013), entry into climate agreements like Cities for Climate Protection and ICLEI (Sharp et al., 2011; Zahran et al., 2011), and the numerous policies that cities can adopt to reduce climate change both within government and in the community (Hughes et al., 2018; Krause, 2012).

In addition to the large number of climate actions that scholars have investigated, the literature has also identified a number of different variables that influence climate policy adoption among local government. A number of studies have focused on interest groups, investigating how the presence of business interests and environmental interests push government to avoid or implement climate action (Bae & Feiock, 2013; Daley et al., 2013; Sharp et al., 2011). Others have investigated governmental institutions, such as council-manager and mayor-council systems or the presence of independent staff for sustainability (Deslatte & Swann, 2016; Yi et al., 2017). Some studies have focused on intergovernmental relations, investigating how networks influence the adoption of climate policies (Daley et al., 2013; Hawkins et al., 2018; Hughes et al., 2018).

Of primary interest to the study here, numerous scholars have investigated how issue severity and resident ideology influence the adoption of climate policy. Specifically, scholars have investigated how climate risk, as measured by coastal proximity, drought, air quality, and other factors, has motivated cities to increase their efforts on climate change (Hultquist et al., 2017; Romsdahl et al., 2015; Wang, 2013). Similarly, scholars have long identified that resident ideological preferences play a large role in adoption. Studies have frequently found that increasing Democratic vote share is associated with climate action of various kinds (Gerber, 2013; Hughes et al., 2018; Krause, 2012).

In this paper, however, we suggest that there is a more complex and nuanced relationship between issue severity, resident ideological preferences, and local climate action in the United States than previously explored. We post that contextual responsiveness theory, previously applied to local government water policy in the United States, suggests that the impact of issue severity on climate policy should be conditional on the ideological preferences of the residents being served (Mullin, 2008; Switzer, 2020). We argue that where residents are liberal, and therefore ideologically predisposed toward climate action, increasing levels of issue severity will be associated with greater levels of climate action among local governments. When the residents served by a local government are more conservative, however, issue severity will have a limited impact.

We test our hypothesis using data from a 2015 survey on sustainability from the International City/County Management Association (ICMA). Using three different measures of issue severity, a measure of resident policy conservatism, and a number of interactive models, we find that ideology conditions the impact of coastal location and drought on local government climate action. When residents are liberal, coastal proximity and higher instances of drought increase the number of climate policies adopted by local governments. For those governments serving moderate or conservative populaces, however, there is no statistically significant effect of issue severity.

RESIDENT IDEOLOGY AND ISSUE SEVERITY

One of the most consistent variables associated with local government adoption of climate policy in the United States is the ideological leanings of residents. Local governments serving more liberal and Democratic leaning residents are more likely to adopt climate policies than those serving more conservative and Republican residents (Gerber, 2013; Hughes et al., 2018; Krause, 2012). To some extent, this should not be surprising. Literature on climate change public opinion has long found that opinion on climate policy is polarized on partisan and ideological lines (Egan & Mullin, 2017; Egan et al., 2022). As local governments are ultimately meant to represent the ideological interests of the residents they serve, the ideological leanings of residents should have a major impact on the climate policies pursued by a locality.

For a long time, however, the urban politics literature suggested that local governments were not necessarily well equipped to represent the ideological interests of the residents they served. Scholars suggested that a combination of vertical (state and federal limits) and horizontal (competition with other governments) constraints would mean that local governments would be limited in their responsiveness to resident partisanship and ideology (Burns & Gamm, 1997; Frug, 1980; Gamm & Kousser, 2013; Peterson, 1981; Vigdor, 2004). Over the past decade, these assumptions have been challenged again and again, with numerous studies finding that local government policy in the United States is quite representative of the ideological leanings of residents (Einstein & Kogan, 2016; Sances, 2021; Switzer, 2019; Tausanovitch & Warshaw, 2014).

The literature on local government climate policy in the United States has been no different, as numerous studies have explored how partisanship and ideology influence the adoption of climate policy. In general, these studies have consistently found that increasing public support for climate change, as well as a higher Democratic voting population, increase the number of actions taken by local governments (Gerber, 2013; Hughes et al., 2018; Krause, 2012). Yeganeh et al. (2020) performed a meta-analysis of papers investigating local government climate policy adoption in the United States. Among the variables included in the 53 papers in their analysis, public support and Democratic vote share were two of the most influential. Eight studies included in their analysis included some measure of public support for climate change, while 16 included a measure indicating Democratic vote share (Yeganeh et al., 2020). Consistent with the literature in other policy areas, their analysis suggests that the ideology of residents served by a government has an important influence on the policies pursued by that government.

Also frequently explored in the literature on local climate policy in the United States has been the influence of issue severity. Again, this is reflective of the broader literature on local government policy, as numerous studies across a number of different policy areas, including water policy and immigration policy, have found that increasing issue severity in a given policy area increases the policy efforts of local governments (Hopkins, 2010; McGuire & Silvia, 2010; Mullin, 2008; Walker & Leitner, 2011). Studies in climate policy have also found that greater climate risk leads to higher levels of policy adoption. Coastal location has been the most frequently included variable to indicate risk, but studies have also focused on things like drought, air quality, or disaster events (Hultquist et al., 2017; Krause, 2012; Romsdahl et al., 2015; Wang, 2013). Again, Yeganeh et al.'s (2020) meta-analysis proves instructive when evaluating the influence of issue severity on local climate action. Of the 53 studies included in their analysis, 5 included some measure of coastal location, while 6 included some other measure of vulnerability. They found that coastal location had a consistent and positive influence on the adoption of climate policy, with less consistent effects for other forms of vulnerability.

Studies of local climate policy in the United States have focused a great deal of attention on the influences of both resident ideology and issue severity on local climate action. It is likely, however, that there is a more nuanced relationship between these variables than previously identified in the literature. While many studies include both types of variables in the analysis, it is possible that the impact of issue severity is conditional on the ideology of local government residents. This means that these previous studies may be simultaneously overstating and understating the effect of climate risk severity on local government climate adoption. For liberal communities, risk indicators like coastal location and drought may have an even stronger effect than previously identified in the literature, while they likely have a smaller effect in conservative communities.

CONTEXTUAL RESPONSIVENESS THEORY AND LOCAL CLIMATE ACTION

Outside of the context of climate change, studies of local government have investigated how the responsiveness of local governments may be moderated by the context in which they operate. Specifically, Mullin (2008, 2009) has argued that the relative responsiveness of general-purpose governments and special districts will depend on the environmental context in which they operate, testing her argument using water utility policy as the point of empirical departure. Switzer (2020) extended Mullin's theory, suggesting that problem severity and resident ideology have a sophisticated and interactive relationship, where the impact of each on local government policy is dependent on the context in which a local government operates.

This theoretical argument is based on the idea that local elected officials in general purpose governments and the residents they serve ultimately operate in a multi-dimensional policy space (Mullin, 2008). There are innumerable policy areas and policy decisions that voters and elected officials can choose to focus their attention on. Crucially, elected officials are likely to focus on issues that they see at politically beneficial, putting aside policy problems that they deem unlikely to bring electoral reward (Mullin, 2008; Switzer, 2020). Elected officials face a strong incentive to focus on policy areas that they believe will ensure them reelection. What issues are important to residents, then, will determine the policies that elected officials are most likely to pursue (Switzer, 2020).

Switzer (2020) argues that resident attention will depend on issue severity, ideological preferences, and their interaction. It has long been established that higher levels of objective risk lead individuals to worry more about specific policy problems and support policy to fix them (Bishop, 2013; Brody et al., 2008; Egan & Mullin, 2012). Similarly, what specific issues individuals find compelling and worthy of action is a result of their ideological perspective (Feldman, 1982; Lynch & Gollust, 2010; Switzer & Vedlitz, 2017). These are uncontroversial points that lead to obvious conclusions with respect to local government policy. Where risks in a given policy area are higher, residents will focus on that policy problem, and elected officials will face incentives to seek solutions to that problem. Where residents have an ideological interest in a given policy problem, residents will focus on that policy problem, and elected officials will face incentives to seek solutions to that problem. This simple logic is why dozens of scholars of local government climate policy have focused on resident ideology and issue severity in their models.

What contextual responsiveness theory suggests, however, is that there is a more complex relationship between issue severity, resident ideology, and government policy. Specifically, it argues that the impact of issue severity will depend on ideology and vice versa. For the purposes of this paper, we will focus on the former argument, that the influence of issue severity on local government policy will depend on the ideological preferences of government residents. Literature in political science has long shown that attention to policy issues vary depending on accordance with prior ideological beliefs (Zaller, 1992). Ideology is a lens through which individuals interpret the facts of the world around them, as shown by the literature on motivated reasoning (Fischle, 2000; Hartman & Newmark, 2012; Lebo & Cassino, 2007; Taber et al., 2009). Given this, Switzer (2020) argues that local governments that serve residents who are not ideologically predisposed toward solving a given policy problem do not face strong incentives to adopt policy even in the face of increasing issue severity. In contrast, if residents are already ideologically inclined to be concerned with a given policy issue, an increase in severity will only increase their concern, and therefore the incentives of elected officials to respond. In short, this argument suggests that issue severity will matter, but the impact will depend on whether the policy issue is one that residents are ideologically inclined to focus on. Switzer (2020) tested the theory in the context of water policy, finding that water scarcity increased government conservation efforts, but this only had a strong impact in liberal communities. In conservative communities, water scarcity had no significant impact on conservation policy.

This contextual responsiveness argument is perhaps even more applicable to climate change, which is more ideologically divisive than water policy (Egan et al., 2022). It is reasonable to expect that residents of coastal governments or governments facing increasing threats from drought would be especially concerned about climate change. These communities are more likely to face large consequences from climate change than inland communities with abundant water, or at the very least the threat of climate change is more obvious. If residents of these communities are more liberal, their perception of the risk is likely even greater. Liberal individuals are far more likely to be concerned with the rising threat of climate change more generally (Egan & Mullin, 2017). If you combine the ideological predisposition of residents with a greater level of object risk, elected officials are going to face a strong incentive to take policy action. On the other hand, conservatives are far less likely to be concerned with climate change or even acknowledge its existence (Egan & Mullin, 2017). Even when living in a higher risk area, their attention will likely focus on other policy problems. All of this suggests that it is important to consider the important role that context plays when evaluating the influence of issue severity on local climate policy. This leads to the hypothesis to be evaluated in this paper:

> The positive effect of issue severity on local government climate policy will be conditional on resident ideology. It will be higher in communities with liberal residents than communities with conservative residents.

DATA

In order to apply the contextual theory of local government responsiveness to the empirical case of climate change, we use data from a number of different sources. The primary data source we use to examine local government climate action is the 2015 International City/County Management Association (ICMA) Local Government Sustainability Practices Survey. The survey was sent to 8.562 local governments, with 1899 local governments responding

TABLE 1 Climate policies adopted by local governments

Which of the following sustainability actions has your government undertaken?	Percent of governments
1. Adopted a climate mitigation plan	9.82
2. Adopted a climate adaptation plan	5.31
3. Conducted a greenhouse gas inventory of local government operations	21.59
4. Conducted a greenhouse gas inventory of the community	14.67
5. Set greenhouse gas reduction targets for local government operations	16.97
6. Set greenhouse gas reduction targets for the community	11.09

(22.2% response rate). We drew ideology data from Tausanovitch and Warshaw's American Ideology Project (Tausanovitch & Warshaw, 2014). Tausanovitch and Warshaw assembled ideology data for all counties in the United States, as well as all municipalities with populations greater than 20,000. Our dataset was limited to those governments with ideology data available, resulting in a final sample of 859 local governments. Our data on issue severity was drawn from the Census Tiger/Line Dataset, the United States Drought Monitor, and NOAA's Storm Events Database. Demographic data were obtained from the American Community Survey 2015 5-year estimates.

We follow Hughes et al. (2018) in using a combination of multiple government policies to capture a local government's commitment to climate action, rather than using any single measure. Specifically, the ICMA Sustainability Practices Survey contained a series of six questions related to potential climate change actions that the local government could have taken. These are: adopting a climate mitigation plan, adopting a climate adaptation plan, conducting a greenhouse gas inventory of local government operations, conducting a greenhouse gas inventory of the community, setting greenhouse gas reduction targets for local government operations, and setting greenhouse gas reduction targets for the community. Table 1 displays the questions and the percentage of governments in our sample that adopted each of the policies. The six items achieve a Cronbach's alpha of .89, suggesting a high degree of scale reliability.[1]

Again, following Hughes et al. (2018), we quantify climate policy response on a 0–1 scale. For example, if a local government adopted three of the six climate policies, they would have a Climate Policy Score of 0.5. The average climate policy score for the local governments included in this analysis is .132, meaning on average a local government adopted a little less than one of the six possible policies. Descriptive statistics for this and all other variables in the analysis can be seen in Table 2. Figure 1 shows the local governments included in the analysis and their calculated climate score. Figure 1a shows the county governments included in the analysis, while Figure 1b shows the municipal governments included in the analysis.[2]

In order to measure ideological preferences, we use Tausanovitch and Warshaw's (2014) measure of local citizen policy conservatism. Tausanovitch and Warshaw (2014) used a series of seven large-N surveys in the United States that asked a number of policy questions across various policy areas. They used multilevel regression and poststratification to develop a measure of policy conservatism for every county in the United States as well as every municipality with more than 20,000 residents. This allows us to properly match level of government with ideology, as we are able to use the municipal ideology data for the municipalities in the analysis and the county ideology data for the counties included in the analysis.[3] The variable ranges from −.82 for the local government with the most liberal residents in Evanston, IL to .80 for the local government with the most conservative residents in Daviess County, MO.

TABLE 2 Descriptive statistics

	Percentage	Mean	Stand dev	Min	Max
Binary variables					
Coastal location	39.607				
County government	48.730				
Continuous variables					
Climate score		0.132	0.267	0.000	1000
Policy conservatism		0.081	0.288	−0.821	0.797
Drought score		0.844	0.520	0.050	2511
Severe weather events		17.933	28.936	0.000	140.000
% w/bachelor's degree		15.737	7314	1400	49.300
Median household income (1000s)		54.134	19.564	17.764	183.125
% Below poverty		17.022	20.211	0.000	84.700
% Black		17.579	13.253	0.500	84.600
% Hispanic		14.214	17.084	0.000	95.500
Logged population		10.749	1270	6463	16.100

FIGURE 1 Counties and cities with climate score. (a) Counties. (b) Cities

We argue that the ideology of residents served by a local government should moderate the impact of the severity of the issue of climate change on policy. We measure issue severity using three different variables. First, we use the coastal status of a local government, a very common measure in studies of local government climate policy. Not surprisingly, the literature has consistently found that cities closer to coastlines are more likely to take climate change seriously. One of the largest projected impacts of climate change is the rapid level of sea level rise. Sea level rise would have a larger impact on coastal communities, increasing their urgency to act. Specifically, we created a dummy variable that is coded as 1 if the local government is within 50 miles of a coastline and 0 if it is not.[4] We expect that coastal governments should be more likely to adopt climate policies generally, but that this effect will be largest for cities with more liberal residents.

The second variable we use is a measure of drought severity. One of the major impacts of climate change on local governments is the impact on water availability. Nowhere is this clearer than in the state of California, which has experienced record droughts over the past decade (Griffin & Anchukaitis, 2014). We suggest that local governments that have experienced higher levels of drought should find the issue of climate change more salient than those that have not. We use data from the United States Drought Monitor (USDM) to measure the severity of drought for a given local government. The USDM gives weekly drought scores for every county in the United States. They score the level of drought on a 6-point scale. The USDM also includes the percentage of each county experiencing each level of drought. The lowest level is no drought. This means that the region is not experiencing any abnormal conditions with respect to drought. D0 indicates that the region is abnormally dry, D1 indicates a moderate drought, D2 indicates a severe drought, D3 indicates an extreme drought, and D4 indicates an exceptional drought. Following Zhang et al. (2021), we convert the USDM data into a drought score variable. For each week, we calculate a drought score based on the level of drought in a county. No drought is given a 0, D0 is given a 1, and so on, until D4, which receives a value of 5. If the county has different scores in a given week for different parts of the county, we weight the value based on the percentage of the county in each category. For example, if a county has 50% of its area in D3 and 50% in D4, it would receive a score of 4.5 for that week. We then aggregate the weekly scores for the ten-year period between 2005 and 2014. The average drought score for this period is .84. The max drought score was 2.51, experienced by Frio, TX.[5]

The final issue severity variable we use is a measure of extreme storm events. One of the major projected influences of climate change is an increase in extreme weather events. It is our expectation that cities that have experienced more of these events should have a higher level of concern about the future of climate change, and therefore be more likely to take climate action, conditional on the ideology of residents. NOAA maintains a dataset of extreme storm events in the United States. We looked at the years 2005–2014. We identified a count of the number of storms in each county in the United States that had at least one injury or death over the ten-year period. A number of cities in Cook County, IL shared the highest number of storms causing injury or death with 140.[6]

We also included a number of control variables in the analysis. First, we identified whether the local government was a county or a municipality. It is possible that counties and cities respond differently to climate incentives. We included a dummy variable coded 1 if the local government is a county and 0 if it is a municipal government. And 48% of the governments included in the analysis are county governments.

Drawing from the 2015 ACS, we also included a number of demographic variables. We obtained measures of socioeconomic status, including the percentage of residents below the poverty line, the median household income of the residents, and the percentage with a bachelor's degree. Additionally, we included controls for race and ethnicity, including percentage Black and percentage Hispanic. Finally, the survey included a population size variable. We included logged population in the models.

MODELS

In order to test our hypotheses about the relationships between resident ideology, issue severity, and local climate action, we estimate a series of OLS models. First, we estimate a model without interactions to show the non-interactive estimated impact of ideology and issue severity, consistent with how the literature has treated the variables to this point. We then use two different types of interactive models to estimate whether issue severity is conditional on resident ideology. The first set of these are linear interactive models where each of the severity variables is interacted with the measure of resident ideology.

Recent work has shown that linear interactive models may lead to biased estimates of conditional effects. This is because they assume that the marginal effect of the variable included in the interaction changes at a linear rate across the value of the moderating variable (Hainmueller et al., 2019). This may not be the case. For example, a linear interaction model applied to the data described above assumes that the effect of issue severity will change linearly across values of resident ideology. It suggests that the change in the marginal effect of issue severity moving from one standard deviation below mean ideology to mean ideology will be the same as moving from mean ideology to one standard deviation above mean ideology. It is possible, however, that it is liberal ideology as compared to mean ideology that matters more for climate action, rather than conservative ideology. Binning estimators allow for this assumption of linearity to be relaxed and estimate unbiased marginal effects for each variable across low, medium, and high values of the moderating variable. Finally, all models included in the paper contain standard errors clustered at the state level.

RESULTS

Table 3 contains the regression results for the non-interactive models and the linear interaction models.[7] Model 1 shows the results of the model with no interactions, Model 2 shows the results of a model containing the interaction between ideology and the coastal dummy variable, Model 3 contains the model with the interaction between ideology and drought score, Model 4 contains the results of the model with the interaction between ideology and storm events, and Model 5 contains all of the interactions.

The non-interactive relationships displayed in Model 1 show how previous studies of local climate policy would have treated these variables. The results are mostly consistent with the expectations from the literature. First, local governments serving residents with more conservative ideologies are less likely to pursue climate policy, while governments serving liberal residents are more likely. This result is expected given the large number of studies showing that more democratic and liberal leaning residents is associated with more local climate action. A two standard deviation decrease in policy conservatism, which can be interpreted as a two standard deviation increase in liberalism, is associated with about a .1 increase in the predicted climate score for a given local government, all else equal.

The results for issue severity, while generally in line with expectations, are not quite as clear-cut. Both the coastal variable and drought score variable have effects in the correct direction, with the coastal dummy just significant at the .05 level and drought score not quite significant. Coastal proximity is associated with a .076 higher climate score, while a one unit increase in

TABLE 3 Hierarchical linear models predicting water rate progressivity

	Model 1: No interactions		Model 2: Coastal		Model 3: Drought		Model 4: Weather events		Model 5: All interactions	
	Coefficient	*p*-Value	Coefficient	*p*-Value	Coefficient	*p*-Value	Coefficient	*p*-Value	Coefficient	*p*-Value
City Policy Conservatism	−0.350 (0.097)	.001	−0.199 (0.071)	.007	−0.185 (0.069)	.010	−0.314 (0.097)	.002	0.012 (0.069)	.860
Coastal Location	0.076 (0.038)	.049	0.089 (0.038)	.023	0.078 (0.037)	.041	0.077 (0.038)	.052	0.091 (0.037)	.017
Drought Score	0.095 (0.048)	.051	0.087 (0.041)	.040	0.111 (0.052)	.037	0.096 (0.047)	.047	0.104 (0.041)	.015
Severe Weather Events	−0.000 (0.000)	.665	−0.000 (0.000)	.784	−0.000 (0.000)	.807	−0.000 (0.000)	.131	−0.000 (0.000)	.236
Coast × Policy conservatism			−0.327 (0.085)	<.001					−0.328 (0.073)	<.001
Drought × Policy conservatism					−0.182 (0.124)	.149			−0.193 (0.084)	.026
Weather × Policy conservatism							−0.002 (0.001)	.097	−0.002 (0.001)	.015
County	0.048 (0.057)	.402	0.052 (0.057)	.363	0.053 (0.056)	.343	.033 (0.058)	.565	0.042 (0.056)	.448
% Below poverty	−0.000 (0.002)	.993	0.000 (0.002)	.842	0.000 (0.002)	.981	0.000 (0.002)	.898	0.001 (0.002)	.699
Median income	0.000 (0.000)	.926	0.000 (0.000)	.944	−0.000 (0.000)	.987	0.000 (0.000)	.801	0.000 (0.000)	.897
% Bachelor's	0.003 (0.002)	.245	0.003 (0.002)	.193	0.003 (0.002)	.123	0.002 (0.002)	.298	0.003 (0.002)	.122

TABLE 3 (Continued)

	Model 1: No interactions		Model 2: Coastal		Model 3: Drought		Model 4: Weather events		Model 5: All interactions	
	Coefficient	*p*-Value	Coefficient	*p*-Value	Coefficient	*p*-Value	Coefficient	*p*-Value	Coefficient	*p*-Value
% Black	−0.001	.677	−0.001	.646	−0.000	.817	−0.001	.641	−0.000	.773
	(0.002)		(0.001)		(0.001)		(0.001)		(0.001)	
% Hispanic	−0.001	.149	−0.001	.206	−0.001	.094	−0.001	.119	−0.001	.090
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Logged population	0.025	.001	0.028	<.001	0.021	.003	.027	<.001	0.026	<.001
	(0.007)		(0.006)		(0.007)		(0.007)		(0.006)	
Constant	−0.270	.020	−0.334	.006	−0.245	.027	−0.295	.011	−0.333	.003
	(0.112)		(0.116)		(0.107)		(0.112)		(0.104)	
Observations	859		859		859		859		859	
R^2	.320		.346		.330		.323		.358	

Note: Standard errors in parentheses. Standard errors clustered by state.

drought score (about two standard deviations), equivalent to being on average one point higher on the USDM scale over the ten-year period, is associated with a .095 increase in climate score. Interestingly, significant weather events do not have a significant impact and the coefficient is not even in the correct direction. Overall, there is perhaps some evidence that issue severity matters, but the results are not as clear as they are for ideology.

The relatively weak results for the effect of issue severity on climate policy should not be wholly surprising given our theoretical expectations. Indeed, our hypothesis suggests that the effect of issue severity should matter more when residents have a more liberal ideology. This could potentially explain the results of the non-interactive model. If the severity measures are having less of an impact in conservative areas, the model could be overestimating the impact in those areas and underestimating it in liberal areas. If the impact of issue severity is conditional on resident ideology, then such a non-interactive model is not appropriate.

Models 2–5, the linear interactive models, and the binning estimator models attempt to account for this by interacting policy conservatism with our different measures of severity. It is easier to interpret the results of both the linear interaction models and the binning estimators graphically. Figures 2–4 show the marginal effects of the different severity measures, with the dashed lines representing the marginal effects from the linear interaction models and the solid lines and dots representing the effects from the binning estimators.[8]

The dashed lines in Figure 2 show the marginal effect of the coastal dummy variable from Model 2 as well as 95% confidence intervals. The interaction is significant in both Models 2 and 5, and the marginal effects are consistent with the expectations posed in our Hypothesis. At low levels of policy conservatism, meaning in areas where residents are more liberal, the effect of the coastal dummy is significant and positive. As policy conservatism increases, however, the effect of being in proximity to the coast decreases. The models show that being coastal matters for local governments, but only when residents are liberal.

As mentioned, however, linear interaction models make an assumption that the marginal effect changes linearly across values of the moderating variable (Hainmueller et al., 2019). The binning estimator allows us to test whether this assumption holds. If it does not, the estimation may be biased. A standard *F*-test of the equivalence of the binning estimator and linear interac-

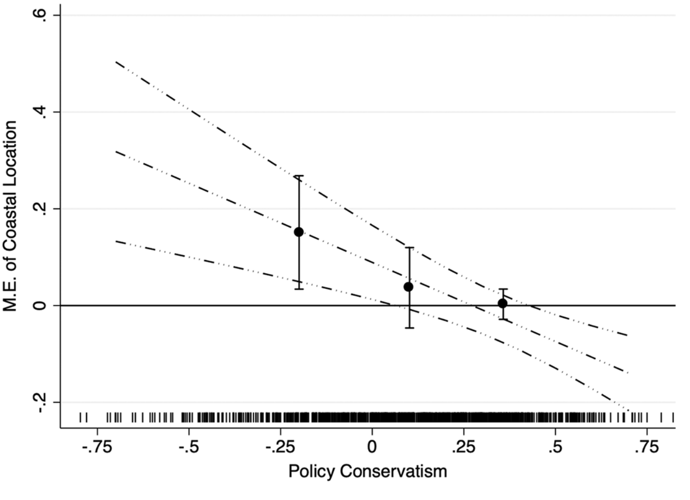

FIGURE 2 Marginal effect of coastal location on climate score.

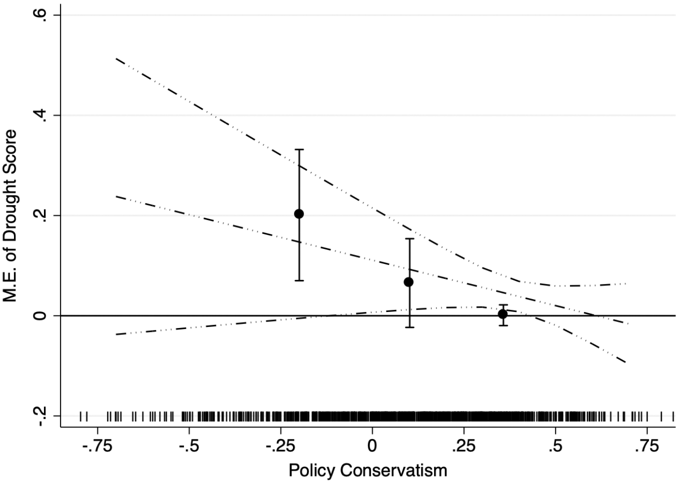

FIGURE 3 Marginal effect of drought score on climate score

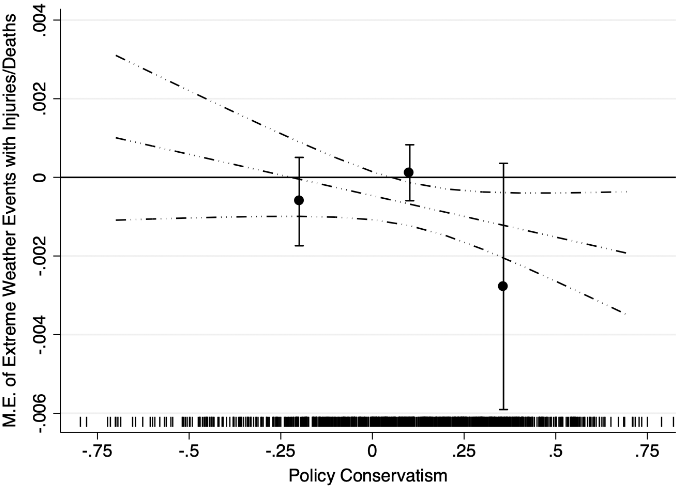

FIGURE 4 Marginal effect of weather events on climate score

tion model rejected the null of equivalence ($F = 4.61$, $p < .001$), suggesting that the linear interaction model is biased in its assumption of linear changes in marginal effects. This means that binning estimator is the more appropriate model for evaluating the interaction.

The solid lines and dots in Figure 2 show the results of the binning estimator. The binning estimator contains three evaluation points in three bins, representing the lowest tercile, middle tercile, and highest tercile of the moderating variable, in this case policy conservatism. The results are largely consistent with the linear interaction model and our Hypothesis. The effect of the coastal dummy on climate policy is only positive and significant in the lowest tercile, but not significant in either the middle or highest terciles. This means that when residents have a strong liberal ideology, coastal proximity increases climate policy effort, but when residents are more moderate or more conservative, coastal status does not impact climate policy. In addition to being significant and positive, F-tests show that the difference between the marginal effect in the lowest bin of policy conservatism is statistically distinguishable from the effect in the middle bin

($F = 6.95$, $p = .011$) and highest bin ($F = 7.53$, $p = .009$), but the two higher bins are not statistically distinguishable from each other ($F = 0.84$, $p = .364$).

Figure 3 shows the marginal effect of drought score across values of policy conservatism, representing the marginal effects in Model 3 and the binning estimators. Once again, the dashed lines represent the marginal effects from the linear interaction model, while the solid lines represent the marginal effects from the binning estimator. The linear interaction model shows some support for the hypothesized relationship. Although not significant in Model 3, the interaction is significant at conventional levels in Model 5. Additionally, the effect is generally in the expected direction, with a positive effect for drought score at lower levels of policy conservatism and the effect becoming smaller at higher levels of conservatism. Once again, however, an F-test was able to reject the null of equivalence between the linear interaction model and the binning estimator model ($F = 10.46$, $p < .001$). This means that the estimates are biased and the binning estimator is more appropriate.

The results from the binning estimator, shown in the solid lines in Figure 3, are consistent with expectations. In the lowest bin, where residents are the most liberal, the impact of drought score is positive and significant. In the middle and highest tercile, however, where residents are more moderate or conservative, the effect is not statistically significant at conventional levels. This means that being in an area prone to drought does indeed impact local government climate policy, but crucially this effect is only significant in more liberal communities. Again, the marginal effect in the lowest tercile is statistically distinguishable from the marginal effect in the middle tercile ($F = 13.03$, $p = .001$) and highest tercile ($F = 9.46$, $p = .004$), but the effects in the middle and high terciles are not statistically distinguishable from each other ($F = 2.21$, $p = .143$).

Finally, we turn to the marginal effect of severe weather events, displayed in Figure 4. The linear interaction models have some evidence for the significance of the interaction (significant at .10 in Model 4 and .05 in Model 5), but the effects are not consistent with expectations. The marginal effect of extreme weather is only statistically significant in more conservative communities, but the effect is negative. This means that in more conservative localities, increasing severe weather events is associated with fewer climate policies, while there is no statistical association between severe weather events and climate policy in liberal communities. Once again, however, the linear interaction model may not be appropriate, as the F-test rejects the null of equivalence with the binning estimator ($F = 3.33$, $p = .004$). The binning estimator results do not show statistical significance for weather events in any of the three bins, and none of the marginal effects are statistically distinguishable from each other.

DISCUSSION

The models above are largely consistent with expectations. Consistent with prior literature, we see significant effects of both ideology and issue severity. However, the results of Model 1 in the analyses are not especially convincing with respect to the non-interactive effects of coastal proximity and drought. While the effects of the coastal dummy and drought score variable are in the expected direction, meaning drier governments nearer to coasts are expected to have more aggressive climate policy, the effects are right on the edge of statistical significance, and are not especially large.

The inferences drawn from the interactive models that include the potential moderating impact of resident ideology on the effect of issue severity, however, show why it is crucial to consider the contextual theory of government responsiveness. The results of the binning models are quite different from those from the non-interactive Model 1 with respect to the statistical effects of the coastal dummy and drought score variable. The non-interactive model assumed that the effect of being a coastal city would be the same regardless of the ideology of residents being served. It suggested that the effect of the coastal dummy was a 0.076 increase in climate score, or about the equivalent of adding half an additional climate policy. On the other hand, the binning estimator suggested that the effect is much stronger for governments serving a more liberal population, and statistically indistinguishable from zero for those serving moderate or conservative populations. In the lowest tercile of conservatism, where residents are most liberal, the marginal effect of the coastal dummy is .151 ($p = .013$), about double the non-interactive effect size, and equivalent to almost a whole additional climate policy being added. For governments in liberal areas, the effect of being on a coast is essentially double what a model not considering conditionality would have predicted, while the effect for governments with moderate or conservative residents is not statistically distinguishable from 0.

The change in inference is also large when comparing the effect of drought score across the different types of models. The non-interactive model suggested a positive, but not quite statistically significant, impact drought on the adoption of climate policy by local governments. In the non-interactive Model 1, a one unit increase in drought score was associated with a .095 increase in climate score. Again, this appears to be an underestimate for governments serving liberal residents and an overestimate for governments serving moderate and conservative residents. The binning estimator predicts that a one unit increase in drought score for governments residents in the lowest tercile of ideology would be associated with a .201 ($p = .003$) increase in climate score, equivalent to increasing by over one climate policy, and over double the effect size from the non-interactive mode. For governments serving moderate and conservative populations, however, the predicted effect from the non-interactive model would be an overestimate, as the binning estimator showed that drought score is not significantly associated with climate policy adoption.

The generally insignificant results for weather events also bear some mention here. While coastal proximity and drought had the impact expected, experience of extreme weather events did not. It is perhaps the case that weather events differ in terms of their impact on the saliency of climate change. A hurricane may greatly influence how people and the governments that represent them think about climate policy, but a heavy thunderstorm or snowstorm may not. Indeed, the largest number of extreme weather events were areas prone to large snowstorms. It may be useful to tease out these effects in future research.

Overall, however, these results show the importance of considering the potential conditional relationships that exist when it comes to the adoption of climate policy by local governments. It is not so simple to say that higher levels of issue severity, such as proximity to a coastline or increased drought risk, will unilaterally lead governments to adopt climate policies. Rather, the relationship between risk and climate policy may be a more nuanced and complex one. The public opinion literature on motivated reasoning has long recognized this nuance. Ideology shapes the way individuals interpret reality (Fischle, 2000; Hartman & Newmark, 2012; Lebo & Cassino, 2007; Taber et al., 2009). Ideological worldviews provide a lens through which people filter the facts they experience. Objective risk, like that of climate change to a coastal or dry community, may only be perceived as a call for action if it aligns with a community's ideological predispositions.

CONCLUSION

The results presented here generally support the proposed hypothesis that the effect of issue severity on local government climate policy adoption would be conditional on resident ideology. We found strong support for our hypothesis when investigating the impact of coastal location and drought on climate policy adoption. Issue severity, matters, but only in certain contexts. We believe this to be a significant contribution to the literature on local climate policy in the United States. A great deal of the literature on local climate policy to this point has focused on ideology and issue severity variables. To our knowledge, this is the first paper to explore a potential interactive relationship between them. While our study only explores this interactive relationship in the ICMA Sustainability Survey, we hope that future research on local government climate policy in the United States considers the conditional relationship outlined here.

Despite the optimism for our research, all research, including this study, is limited in certain ways. First, as always when using cross-sectional observational data, we cannot be certain that the effects in the analyses are the result of the theoretical expectations and not some other unobserved variables. While we believe our empirical approach to be robust and consistent with the existing literature, there may be ways to explore the conditional relationship between ideology and issue severity using quasi-experimental methods that better allow for isolation of the theorized relationships. Additionally, the ICMA survey was done in 2015. Climate change is an ever-evolving policy area. While a 7-year-old survey of governments would not be unusually old in most areas of policy, a lot has changed over the past 7 years. Finally, the response rate of 22.2% does raise some concerns. It would be useful to apply the theory to data collected directly from cities, rather than a survey that may be subject to low response rates. It may We hope that scholars, not excluding ourselves, consider applying contextual responsiveness theory to other climate actions. One other element to potentially consider is the difference visible signaling of climate policies, which is likely occurring here, and what Rasmussen et al. (2017) call “adaptation by stealth.” It is possible that when ideological barriers exist to public acceptance of climate action, policymakers who nonetheless wish to pursue climate activity may couch climate information into broader sustainability issues (Rasmussen et al., 2017). It would be interesting to investigate how “stealthy” adaptation activities change the dynamics observed here.

Climate change is the defining problem of the 21st century. Understanding how governments respond to it is a crucial question for scholars to explore. In the United States, where federal action has been limited, this means growing our understanding subnational policies. The large and robust literature on local government climate policy action in the United States has provided deep insights into why local governments take the lead. Our paper builds on this excellent literature by suggesting we consider the relationship between resident ideology and issue severity as a central factor.

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ENDNOTES

[1] We also ran the analyses with the items disaggregated. The results of these analyses can be seen in the Appendix. The results are consistent across all six items, suggesting that there is little gained from considering the items separately.

[2] Alaska and Hawaii are not included in Figure 1, but combined have six governments included in the dataset.

[3] It is possible that using ideology data from two separate datasets, despite being from the same general methodology and the same scholars, may influence the results. The appendix contains a number of different ways of including the measures of ideology. We use county ideology for all local governments, we run the analysis with just municipalities, and we run the analysis with just counties. All the supplementary analyses are consistent with the analyses here.

[4] The appendix contains an analysis that contains a different coastal proximity variable. Rather than a measure that creates a dichotomous variable, we include a measure of logged distance from the coast. Results are consistent with those presented here.

[5] In addition to an aggregate drought score, in the appendix we also run the analysis with the number of weeks a given locality experienced an extreme drought (D3) or higher. Results are consistent with those displayed in the paper.

[6] In the appendix we include a model that uses the total cost of weather events over this time period rather than the number causing injury or death. Results are consistent with those included in the paper.

[7] Full binning estimator models can be found in the statistical appendix.

[8] These figures show the results of Models 2–4. Marginal effects plots from Model 5 can be seen in the statistical appendix. They are consistent with the results found here.

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APPENDIX: STATISTICAL APPENDIX

Binning estimator models

The binning estimator models used to produce Figures 1–3 can be seen in Tables A1–A3. The marginal effect at each evaluation point is the coefficient on the interaction between the issue severity variable and the "lowest/middle/highest" Bin. These are displayed in the figures in the paper.

TABLE A1 Binning estimator with coastal

	Coef.	Std. err.	*p*-Value
Lowest Conservative Bin	0.126	0.049	.014
Coastal#Lowest Bin	0.151	0.058	.013
ConsDiffFromEvalPoint#LowestBin	−0.298	0.178	.102
DiffFromEvalPoint#LowestBin#Coastal	−0.215	0.192	.270
Middle Conservative Bin	0.020	0.018	.257
Coastal#Middle Bin	0.037	0.041	.379
ConsDiffFromEvalPoint#MiddleBin	−0.116	0.162	.479
DiffFromEvalPoint#MiddleBin#Coastal	−0.505	0.283	.081
Coastal#Highest Bin	0.003	0.016	.857

(Continues)

TABLE A1 (Continued)

	Coef.	Std. err.	*p*-Value
ConsDiffFromEvalPoint#HighestBin	−0.091	0.054	.097
DiffFromEvalPoint#HighestBin#Coastal	0.111	0.157	.483
County	0.027	0.058	.649
Drought score	0.085	0.042	.047
Severe weather	0.000	0.000	.581
% Poverty	0.000	0.002	.924
Median income	0.000	0.000	.918
% Bachelor's	0.002	0.002	.302
% Black	−0.001	0.001	.515
% Hispanic	−0.001	0.001	.168
Logged population	0.031	0.006	.000
Constant	−0.392	0.112	.001
Observations		859	

TABLE A2 Binning estimator with drought score

	Coef.	Std. err.	*p*-Value
Lowest Conservative Bin	0.030	0.042	.480
Drought#Lowest Bin	0.201	0.065	.003
ConsDiffFromEvalPoint#LowestBin	−0.600	0.165	.001
DiffFromEvalPoint#LowestBin#Drought	0.181	0.205	.383
Middle Conservative Bin	−0.035	0.033	.303
Drought#Middle Bin	0.065	0.044	.145
ConsDiffFromEvalPoint#MiddleBin	0.018	0.220	.935
DiffFromEvalPoint#MiddleBin#Drought	−0.403	0.277	.152
Drought#Highest Bin	0.001	0.010	.921
ConsDiffFromEvalPoint#HighestBin	−0.124	0.077	.111
DiffFromEvalPoint#HighestBin#Drought	0.130	0.070	.069
County	−0.001	0.058	.992
Coastal	0.079	0.036	.034
Severe weather	0.000	0.000	.635
% Poverty	0.000	0.002	.809
Median income	0.000	0.000	.856
% Bachelor's	0.002	0.002	.371
% Black	−0.001	0.001	.562
% Hispanic	−0.001	0.001	.017
Logged population	0.024	0.005	.000
Constant	−0.232	0.086	.009
Observations		859	

TABLE A3 Binning estimator with weather events

	Coef.	Std. err.	*p*-Value
Lowest Conservative Bin	0.184	0.054	.001
Weather#Lowest Bin	−0.001	0.001	.276
ConsDiffFromEvalPoint#LowestBin	−0.425	0.135	.003
DiffFromEvalPoint#LowestBin#Weather	−0.001	0.001	.281
Middle Conservative Bin	−0.005	0.022	.826
Weather#Middle Bin	0.000	0.000	.742
ConsDiffFromEvalPoint#MiddleBin	−0.084	0.160	.602
DiffFromEvalPoint#MiddleBin#Weather	−0.011	0.005	.035
Weather#Highest Bin	−0.003	0.002	.081
ConsDiffFromEvalPoint#HighestBin	0.029	0.062	.641
DiffFromEvalPoint#HighestBin#Weather	−0.012	0.006	.060
County	−0.001	0.061	.983
Drought score	0.088	0.045	.055
Coastal	0.070	0.036	.061
% Poverty	−0.001	0.002	.738
Median income	0.000	0.000	.752
% Bachelor's	0.002	0.002	.478
% Black	−0.001	0.002	.502
% Hispanic	−0.001	0.001	.125
Logged population	0.031	0.006	.000
Constant	−0.370	0.106	.001
Observations		859	

Marginal effects plots from Model 5

Figures A1–A3 show the marginal effect plots produced from Model 5 in the paper. As can be seen, they do not differ substantially from the plots developed from Models 2–4.

Logged distance from coast

Figure A4 contains the results of a model that uses the logged distance from the coast rather than the dichotomous dummy variable for a coastal location. As can be seen, the results do not substantially differ.

Weeks in extreme drought

Figure A5 shows the results of models including the number of weeks in extreme drought (D3 or higher) instead of the aggregate drought score. The results do not substantially differ.

Total cost from storm events

Figure A6 includes the total cost from storm events instead of the number of storm events that caused injury or death. The results are consistent with those from the manuscript.

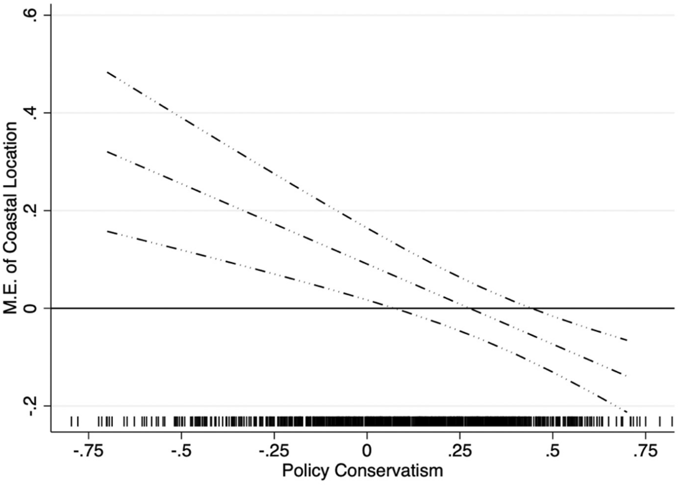

FIGURE A1 Marginal effect of coastal location—from Model 5

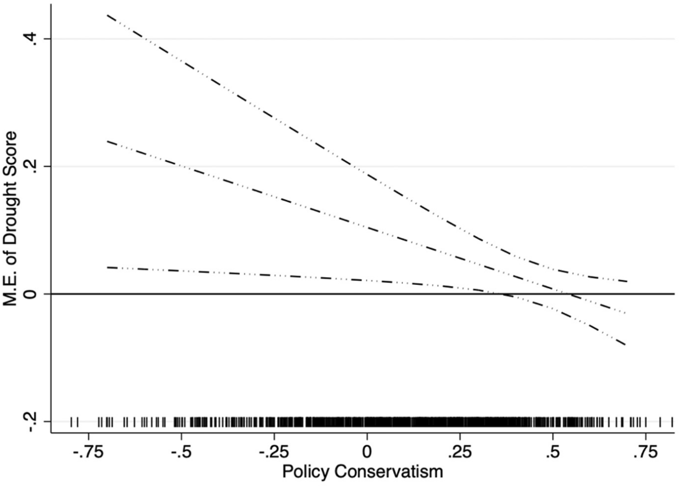

FIGURE A2 Marginal effect of drought score—from Model 5

All governments with county level ideology

Figures A7–A9 show the results of models that use county level ideology for all the local governments included in the analysis. The results are largely consistent with those in the manuscript.

Only counties

Figures A10–A12 show the results of models that only include counties in the analysis. Again, the results are largely consistent with those in the manuscript.

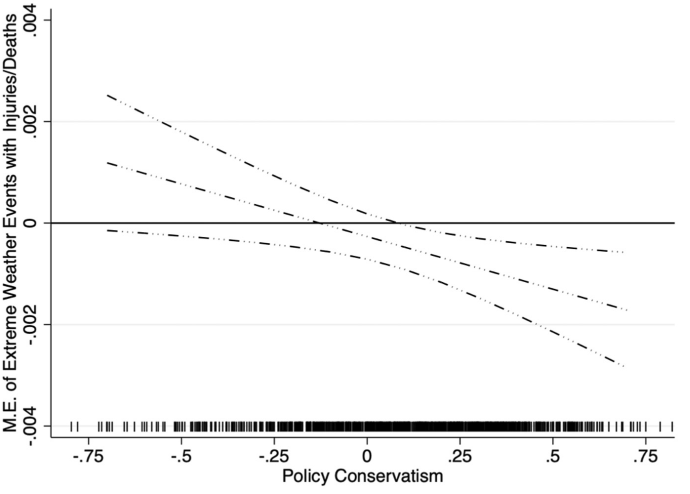

FIGURE A3 Marginal effect of weather events—from Model 5

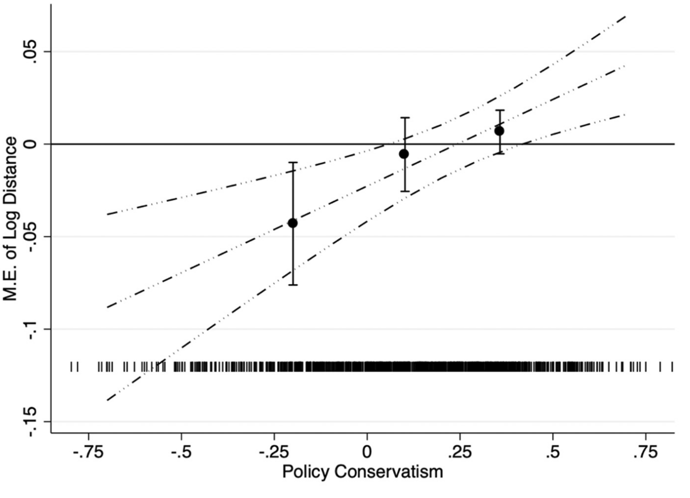

FIGURE A4 Marginal effect of logged distance from the coast

Only municipalities

Figures A13–A15 show the results of models that only include municipalities in the analysis. Again, the results are largely consistent with those in the manuscript.

Disaggregated measures of climate policy

Figures A16–A18 show the results of models that disaggregate the six climate items included in the analysis. The results are consistent with the results included in the manuscript. A16 shows the results for the coastal variable, A17 shows the results for the drought variable, and A18 shows the results for the weather variable.

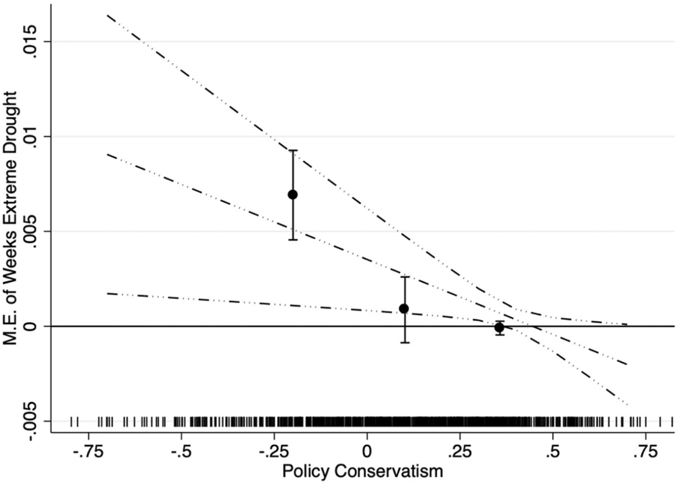

FIGURE A5 Marginal effect of weeks of extreme drought

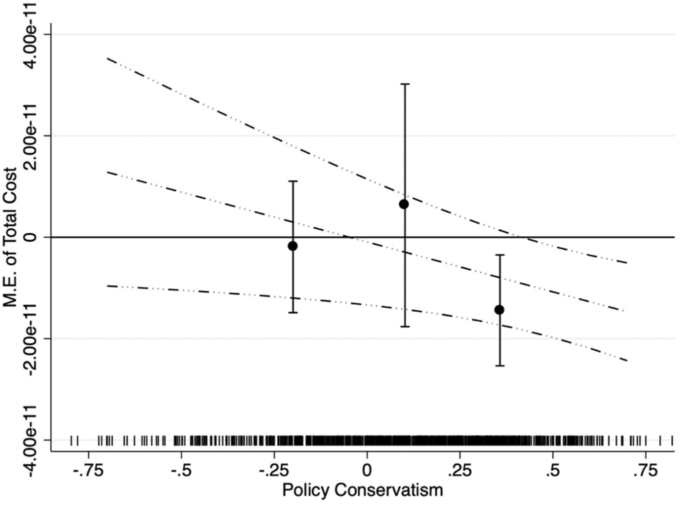

FIGURE A6 Marginal effect of cost of weather events

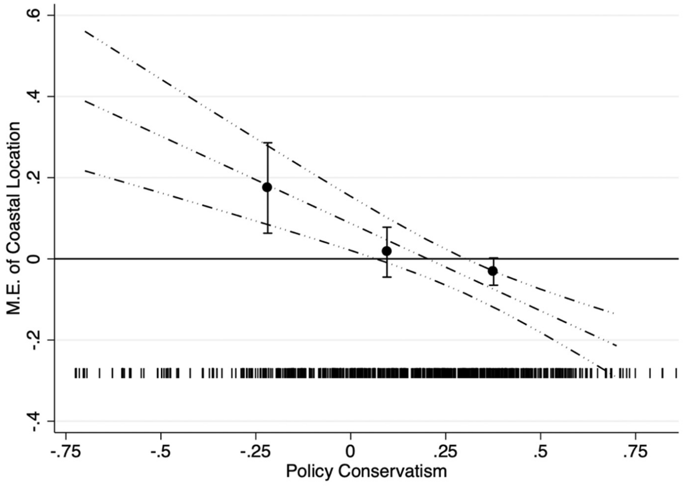

FIGURE A7 Marginal effect of coastal location—county ideology

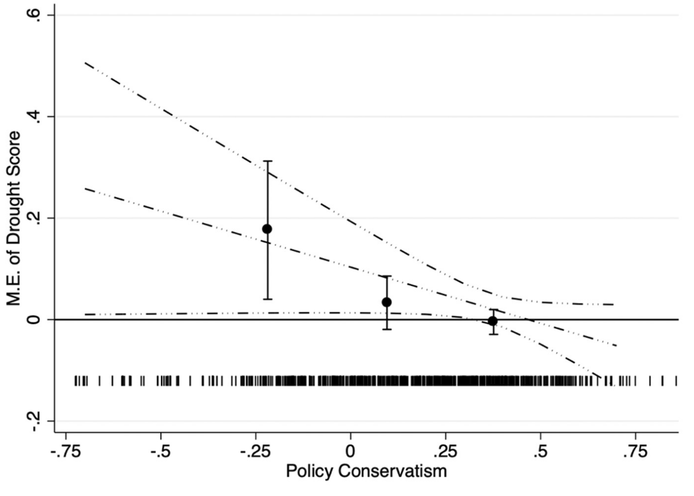

FIGURE A8 Marginal effect of drought score—county ideology

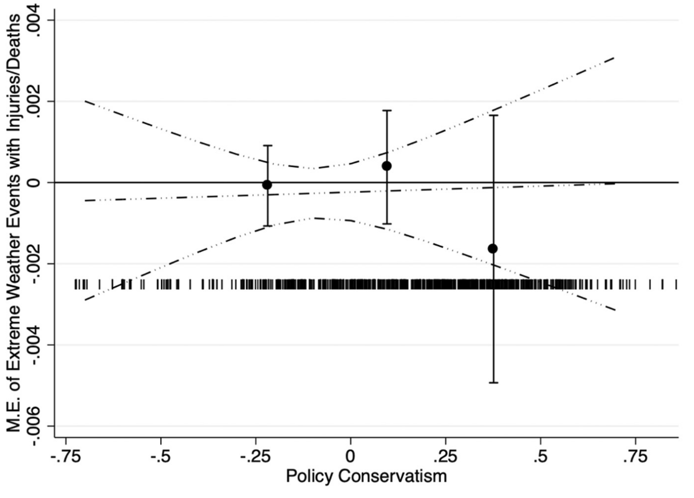

FIGURE A9 Marginal effect of weather events—county ideology

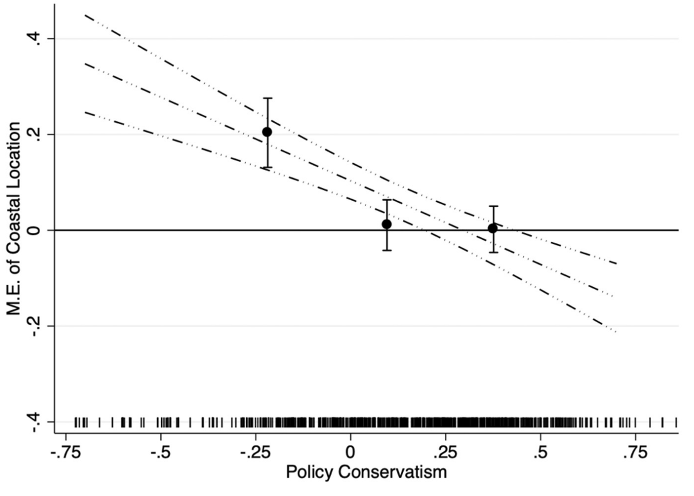

FIGURE A10 Marginal effect of coastal location—only counties

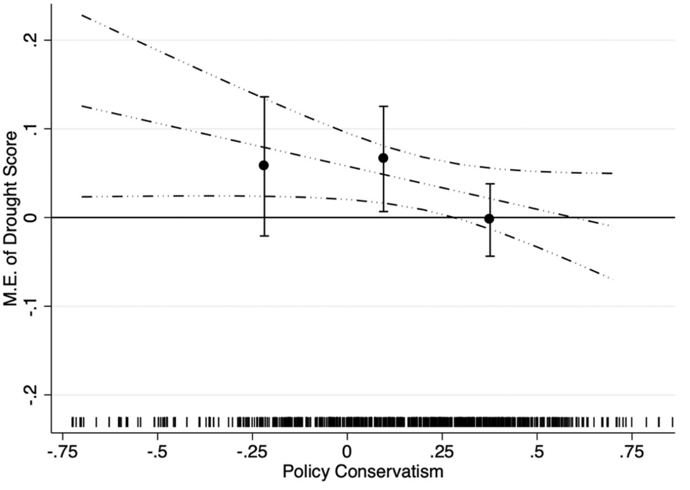

FIGURE A11 Marginal effect of drought score—only counties

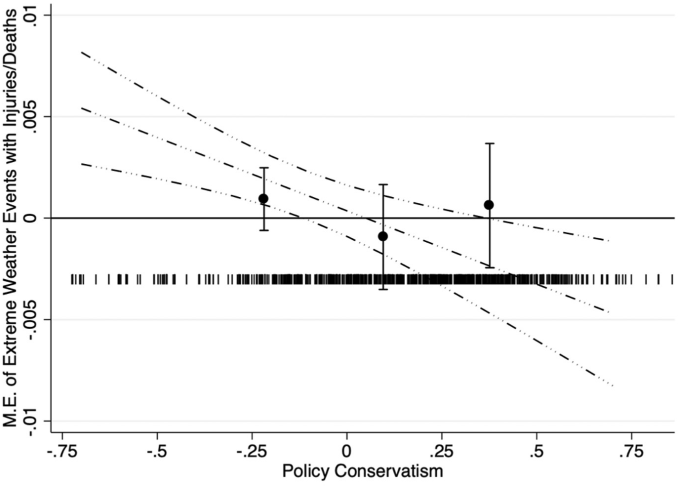

FIGURE A12 Marginal effect of weather events—only counties

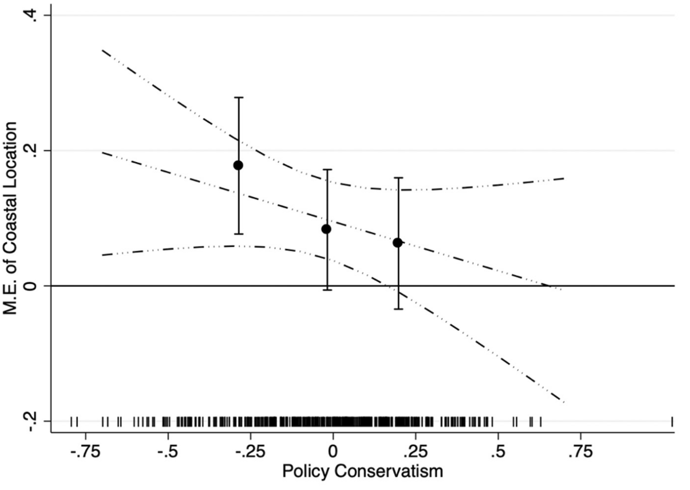

FIGURE A13 Marginal effect of coastal location—only cities

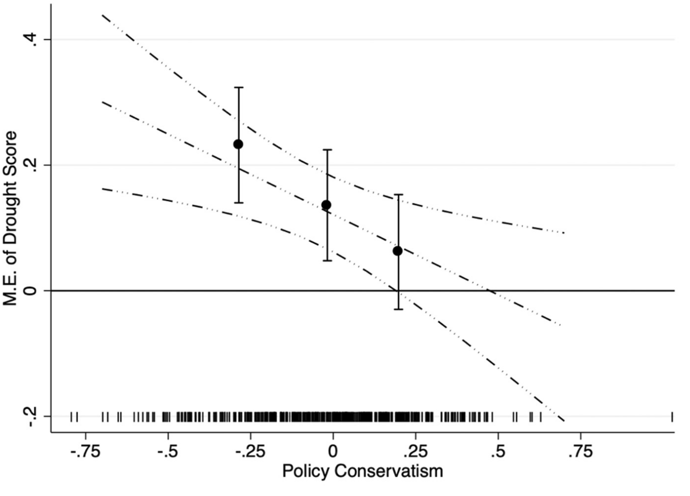

FIGURE A14 Marginal effect of drought score—only cities

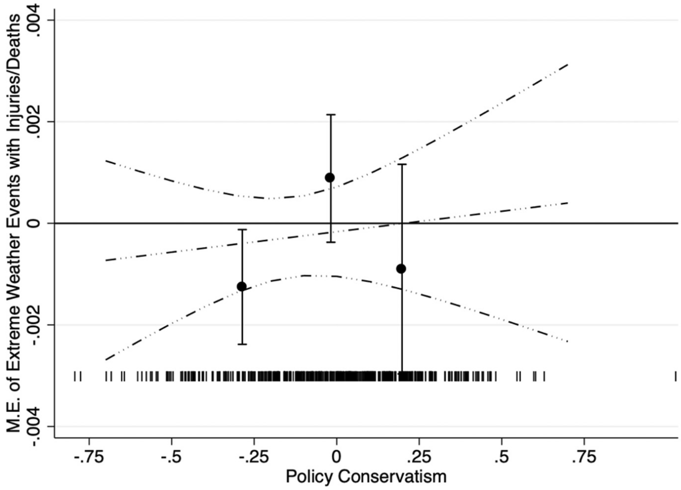

FIGURE A15 Marginal effect of weather events—only cities

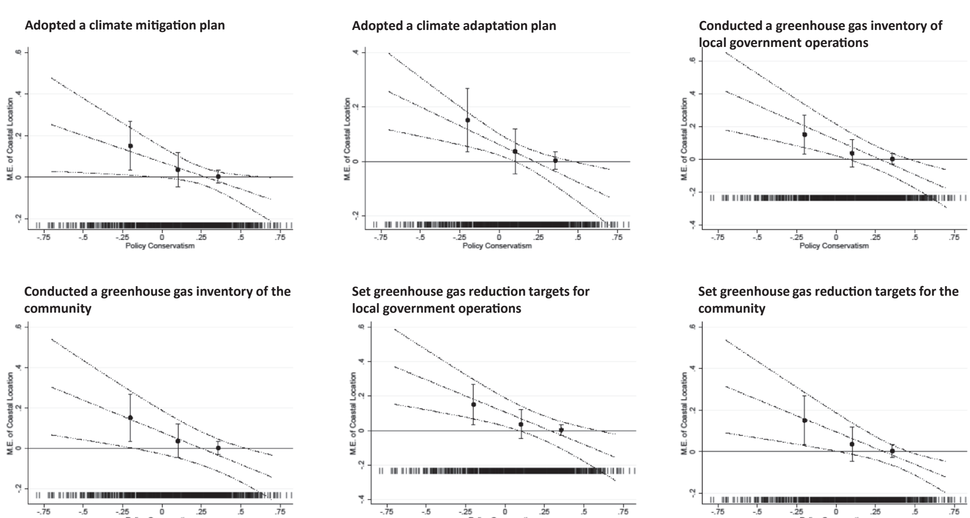

FIGURE A16 Marginal effect of coastal location—disaggregated DV

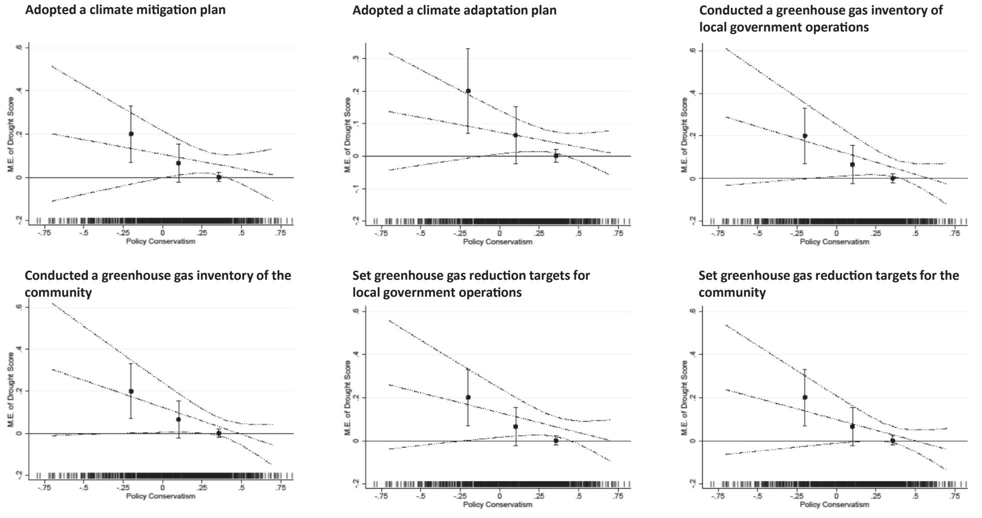

FIGURE A17 Marginal effect of drought score—disaggregated DV

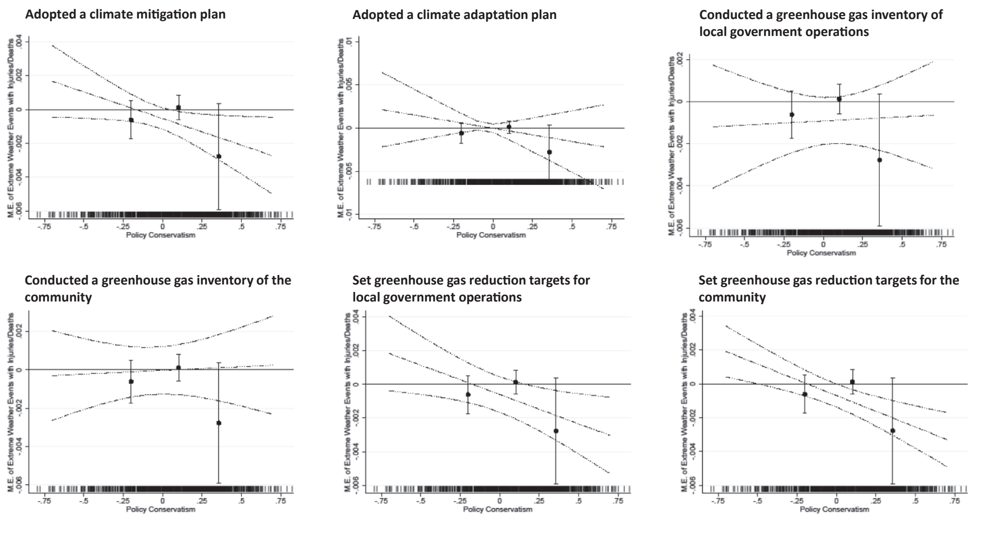

FIGURE A18 Marginal effect of weather events—disaggregated DV