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Non-state climate governance, corporate leadership, and governance performance: evidence from the US electric utility sector

Yuhao Ba

Lee Kuan Yew School of Public Policy, National University of Singapore, Singapore 259772, Singapore

E-mail: yba@nus.edu.sg

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Abstract

COP26 highlighted near-term emissions reductions in addition to longer-term net-zero. At the same time, shifts in political landscapes around the world have furthered the salience of climate action led by non-state actors such as business interests, civil society and nonprofits, and local and regional communities. Despite the promise, performance of non-state climate action remains unclear and requires further empirical validation. The current study focuses on corporate entities and explores the potential effect of corporate leadership on climate governance (CG) performance. Our aim is to advance the literature on non-state CG by offering empirical evidence of the less-studied effectiveness of non-state CG leadership. Echoing previous research, our study identifies a contingent perspective on the effect of corporate leadership on CG performance. Specifically, through the context of utilities' energy efficiency programming in the U.S. and a multilevel research design, we find suggestive evidence that when the moderating effect of citizens' support is considered, corporate leadership could potentially positively affect CG performance. Additionally, we demonstrate that a CG system's operational uncertainty can complicate the effect of corporate leadership on performance whereas a pro-environmental citizenry can enhance such effect.

1. Introduction

Climate governance (CG) denotes the system of institutional mechanisms such as rules, norms, and organizations to manage environmental externalities such as greenhouse gas emissions in order to confront climate change and enhance sustainability (Lemos and Agrawal 2006, Ostrom 2009b, Gilligan and Vandenbergh 2020). CG efforts conducted by non-state actors including businesses, civil society, and local and regional communities have become a central element of global and national responses to the changing climate (Gilligan and Vandenbergh 2020, Hsu *et al* 2020, Hale *et al* 2021). Some normative and/or theoretical appeal of non-state CG arrangements include lowered government expenditures on conventional regulatory mechanisms, limited room for externalities associated with bureaucratic agency, enhanced representativeness and inclusiveness of different stakeholders, and improved learning and resource management (Lemos and Agrawal 2006, Rosenberg 2017, Hsueh 2020).

Recent dynamics in political landscapes around the globe have furthered the salience of non-state CG actions (Kahler 2018). This is particularly so in the U.S. due to policy changes triggered by the Trump Administration that have reduced government leadership (Dallas and Waring 2017). While effects of such movements are still taking shape and the Biden Administration has made attempts to reverse many of its predecessor's policy actions (Bomberg 2021), calls for non-state leadership to fill the voids left have gained further momentum (see Avant *et al* 2017, Beauchamp *et al* 2020, Ba 2022). We join this conservation by examining performance of non-state CG leadership and argue that it is an essential step towards systemizing knowledge on non-state CG and a prerequisite for its application in practice.

Specifically, we focus on corporations given the size of their environmental footprints and their potential in delivering CG solutions (van der Ven *et al* 2016, Gilligan and Vandenbergh 2020).

Questions however remain as to the motivations for corporate CG involvement in the first place. First, corporations' beyond-compliance CG action can serve as club goods by delivering nonrival but possibly excludable reputational benefits (Potoski and Prakash 2005). For instance, a price premium of environmentally desirable products to increase businesses' competitiveness against rivals (Arora and Gangopadhyay 1995). Second, corporations' beyond-compliance CG action can be a political strategy to preempt more stringent government regulations (Lyon and Maxwell 2008, Malhotra *et al* 2019), although its effectiveness is dependent on corporations' economic conditions (Reinhardt 1999) and internal factors (Prakash 2001). Lastly, while less focused in the literature, altruistic corporate CG action does exist (Lyon and Maxwell 2008) and is subject to firms' strategic rationales (Fry *et al* 1982) and contextual dynamics (Huang and Watson 2015, Ba 2021).

Corporate CG leadership has been examined by scholars from various disciplines (Light and Orts 2015, Mol 2016, Gilligan and Vandenbergh 2020, Ba 2022). While proponents view corporate CG leadership as a remedy for the voids left by the retrenching state leadership (see e.g. Lyon and Maxwell 2011, Judge-Lord *et al* 2020), critics concern that enhanced corporate governance involvement might aggravate democratic deficit and inequality (Liverman 2004, Lemos and Agrawal 2006). Additionally, current scholarship on corporate CG involvement and leadership lacks empirical evidence regarding its effect on CG outcomes (Hsueh 2020). The lack of evidence arises, at least partially, from the complex, multifaceted, and context-dependent nature of CG arrangements (Newig and Fritsch 2009, Ostrom 2009a, Minx 2017, Hsueh 2019). Research on implementation outcomes is also complicated by the broad purview that performance assessment entails (Newig and Fritsch 2009, Hsu and Zomer 2014).

Factors theoretically derived to shape non-state CG performance include: leadership, structure, stringency, feedback, uncertainty, social support, and contextual variables such as local economy and political competition (see Hsueh 2013, Howlett *et al* 2015, Berardo and Lubell 2016, Heikkila 2017, Dasgupta and De Cian 2018, Yi 2018, Hsu *et al* 2020, Judge-Lord *et al* 2020, Neuner 2020, Hale *et al* 2021). Among these, some have been empirically tested but with mixed results (see Newig *et al* 2018). For instance, depending on the target level of an CG solution (e.g. individual vs. community), social support is found to have different effects on environmental outcomes (e.g. no effect vs. positive effect; Ramos *et al* 2016). A more suitable way of understanding non-state CG performance is that, performance is not granted, but rather dependent on a series of contributing factors (see Irvin and Stansbury 2004, Newig *et al* 2018).

Our study explores whether and to what extent corporate leadership affects an CG system's performance using the context of electric utility energy efficiency (EE) programming in the U.S. Our aim is to advance the current literature on non-state CG by shifting attention from adoption and legitimacy of non-state CG arrangements to their effectiveness and performance and offering empirical evidence. Our results point to a contingent perspective on the effect of corporate CG leadership. When the moderating effect of citizens' support is considered, corporate leadership is shown to potentially positively affect CG performance. Additionally, our results indicate that a system's operational uncertainty can complicate the effect of corporate leadership whereas a pro-environmental citizenry can enhance such effect.

2. Empirical context & hypotheses

Utilities' EE programming provides a useful setting for our study (Baldwin 2019). EE programming refers to programs delivered to downsize energy use and associated negative environmental externalities (Gillingham *et al* 2009). In the U.S., EE programming is primarily delivered at the state level. On the supply side, EE programming relies on collaboration between state governments and utilities. Within governments, state energy offices are responsible for EE policymaking whereas public utility commissions for regulatory oversight (Shih *et al* 2016). Utilities represent the most common administers of EE programs (U.S. DOE 2013), holding great influence over state EE policymaking given 'the economies of scale of their supply, their capability of and expertise on grid management, their access to customer energy demand information, and the advantage of utilizing existing billing infrastructures' (Shih *et al* 2016, p 24). On the demand side, customers across all sectors (i.e. residential, commercial, industrial, and transportation) are targeted by EE programs to alter their energy consumption and lower their energy bills.

2.1. Corporate leadership and CG performance

The literature on non-state governance has posited the potential of corporate leadership to enhance CG performance (Cashore 2002, Bartley 2007, Hsueh 2013, Hale 2016, Hsu *et al* 2020). The rationale lies in corporations' institutional adaptability, fiscal advantage and market control, and information and technological advantages due to their front-line role in many CG governance systems (e.g. service production and distribution; Lyon and Maxwell 2004, Kraft and Kamieniecki 2007, Vidovic and Khanna 2007). Additionally, corporate-led governance solutions such as self-regulation and voluntarism are considered more cost-efficient than conventional command-and-control approaches due to lightened

burdens on regulators for monitoring and enforcement (Hsueh 2020).

In the context of EE programming, we argue that corporate leadership can positively affect CG performance. As noted, utilities play a pivotal role in state-level EE programming (Baldwin 2019). Among them, investor-owned utilities (IOUs), which are private enterprises, serve 72% of U.S. electricity needs (U.S. Energy Information Administration (EIA) 2019) and are of great potential to add to CG performance. While it seems that IOUs' pursuit of EE would conflict with their interest since their profitability is dependent on energy sale, policy reforms such as revenue decoupling and performance incentives have mitigated their disincentives. The potential of corporate leadership also comes from governance deficit caused by an increasingly constrained government leadership (Mol 2016, Ba 2022). This is particularly so since policy changes during the Trump administration undermined the resilience of existing CG solutions and furthered non-state actors' CG ambitions. For instance, the administration's 2019 attempt to soften light bulb efficiency standards was challenged by a series of non-state actors, including 37 major IOUs, and ended up in failure (ACEEE 2019). We thus hypothesize:

Hypothesis 1: All else being equal, corporate CG leadership can positively affect CG performance in utilities' EE programming in the U.S.

2.2. Uncertainty & citizens' issue position

Uncertainty denotes a lack of information due to the high costs associated with information collection (Herian *et al* 2012) and to bounded rationality at all levels of decision-making (Jones 1999). Uncertainty is a defining characteristic of governance systems and has been considered an important moderating factor of governance performance (see Duit and Galaz 2008, Berardo and Lubell 2016, Nair 2020). Governance theory contends that, at different levels of uncertainty, systems cope differently and the impact of structural and leadership characteristics (e.g. state- vs. non-state-centric) on performance varies accordingly (Duit and Galaz 2008). This is because uncertainty can affect the information flows within a system and between a system and its environment (Pierre and Peters 2005). Uncertainty also affects a system's internal controls given that interactions among system components change at different levels of uncertainty (Duit and Galaz 2008). Both information flows and internal controls are key to governance leadership.

Depending on the context, uncertainty takes various forms (e.g. strategic uncertainty, environmental uncertainty, and operational uncertainty; Moynihan 2008, Packard *et al* 2017). We focus on operational uncertainty and its potential moderating effect. Operational uncertainty refers to the unknown/unpredictable factors that may change during the operation of a system (Mikaelian *et al* 2007). In EE programming, operational uncertainty is critical to governance leadership and can stem from both the demand side (e.g. swings in weather conditions) and the supply side (e.g. in-house operating expertise and energy data analytical skills; Greene 2011, Soroudi and Amraee 2013, Maiorano 2018, Datta 2019). Specifically, at high levels of operational uncertainty, in addition to the aforementioned potential dysfunction of information flows and internal controls, from a behavioral perspective, utilities' loss aversion due to the cost of promoting EE programs might weaken the effect of leadership on performance, whereas at low levels of uncertainty such effect strengthens (Greene 2011). Accordingly, we hypothesize:

Hypothesis 2: All else being equal, operational uncertainty moderates the relationship between corporate leadership and CG performance in utilities' EE programming.

Public opinion studies suggest the potential of citizens' issue position in moderating the effect of governance leadership on performance (Dasgupta and De Cian 2018, Neuner 2020). Citizens' issue position denotes the collection of attitudes and beliefs that citizens take on a particular issue. Unlike issue salience, which refers to the extent to which the public cognitively and behaviorally engages with an issue (Moniz and Wlezien 2020), issue position entails a more stable and less visible set of views held by citizens (Rohrschneider and Whitefield 2008). From a management perspective, citizens are clients of governance solutions (Vigoda 2002) and their opinions can affect the types of solutions the leadership would employ (e.g. mandates vs. incentives) and by extension the system's performance (Burstein 2003). From a policy implementation perspective in which citizens are considered policy targets, their issue positions are likewise important since successful implementation requires the alignment between the goals of the leadership and the positions of its targets (Sabatier and Mazmanian 1980).

In EE programming, the moderating effect of citizens' issue position becomes more salient due to a third role of citizens as utilities' customers. Specifically, those whose issue positions are in favor of environmental sustainability are more likely to participate in EE programming (e.g. buying EE appliances; Ramos *et al* 2016). Regarding citizens' client role, citizens with different issue positions present varied levels of support for CG solutions (Rhodes *et al* 2015). In EE programming, however, scholars also acknowledge the existence of 'not-in-my-back-yard' bias—difference between general support and resistance to self-involvement (Wüstenhagen *et al* 2007). This further complicates the effect of leadership on CG performance. Lastly, about citizens' target role, information and communication strategies (e.g. EE advising

and social media) can help utilities better align citizens with different issue positions with utilities' goals (Moreno-Munoz *et al* 2016). Accordingly, we hypothesize:

Hypothesis 3: All else being equal, citizens' issue position moderates the relationship between corporate leadership and CG performance in utilities' EE programming.

3. Research design

3.1. Variables, measurement, and data

3.1.1. Dependent variable

We operationalize environmental performance at the utility level (Baldwin 2019) using two key aspects of EE programming: energy savings and peak demand reduction, which represent implementation outcomes in passive and active EE, respectively. Passive EE involves attempts to alter customers' long-term demand whereas active EE are for short-term changes (Palensky and Dietrich 2011). Specifically, we use data envelopment analysis (DEA) to account for both inputs and outputs of EE programming to provide a more comprehensive performance measure. A DEA efficiency score thus can be thought of as a type of EE productivity index. The two output variables are total incremental annual energy savings (in megawatt hours) and total incremental annual peak demand savings (in megawatts), and the two input variables are total annual cost on customer incentives (in thousand dollars) and total annual all other costs (in thousand dollars). More details of the dependent variables can be found in online appendix.

3.1.2. Independent variable

Instead of taking a binary approach (corporate-led/non-corporate-led), inspired by the limited statehood literature (see Lee *et al* 2014), we adopt an indirect negative proxy of corporate CG leadership by focusing on changes in government leadership in the electric utility sector. Specifically, the difference between the annual percent change in governments' environmental spending and the annual percent change in state governments' total expenditures is utilized to operationalize corporate CG leadership. The rationale lies in the argument that corporate entities step into CG due to the projected and/or perceived retrenchment of government leadership. That is, corporate CG involvement can be considered as a response to the downsizing government CG leadership. Importantly, it is worth noting that our indirect negative proxy of corporate CG leadership is contextually dependent since utilities and government agencies represent the two major players in utilities' EE programming. In contexts where there are multiple types of non-state actors, other measures of corporate CG leadership should be devised. In our study, corporate CG leadership of state_s in year_t can be constructed as follows

$$\text{Corporate CG Leadership}_{st} = \frac{\text{State Environmental Spending}_{st}}{\text{State Environmental Spending}_{st-1}} - \frac{\text{State Total Expenditures}_{st}}{\text{State Total Expenditures}_{st-1}}.$$

3.1.3. Moderating and control variables

We construct two moderating variables: operational uncertainty and citizens' issue position. About operational uncertainty, adverse weather conditions have been a major threat to utilities' operation due to their impact on electricity demand and damage on transmission and distribution facilities (see Delmas *et al* 2007, Panteli and Mancarella 2015). Building on Craig and Feng (2017), we use the three year moving average of abnormal heating degree days (HDDs) at the state level to measure operational uncertainty. HDD reflects the energy demand for heating. As for citizens' issue position, following Delmas *et al* (2007), we employ the national environmental scores developed by the League of Conservation Voters as a proxy of citizens' views on environmental issues. The scores range from 0 to 100 and represent the percentages of each state's pro-environment votes at the congress (House and Senate). Lastly, following previous research (e.g. Delmas *et al* 2007, van Laerhoven 2014, Rhodes *et al* 2015, Dunlap *et al* 2016, Ramos *et al* 2016, Vatn 2018, Baldwin 2019, Wei 2020), we also include several controls variables. Details of the moderating and control variables are in online appendix. Measurements, descriptive statistics, and data sources are in table 1.

3.2. Empirical models and sample

This study examines the performance of corporate CG leadership using observational data at both state and utility levels and across multiple time periods. A multilevel modeling design is utilized to account for variation in this nested governance structure (Baldwin 2019). Compared to classical regression, multilevel modeling improves in aspects such as prediction, data reduction, and causal inference, but to varying degrees (Gelman 2006). In general, multilevel models can be an alternative to model causal relationships with hierarchical heterogeneities when randomized experimental data are not available (Subramanian 2004, Hsiao 2007). A multilevel model thus fits the purpose of this research. Our basic model without the two moderators is specified as follows:

$$P_{ist} = \alpha_0 + \alpha_1 L_{st} + \alpha_2 G_{st} + \alpha_3 U_{it} + \theta_s + \delta_t + \varepsilon_{ist},$$

where P_{ist} represents environmental performance of utility_i in state_s and year_t, L represents state-level corporate CG leadership; G represents a vector of state-level control variables; U represents a vector of utility-level characteristics. Additionally, α_0 is

Table 1. Variables, measurements, descriptive statistics, and data sources.

Variable	Measurement	Mean	S.D.	Min	Max	Data Source
State Level						
Variables of interest						
Corporate CG leadership (negative proxy)	Annual % growth in Environmental Spending − Annual % growth in Total Expenditure (State + Local; 2019 dollars)	−2.53	5.99	−18.99	21.33	a
Operational uncertainty	Three year moving average of abnormal Heating Degree Days	−478.59	276.30	−1200.67	126.33	b
Citizens' issue position	% of congressional pro-environmental votes (House + Senate)	46.81	28.91	0	100	c
EE policy implementation						
State EE policy implementation	Composite index covering financial incentives, lead-by-example, and R&D programs	3.81	1.20	0.5	5.5	d
Governance decentralization						
Number of special-districts governments	Number of special-districts governments per million population (County + Subcounty)	123.65	119.09	17.78	752.79	e
Political competition						
Divided government	State Partisan Composition (Legis. + Gov.)	0.31	0.46	0	1	f
Basic controls						
Population size	Population size (log)	15.93	0.92	13.64	17.49	g
Government Size	Number of government full-time employment per thousand population	45.37	5.75	33.27	60.27	h
Per capita income	Per capita income in real 2019 thousand dollars	52.12	8.34	37.15	77.87	i
Utility Level						
Variables of interest						
Utility CG performance	DEA efficiency score (*100)	−1.77	7.33	−23.54	28.13	j
Basic controls						
Utility size	Summer + Winter Peak Demand (Megawatts; log)	8.64	1.26	4.14	10.86	j
Market condition	% of revenues from retail sales	75.03	20.59	0	103.10	j

Note: a = the U.S. Census Annual Survey of State and Local Government Finances; b = NOAA National Centers for Environmental Information; c = League of Conservation Voters (LCV); d = ACEEE State Energy Efficiency Scorecards; e = the U.S. Census of Governments: Organization; f = National Conference of State Legislatures; g = the U.S. Census State Population Totals: 2010–2019; h = the U.S. Census Annual Survey of Public Employment & Payroll; i = the U.S. Bureau of Economic Analysis Personal Income by State; j = EIA Form 861.

the intercept, α_1, α_2, α_3 represent respective parameters to be estimated. θ_s and δ_t represent state- and year- specific effects, respectively. ε_{ist} represents the disturbance term. Computationally, informed by Andrews *et al* (2006), we approach this multilevel model with a series of three-way fixed effects regressions given the three levels of variation in our data: across utilities, across states, and over time. Compared to conventional panel data methods in which only two levels of variation are in place (e.g. agencies and time), this approach addresses additional variation caused by a third level in data, which is normally a level higher than the cross-sectional units. All independent variables are lagged by one year to eliminate possible simultaneity bias. The final sample consists of observations from 71 IOUs in 33 states from 2013 to 2018 ($n = 426$).

4. Results

Table 2 presents the results of our multi-level regressions. Model 1 is parsimonious without accounting for any moderating effects. In this model, a negative

Table 2. Regression results.

Variables	Model 1	Model 2	Model 3
Variables of interest			
Corporate CG leadership (negative proxy)	−0.119	−0.477	−0.789*
	(0.219)	(0.554)	(0.450)
Operational uncertainty	−0.012**	−0.013**	−0.013**
	(0.006)	(0.006)	(0.006)
Citizens' issue position	0.623***	0.610***	0.618***
	(0.195)	(0.196)	(0.195)
Corporate CG leadership × Operational uncertainty		−0.001	
		(0.001)	
Corporate CG leadership × Citizens' issue position			0.013*
			(0.008)
EE policy implementation			
State EE policy implementation	3.117	3.418	3.511
	(2.619)	(2.656)	(2.622)
Governance decentralization			
Number of special-districts governments	−0.059	−0.043	−0.126
	(0.183)	(0.185)	(0.187)
Political competition			
Divided government	−2.120	−2.016	−1.499
	(3.813)	(3.818)	(3.819)
State level control variables			
Population size	202.523	206.952*	198.618
	(123.911)	(124.164)	(123.577)
Government size	5.652***	5.498***	5.403***
	(1.991)	(2.004)	(1.990)
Per capita income	−0.481	−0.476	−0.498
	(0.759)	(0.760)	(0.757)
Utility level control variables			
Utility size	2.904	3.804	3.215
	(16.385)	(16.447)	(16.339)
Market condition	−0.049	−0.051	−0.075
	(0.240)	(0.240)	(0.240)
Constant	−3466.738	−3541.100	−3387.087
	(1980.453)	(1984.754)	(1975.332)
N	413	413	413

Note: Standard errors are in parentheses. ∗, ∗∗, and ∗∗∗ represent significance at the 10, 5, and 1% level, respectively.

yet statistically insignificant relationship is identified between our negative proxy of corporate CG leadership and utilities' CG performance. Hence, although the direction posited in our *Hypothesis 1* is supported (i.e. corporate CG leadership can positively affect CG performance), we lack enough evidence to conclude this effect is significant. Moving on to Models 2 and 3, the results show that when moderating effects are considered, the coefficients and levels of statistical significance of the relationship between corporate leadership and CG performance change. Specifically, in Model 3, when the moderating effect of citizens' issue position is incorporated, a negative and statistically significant estimate of the negative proxy of corporate CG leadership provides support for our *Hypothesis 1*. Together, based on the results of Models 1–3, we find consistent support for the positive direction of the effect of corporate leadership on CG performance. This effect, however, presents mixed statistical significance. Additionally, when the moderating effect of citizens' issue position is considered, we identity a statistically significant positive effect of corporate CG leadership on CG performance.

As for the moderating effects, in Model 2, although operational uncertainty is itself statistically significant, its interaction term with corporate CG leadership lacks statistical significance. We thus fail to provide enough evidence for its moderating effect. In Model 3, however, the statistically significant estimate of the interaction term between citizens' issue position and corporate CG leadership demonstrates support for its moderating effect on the relationship between corporate leadership and CG performance. As such, we find enough evidence in support of our *Hypothesis* 3 but not *Hypothesis* 2. To further comprehend the moderating effects of operational uncertainty and citizens' issue position, we move on to analyze the marginal effects of corporate leadership on utilities' CG performance while holding the values of our moderating variables at different levels.

Figure 1 presents the marginal effects of corporate leadership on CG performance while holding

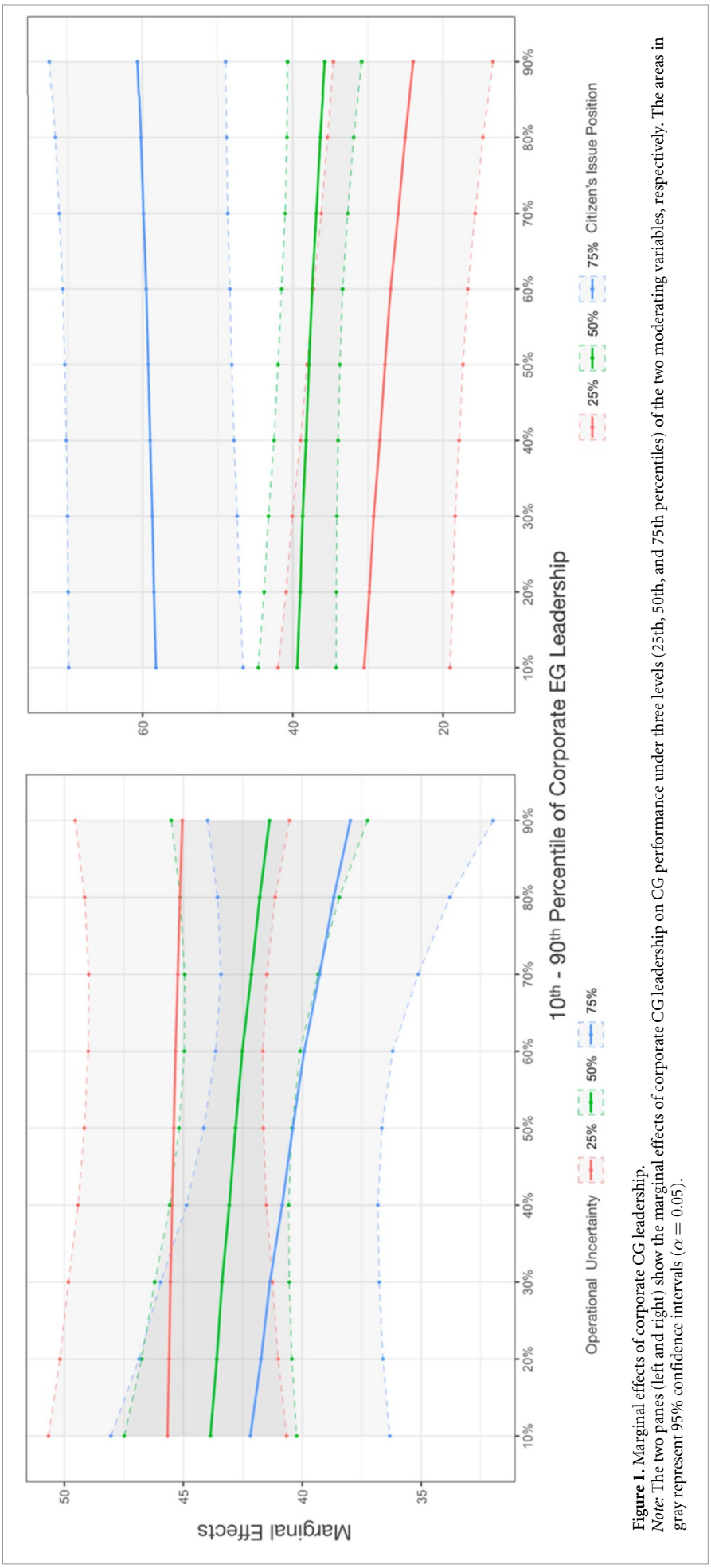

Figure 1. Marginal effects of corporate CG leadership.
Note: The two panes (left and right) show the marginal effects of corporate CG leadership on CG performance under three levels (25th, 50th, and 75th percentiles) of the two moderating variables, respectively. The areas in gray represent 95% confidence intervals ($\alpha = 0.05$).

operational uncertainty and citizens' issue position at their 25th, 50th, and 75th percentiles, respectively (left pane & right pane). The marginal effects of corporate leadership are calculated at its 10th to 90th percentiles to illustrate the effects of the two moderating variables. The statistically significant estimates of all the marginal effects provide further support for our *Hypotheses* 2 and 3. Specifically, in figure 1 (left pane), the marginal effect of corporate leadership on CG performance decreases in magnitude when operational uncertainty moves from its 25th to 75th percentile but increases when the same movement is made on citizens' issue position (see figure 1, right pane). This indicates that a system's operational uncertainty could take a toll on leadership and by extension complicate its effect on performance. Along this line, it is suggested that a pro-environmental citizenry can enhance the effect of corporate leadership on CG performance. Lastly, to check the robustness of our baseline regression results, following Lu and White (2014), we run several robustness checks including a Hausman test and two alternative regression specifications. These results are consistent with our main baseline regression results (see appendix).

5. Discussion and conclusion

Through the context of utilities' EE programming in the U.S., we examine the potential influence of corporate leadership on CG performance and the moderating effects of operational uncertainty and citizens' issue position. Our results suggest a contingent perspective on the effect of corporate CG leadership. When the moderating effect of citizens' support is considered, corporate leadership can potentially positively affect CG performance. Additionally, our results indicate that a system's operational uncertainty can complicate the effect of corporate leadership whereas a pro-environmental citizenry can enhance such effect. Our contribution is three-fold. First, our study represents one of the first attempts to empirically test the effect of non-state CG leadership. Additionally, our focus on corporate entities is innovative and timely given that they are less studied but of great potential to contribute to varied CG solutions. Second, our demonstration of the moderating effects of operational uncertainty and citizens' issue position contributes to a more systematic understanding of the effect of non-state leadership on CG performance. The findings are likewise informative for studies tackling performance of other forms of governance arrangements (e.g. collaborative and network). Lastly, our operationalization of the key variables by relying on techniques such as DEA and negative indirect proxies provide guidance for future studies aimed at measuring complex concepts such as CG leadership and involvement.

Our study likewise raises practical considerations for how policy makers and practitioners can better rely on non-state actors to enhance CG performance. In general, our study suggests that involving corporate entities in CG systems can be conducive to performance. This is particularly relevant given that governments at all levels are facing increasingly constrained public finances and abnormal exogenous crises such as the COVID-19 pandemic. In fact, researchers have already found evidence of how business- and community-led solutions have been a remedy to governance challenges induced by COVID-19 (Hudecheck *et al* 2020). While designing mechanisms of when and how to incorporate non-state actors, our study indicates that attention should be paid to moderating/conditioning factors such as uncertainty and citizens' support. Lastly, when evaluating performance, our study highlights the importance of considering both inputs and outputs for a more comprehensive measure.

Additionally, it is necessary to acknowledge some limitations. First, our study primarily focuses on corporate entities. Yet in practice, CG efforts of community and civil society actors are likewise critical to performance. We encourage future studies to incorporate efforts of other types of non-state actors and their impact on performance. Secondly, our context of EE programming is relatively unique given the influence held by utilities over EE programming. In cases where corporate involvement is less visible or influential, it might require extra effort to detect the effect of corporate CG leadership. Third, our indirect negative proxy of corporate CG leadership, albeit innovative and working in the context of our study, might not be able to cover the full spectrum of corporate leadership. Furthermore, in contexts where more than one type of non-state actors such as businesses and civil society organizations are influential in policymaking, our measure of corporate CG leadership might not be able to differentiate effects of these actors. Alternative contextually dependent/independent measures are encouraged to further our understanding of non-state CG involvement and leadership.

Moving forward, some potentially fruitful directions for future studies include a comparative analysis of performance of different forms of CG leadership and their potential synergistic and countervailing effects (see e.g. Malhotra *et al* 2019). For instance, a typology of non-state CG leadership is suggested to facilitate analyses across contexts. Moreover, in addition to the relationship between CG leadership and performance, pressing social issues such as equity, vulnerability, and sustainability transitions should be incorporated into the studies of non-state CG (see Olsson *et al* 2020, Ba and Galik 2022). For example, in the context of utilities' EE programming, questions such as the influence of non-state leadership on energy equity and affordability should be asked to further our understanding of the social impact of involving non-state CG. Lastly, at the micro level, it is worthwhile to explore perceived effectiveness

and barriers of non-state CG involvement by actors from across sectors. Experimental studies focusing on biases in policy makers' decision-making regarding involving non-state actors are likewise worthwhile exploring.

Data availability statement

The data that support the findings of this study are available upon reasonable request from the authors.

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