Strategic Management Journal
Strat. Mgmt. J. (2013)
Published online EarlyView in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/smj.2118
Received 2 March 2011; Final revision received 27 February 2013

STRATEGIC RATIONALE FOR RESPONDING TO EXTRA-JURISDICTIONAL REGULATION: EVIDENCE FROM FIRM ADOPTION OF RENEWABLE POWER IN THE US

ADAM R. FREMETH[1]* and J. MYLES SHAVER[2]
[1] *Richard Ivey School of Business, The University of Western Ontario, London, Ontario, Canada*
[2] *Carlson School of Management, University of Minnesota, Minneapolis, Minnesota, U.S.A.*

It is well documented that firms respond to regulations in their home jurisdictions. We present hypotheses that firms also respond to regulations in jurisdictions where they do not operate. We examine renewable-power provision in the U.S. electric utility sector between 2001 and 2006, and find that firms adopt more renewable-power generation when their peers (i.e., firms in the same regulatory jurisdiction) face greater renewable-power standards in other jurisdictions. The underlying mechanism is that forward-looking firms assess when extrajurisdictional regulations foreshadow regulatory changes where they operate. Our analyses support this mechanism versus plausible alternatives. We demonstrate firms acting strategically to respond to extrajurisdictional regulations and show that the central conduit motivating this response is the extrajurisdictional footprint of firms operating in the same jurisdiction as a focal firm.

INTRODUCTION

It is well documented that firms respond to and try to influence public policy and regulations (e.g., Bonardi, 2004; Delmas, Russo, and Montes-Sancho, 2007; Holburn and Zelner, 2010). Moreover, because many firms operate in multiple regulatory jurisdictions, the literature has also explored whether firms alter their regulatory responses from jurisdiction to jurisdiction and the performance implications of adapting or standardizing responses across jurisdictions (e.g., Christmann and Taylor, 2001; Dowell, Hart, and Yeung, 2000). We address a related, yet unexplored, question: Do firms choose to alter their actions in light of regulations in jurisdictions where they do not operate? Giving strategic relevance to this issue is the proliferation of regulations in many sectors (e.g., banking, energy, consumer products).

Choosing whether and how to respond to regulations in jurisdictions where a firm does not operate is an important strategic consideration for two important reasons. First, the empirical reality is that multiple jurisdictions exist in most regulatory arenas. For example, regulations can vary across municipalities, counties, states, and countries. Therefore, any firm that faces a regulation likely also observes regulation in jurisdictions where it does not operate. Second, firms can choose whether and how

Keywords: proactive strategy; extra-jurisdictional regulation; electric utility industry; environmental performance; general method of moments estimator
*Correspondence: Adam R. Fremeth, Richard Ivey School of Business The University of Western Ontario 1151 Richmond St. N. London, Ontario ON N6A 3K7, Canada. E-mail: afremeth@ivey.ca

they respond to regulations in jurisdictions where they do not operate. Thus, the nature of their response is an important choice. For example, firms can simply ignore regulations in jurisdictions in which they do not operate, or they can incorporate this information when choosing their actions.

We predict that firms respond to regulations in jurisdictions where they do not operate. Specifically, firms will respond to regulations both from other jurisdictions in which peer firms (i.e., firms in their jurisdiction) operate and from geographically neighboring jurisdictions. The underlying theoretical mechanism that drives our predictions is that forward-looking firms recognize that extrajurisdictional regulations can influence and thus foreshadow regulatory change where they operate. For instance, regulators' choices can be influenced by regulations in neighboring jurisdictions, and by how firms that they regulate behave in other jurisdictions. Realizing this, forward-looking firms anticipate how extrajurisdictional regulations might influence the regulations that they face and how their operations may be constrained in the future. In doing so, we recognize that both firms and regulators make choices.

Our empirical examination focuses on renewable energy use by investor-owned utilities (IOUs) in the United States between 2001 and 2006. The regulatory policy that we observe is the state-level Renewable Portfolio Standard (RPS), which mandates the use of renewable power by IOUs. These policies vary widely across states and, in some cases, vary within a state over time as regulators have chosen to intensify the demands on utility firms. This setting has the advantage of allowing us to test our theory within a context that exhibits institutional pressures that shape firm behavior (Scott, 1987). Furthermore, this context allows us to effectively control for the nature of market competition because the vast majority of the firms operate as monopolies, offering an undifferentiated product in retail markets. However, they compete in the market for public policy as "demanders" for policy change alongside consumer advocates, other utility firms, environmentalists, and activist groups when seeking approval for changes to rates, capital additions, and environmental policy from the "suppliers" of policy, which include public utility commissions and state or federal legislators. Furthermore, they compete in upstream markets for renewable-power sources, materials, and suppliers. Success in these latter two markets often distinguishes firms in this context, making this distinction significant for the purpose of our analysis.

Our theoretical arguments and empirical results demonstrate that firms choose to respond to regulations in jurisdictions where they do not operate. Of particular interest is the finding that peer firms are the conduit for this regulatory spillover. That is, firms respond to regulations in states where they do not operate but where their peers do. Therefore, in addition to furthering our understanding of how firms are shaped by institutions in their response to regulation, we document a novel way in which peers shape a firm's actions as they compete for favorable policy environments and better position themselves vis-à-vis likely policy developments.

The next section develops our hypotheses. We then discuss the sample, describe the empirical approach, and interpret the results. The final section offers implications for firm strategy and public policy.

HYPOTHESES

Firms make a choice whether and how to react to regulations in jurisdictions where they do not operate. In light of this choice, we start by acknowledging the obvious null hypothesis. Firms have no reason to respond to regulations outside of jurisdictions where they operate; therefore, they do not.

Nevertheless, firms may have an incentive to respond. Ignoring regulations in other jurisdictions would be myopic if such regulations foreshadow impending regulations in the home jurisdiction, as policymakers may regulate prospectively. If adopted in the home jurisdiction, such regulations may constrain firm actions and lead to greater levels of competition in either product or factor markets, both of which could have a significant impact on performance. Therefore, firms might proactively adopt regulations in other jurisdictions with the expectation that doing so will better position them for the future, as their own regulatory environment evolves. Although firms can wait for the environment to evolve and react accordingly (Quinn, 1980), proactive strategies can afford firms such benefits as

DOI: 10.1002/smj

improved relations with key stakeholders (Buysee and Verbeke, 2003), performance-enhancing capabilities (Sharma and Vredenburg, 1998), collaborative relationships with supply chain partners (Klassen and Whybark, 1999), and flexibility while innovating (von Hippel, 1998). As firms seek strategies to attain such benefits in uncertain environments, there is reason to believe that they look outside their home jurisdictions for direction.

Of particular importance, we expect regulations faced by peer firms in other jurisdictions to motivate firms to adopt extrajurisdictional regulations. Two arguments lead to this prediction. First, firms that operate in multiple jurisdictions tend to adopt stringent operating procedures across their operations rather than conforming to the standard in each jurisdiction. Eskeland and Harrison (2003) note that multinational firms in potential pollution havens are significantly more environmentally friendly than indigenous firms. This finding is consistent with the technology transfer literature, which finds that multinationals tend to use the same or similar technologies in developing countries as in their home country (see Caves, 1996, for a review). A key consideration is the difficulty of managing different technologies across geographies (e.g., King and Shaver, 2001); therefore, a more efficient approach is for firms to adopt a consistent stringent operating procedure rather than adopting separate operating procedures for each jurisdiction.[1]

Second, if peer firms adopt more stringent operating procedures for the reasons we note above, then policy makers within the jurisdiction might be more willing to also choose more stringent standards. Policy makers' willingness to set demanding standards results when firms within the jurisdiction are better able to comply. For instance, a policy debate in Idaho has focused on the environmental obligations faced by their electric utilities in other states and the resulting implications on its own renewable energy market. Fremeth (2009) demonstrated that state-level policy makers were much more likely to adopt a stringent RPS when they oversaw electric utility firms that managed a diverse set of technologies and had prior experience in adopting renewable resources. Thus, regulations faced by peer firms are likely to foreshadow future regulation, and forward-looking firms are more likely to engage in activities consistent with stringent regulation in other jurisdictions.

In light of this finding, a firm that ignores how peers are regulated might become disadvantaged by not attaining the necessary inputs, locations, human capital, or technology necessary to respond to future policy changes. This disadvantage could escalate costs, leaving the focal firm with second-best options in factor markets, thereby impairing the effectiveness of both their resources and future profitability. The focal firm might also be disadvantaged in the competition for political markets where public authorities responsible for overseeing their activities and those of their peers may offer differential benefits based on their relative competence at meeting more stringent standards. Peers may use the political arena to influence regulation in a manner that better positions them and results in policy that encumbers the focal firm's resources and impairs its profitability (Capron and Chatain, 2008). As a result, we hypothesize:

> *Hypothesis 1: Firms adopt more stringent operating practices when peer firms face more stringent regulations in external jurisdictions.*

Regulations in neighboring states might also foreshadow future regulation in jurisdictions where a firm operates. This foreshadowing occurs because policy concerns are often geographically shared, and regional policy makers are likely to associate with one another. These policy makers infer that the information held by others is credible and offers direction for policy implementation in their own jurisdiction. For example, a state's membership in a regional organization or a state's geographic proximity can lead to expansive policy making, whereby an initiative spreads throughout a region.

Political scientists have identified the mechanisms by which a policy diffuses across national and subnational borders. This literature focuses on how new, more demanding policies tend to follow a path-dependent process and how their adoption across jurisdictional borders

[1] Within our data, Northern States Power, an electric utility that serves customers in five states in the upper midwest United States, maintains a consistent operating procedure with respect to the provision of renewable energy and energy-efficiency programs, despite significant variation in environmental requirements across jurisdictions.

DOI: 10.1002/smj

regulates the behavior of firms and society at large.[2] Particular attention has been placed on politicians' ability to learn about nearby policies (Volden, Ting, and Carpenter, 2008), the role of leading and lagging jurisdictions (Walker, 1969), and the demographic makeup of the constituency (Case, Rosen, and Hines, 1993; Volden, 2006). Volden *et al*. (2008) highlight how diffusion across neighboring jurisdictions dominates the literature on the patterns of policy adoption. Their work draws comparison to the literature on the adoption of new business practices, which has emphasized that rational actors follow similar leading firms as the requisite knowledge is observed and acted upon (Greve, 1996; Hannan and Freeman, 1977; Reger and Huff, 1993).

The heightened probability of policy diffusion across bordering jurisdictions represents a novel stimulus to a firm's external environment. Such policy diffusion would not only lead to a greater likelihood of policy adoption but would also change the competitive landscape. Delmas *et al*. (2007) highlight how firms shifted from a low-cost strategy to differentiation strategies when a novel policy change permitted. However, firms that are attuned to such policy dynamics will recognize the potential for a policy to diffuse and, thus, will be more likely to respond to future regulations before statutorily required. Thus, we predict:

Hypothesis 2: Firms adopt more stringent operating practices when states contiguous to where they operate enact more stringent regulations.

We recognize that other theoretical mechanisms can generate the same empirical predictions—in particular, firms may mimic peer firms or firms in neighboring jurisdictions only in an effort to follow institutionalized norms and to insulate themselves from claims that they are behaving inappropriately in an uncertain environment. We assess the possibility for alternative theoretical explanations that are consistent with our predictions when we present and interpret the empirical results.

[2] The policy diffusion literature differs significantly from the "pollution haven hypothesis," which predicts that jurisdictions choose to lower regulatory standards in an effort to attract investment from jurisdictions that maintain more stringent standards. The prediction of a ratcheting down of regulatory standards is counter to the robust empirical evidence developed in the diffusion literature.

METHODOLOGY

Empirical context

To provide a suitable context to test our predictions, we focus on the electric utility sector. Firms within this industry represent some of the country's biggest polluters, contributing approximately 40 percent of the country's total carbon dioxide emissions in 2008 (Energy Information Administration, 2011). Moreover, firms within the utility sector face demands along both institutional and technical dimensions (Scott, 1987). For this reason, regulation not only requires that firms operate efficiently in order to meet technical demands for the reliable distribution of electricity but also that firms operate within a set of regulatory and normative rules that are necessary to operate as a monopoly with social license (Bonardi, Holburn, and Vanden Bergh, 2006; Russo, 2003; Sine and Lee, 2009). Similarly, the electric utility industry is a mature sector that is highly regulated at state and federal levels. As a result, this organizational field is closely scrutinized for strategic choices, such as voluntarily adopting alternative forms of energy, which result in significant costs to ratepayers. In particular, public authorities, such as regulators and policy makers, act strategically within this context and provide firms with a powerful decision maker to respond to.

To identify the predicted forward-looking mechanism, this context must allow us to (1) isolate strategic behavior from routinized behavior, (2) observe forces that establish impetus for strategic change, and (3) consider the institutional pressures for both conformity and inertia. The final condition is necessary to make broader claims to the strategy literature as we need to establish a counterfactual argument that recognizes that the observed process may be one of mimesis and not a strategic choice to adapt. Should this empirical context support our strategic choice argument, then it would be plausible to make the broader claim that if such a strategic choice can occur in this strong institutional environment then it is also likely to occur in most contexts where, holding the technical pressure constant, the institutional pressure, including the rules and norms, is not as strong.

With consideration to the first criterion that we set out above, management scholars have examined this context in the past to study both

DOI: 10.1002/smj

strategic and nonstrategic choices. Delmas *et al*. (2007) identify how utility firms strategically respond to deregulation when adopting a diversification strategy. On the other hand, Majumdar and Marcus (2001) illustrate how regulatory design prompted utility firms to behave differently when they were statutorily required to make a nonstrategic decision to meet government emission standards. However, neither paper attempts to isolate those strategic choices from the nonstrategic choices.

Recent technical developments and changes to consumer preferences in the utility sector allow this context to satisfy the second criterion. Growing concerns regarding the degradation to the natural environment, increasing costs of energy, and efforts to stimulate the economy have lead utility firms and policy makers to seek novel alternatives. This response has increased competition in both downstream and upstream markets. Although many utilities continue to operate as regulated monopolies in downstream markets and do not compete for retail customers, a significant subset of firms in deregulated markets openly compete for customers (Delmas *et al*., 2007; Kim, forthcoming). Although competition for customers may be limited for some, competition for sources of power in the upstream market has been intense throughout the United States (Galbraith and Wald, 2008). Here, utility firms need to locate sites, partner with project developers, source capital, procure the necessary inputs, build appropriate transmission lines, and gain the necessary approvals from state regulators. This last point cannot go understated, as Bonardi, Holburn, and Vanden Bergh (2006) demonstrate in their paper on the regulatory review process and the strategies that utilities adopt when competing in the nonmarket arena. As a result, in this context, losing a competitive position in either upstream factor markets or political markets can leave a firm disadvantaged as it attempts to improve its future profitability through future regulatory approvals.

As has been established above, this setting faces institutional pressure from the well-established norms and values that underpin this context. In fact, much of the management literature investigating this context has done so from an institutional perspective, drawing conclusions that social forces have driven its growth. Sine and Lee (2009) demonstrate that the entrepreneurial growth of the wind energy sector emerged from its interaction with an influential social movement. Russo (2003) highlights geographic-specific isomorphic pressures as having stimulated the California wind power sector.

Sample and data

Our sample consists of IOUs between 2001 and 2006. IOUs are the largest players in the U.S. electric utility industry and have discretion over the source of the electricity they sell to final customers. To test our arguments, we examine the extent to which IOUs source renewable power (i.e., biomass, geothermal, hydroelectric, solar, and wind power) to distribute to customers.

Within this industry, some states have adopted regulatory policies of varying strengths to induce the use of renewable power. The policies we focus on are RPS objectives that compel IOUs to include a specified percentage of renewable power in the mix of energy they sell. Generally, these policies include penalties for IOUs that fail to meet the regulatory demand to include renewable power. The pecuniary fines for failing to meet the demands can be significant and, if administered, could attract negative attention from customers and investors.[3] However, these policies can vary significantly across states.[4] For example, Arizona's RPS requires 1.1 percent of energy to be from renewable sources, whereas Minnesota's requires 30 percent for its largest IOUs. Furthermore, as of 2006, 29 states did not have an RPS policy.[5]

Our sample is based on all IOUs in the United States, which consists of 132 firms operating in

[3] The ability for an IOU to meet an RPS is commonly mentioned by credit rating agencies, such as Moody's and Standard & Poor's, in their decisions to upgrade or downgrade credit worthiness. This ability is of utmost importance in the IOU industry, where firms are highly leveraged and often float and revolve debt on an annual basis in their efforts to fund long-term investments.

[4] RPS policies generally specify a final objective date with a series of milestones at periodic intervals throughout the life of the policy.

[5] Numerous related studies have examined the development of the renewable energy sector in the United States. For example, Delmas *et al*. (2007) analyzed the potential for market deregulation as an opportunity for product differentiation into renewable energy generation. Several other studies have focused on the early growth of the independent power producer (IPP) sector in the 1980s (Russo, 2001, 2003; Sine, David, and Mitsuhashi, 2007; Sine and Lee, 2009), which now plays an important role as a source for renewable power bought and distributed by IOUs.

DOI: 10.1002/smj

every state except Alaska and Nebraska, where electricity is provided by public authorities and rural cooperatives. The electric utilities in our sample generate and/or purchase power that provides approximately 85 percent of the country's total electricity. The electric utility sector is a stable industry, which includes many firms with historical roots dating to the electrification of the country during the late nineteenth century. As a result, we do not observe IOUs entering into new markets over the six-year period of our study. Nonetheless, IOUs have expanded their operational footprint into new states through merger and acquisition activity.[6] Market consolidation tends to be motivated by efforts to increase efficiency, procure upstream assets, and attain more favorable regulatory conditions. From the population of 132 firms, we excluded 5 IOUs in Texas because of our inability to assess their mix of energy types. Omitting these 5 firms left a usable sample of 127 firms.

To construct the requisite variables, we sourced information from a series of privately and publicly available databases. The primary source provided by Platts, an electric industry consulting firm, was a dataset that documented firms' power-generation statistics and purchase contracts with independent power producers (IPPs). Platts is a leader in this industry and lists among its clients many IOUs, institutional investors, and banks. We gathered IPPs' data from the U.S. Environmental Information Administration (EIA), the Federal Energy Regulatory Commission's (FERC) Form 1 dataset, Utilipoint (an electric industry consulting firm), Energy and Environmental Analysis (a consulting company), Combined Heat and Power sources database, and the American Wind Energy Association (AWEA). The U.S. Department of Energy's office of Energy Efficiency and Renewable Energy (EERE) provided data on state renewable energy policies. We sourced other state variables from the Congress of State Government's Book of the States, the U.S. Bureau of Economic Analysis (BEA), the Sierra Club of America, and the Department of Energy (DOE).

[6] Entrepreneurial ventures in this sector occur at two levels. First, significant entrepreneurial activity has occurred at the IPP level, where project developers build merchant plants and sell power to IOUs by contract. Second, some deregulated states have seen, at the retail level, the entry of niche competitors who compete with IOUs for the distribution of electricity to final customers.

Dependent variable

We examine the total renewable power *distributed* to the end consumer, which includes power generated by IOUs and purchased from IPPs. Although consistent with the existing literature, the inclusion of IPP power deviates from the common approach of focusing only on IOUs' renewable power-generating capacity (Delmas *et al*., 2007; Sine and Lee, 2009).[7] We favor measuring total power distributed because our predictions concern firms' environmental performance, which is a function of both what an IOU generates and what it sources from IPPs. We calculate the variable $\mathrm{PERCENT\_RENEWABLES}_{it}$ as the share of total power sold by IOU i in year t from wind, solar, hydroelectric, biomass, and geothermal generating sources.

Independent variables

Neighboring jurisdiction regulations

We code a variable to identify the stringency of the RPS policies in states contiguous to where a focal firm operates. $\mathrm{NEIGHBOR\_REGULATION}_{it}$ is the average RPS objective of the contiguous states where the focal firm does not have any operations. The average number of contiguous states for multistate utilities is 6.6 with a maximum of 11 states. The average number of neighboring states for single-state utilities is 3.9 states with a maximum of 7. The mean on this Neighbor Jurisdiction variable is 3.318 percent, only about 1.4 percentage points less than the RPS measure for a focal firm in its home state(s).

Peer regulations

We calculate the variable $\mathrm{PEER\_REGULATION}_{it}$ as the average RPS faced by all other IOUs that operate in the same state(s) as a focal firm but excluding the RPS that they commonly face. Therefore, we define peers as firms that operate in common output markets but face differing policy obligations. For example, Oklahoma Gas & Electric operates in Oklahoma and Arkansas, where five peer firms also operate elsewhere.

[7] The majority of renewable power sold by IOUs is sourced from IPPs. Over the panel, 73 percent of renewable power was sourced contractually with the remainder self-generated. However, we observe considerable variation across firms.

DOI: 10.1002/smj

We measure the RPS objective that each peer is obligated to meet but is not commonly obligated to meet by the states of Oklahoma and Arkansas. When a peer is a multistate utility, we measure its RPS objective as the most stringent policy that it faces across its multiple states—not the RPS shared with the focal utility. We then take the average of the RPS for all peers and assign that value to a focal IOU. We discuss the robustness of our results to other approaches to measuring peer regulation after presenting the main analyses.

Control variables

Many other factors potentially affect firms' environmental performance. For this reason, we include the following firm and state controls.

Firm controls

Many IOUs face statutory requirements for renewable energy in the states in which they operate. $HOME\_RPS_{it}$ measures the percentage of renewable power required by RPS objectives where a firm operates. For multistate utilities, we calculate a weighted average that is based on the electricity sold in each state. We assign this variable the value of zero for IOUs that face no RPS requirement.

We calculate the variable $OPERATIONAL\_CAPABILITY_{it}$ to control for the possibility that firms differ in the organizational systems required to meet regulatory demands. To capture the aptitude of IOUs in responding to an RPS, we created a time-varying measure that represents the operational expertise of a firm to manage a diverse fuel mix by calculating a Herfindahl-Hirschman Index (HHI) of the fuel mix−diversity of an IOU i in year t. This measure includes electricity wholly generated by the firm and purchased from independent power producers to capture that firms are endowed with technical capabilities related to operating power plants and sourcing, contracting, and scheduling electricity generated by third parties. This competence is of increasing importance as electric markets move away from vertical integration and towards a greater role for IPPs. We expect firms with greater fuel mix will be better able to comply with RPS standards (Fremeth, 2009). Because a lower concentration of fuel mix represents a greater HHI, we multiplied this measure by negative one (-1) and expect OPERATIONAL_CAPABILITY to have a positive effect.[8]

We also controlled for firm size with the expectation that larger IOUs might have more technology options because they tend to have sophisticated operations and are required to meet growing demand. The variable $FIRM\_SIZE_{it}$ measures a firm's total electricity sales in megawatt hours (MWh) in a given year.

Because consumers can be an important driver of whether a firm chooses to improve its environmental performance, we include the variable $RESIDENTIAL\_SALES_{it}$, which we define as the percentage of an IOU's sales that are made to residential customers. We also control for $INDUSTRIAL\_SALES_{it}$, which we define as the percentage of an IOU's sales that are made to industrial customers. Industrial consumers are particularly sensitive to increases in electricity pricing that are likely to result from the adoption of renewable power.[9]

Because information can embolden opposing groups or provide public relations opportunities, we capture differences in firms' reporting of their environmental performance. $VOLUNTARY\_REPORTING_{it}$ is a dummy variable identifying firms that participated in the U.S. Department of Environment's 1605(b) program of voluntarily reporting greenhouse gas emissions. This federal program provided utility firms the option to self-disclose estimates of their emissions. $INVOLUNTARY\_REPORTING_{it}$ is a dummy variable identifying firms required to reveal generating technologies due to state mandates. This information is disclosed periodically on websites, in annual reports, and in notices enclosed with monthly utility bills.

State controls

We include the variable $DEREGULATION_{it}$ to account for whether an IOU operates in a

[8] For robustness, we also estimated our models with operationalizations of this measure without various forms of renewable power (e.g., hydro, wind) and with power purchased from IPPs. Our results were robust to these investigations. In addition, although the operationalization of this variable may make it appear to be more of a "flow" variable rather than a "stock" measure of capabilities, it does not vary considerably within firm over the panel.

[9] Sales to commercial customers, the remaining customer class, have been omitted to avoid a linear combination of these variables.

DOI: 10.1002/smj

state that has undergone market deregulation. We also include the variable $\mathrm{NUCLEAR\_MORATORIUM}_{it}$ to capture states that have a moratorium on new nuclear-generating plants. For multistate utilities, we weight both variables by the percentage of sales in each state. We expect both variables to be positively related to an IOU's use of renewable power because these variables shape the choices of energy generation technologies available to IOUs.

We also control for the state operating environment in two ways. First, we include state carbon dioxide emissions in metric tons per state capita ($\mathrm{CO2\_EMISSIONS}_{it}$). To further evaluate the industrial concern with renewably generated, higher-priced power, we include $\mathrm{MANUFACTURERS}_{it}$, which is the percentage of the gross state product sourced from the manufacturing sector. In both cases, we calculate weighted averages on the basis of the firms' state sales for multistate utilities.

We include the variable $\mathrm{DEMOCRATS}_{it}$ to capture the political leaning of a state in which an IOU operates. The variables take the value 1 if the Democratic Party both holds a majority in the state legislature and controls the governor's office. We include the state budget in \$ millions per capita in the variable BUDGET_{it} to control for the possibility that affluent states are better able to afford to enact stringent renewable energy policies and to pay the premium for such power. We include the variable $\mathrm{SIERRA\_CLUB}_{it,}$ which is the state membership in the Sierra Club in thousands, to operationalize the influence of the environmental lobby.

Finally, we include two variables that capture the preferences and competencies of state public utility commissions (PUCs). $\mathrm{PUC\_TENURE}_{it}$ captures the average years of experience of the commissions that interact with an IOU. More experienced commissions hold greater tacit knowledge of the operational competencies of the firms that they regulate and tend to provide more consumer-friendly policies (Fremeth and Holburn, 2012). $\mathrm{ELECT\_PUC}_{it}$ identifies PUCs that are directly elected by the public. PUCs that are directly elected are more responsive to consumer interests because of their concern with re-election (Bonardi *et al*., 2006; Zelner, 2001). These state-specific variables are weighted by an IOU's state sales to account for multistate utilities. Table 1 presents descriptive statistics.

Estimation

We test our predictions using a dynamic panel estimator. We chose this approach for the following reasons: the panel data has few years (six years) and many firms (127 firms), we predict linear relationships, the dependent variable is likely dependent on its past realizations (i.e., the current proportion of renewable power is contingent on the past proportion of renewable power), the independent variables are possibly correlated with past and current realizations of the error term (i.e., the fuel mix diversity is predetermined and not strictly exogenous), we want to control for potential unobserved firm effects, and we are concerned with heteroskedasticity and autocorrelation in the panel.

Although several of these concerns could be handled effectively by a fixed effects estimator, the dynamic aspects of our model—such as the inclusion of a lagged dependent variable—are better addressed by the Arellano and Bond (1991) general method of moments (GMM) estimator. We estimate the following two equations:

$$\begin{aligned}\mathrm{PERCENT\_RENEWABLES}_{it} &= \beta_1 \mathrm{PERCENT\_RENEWABLES}_{it-1} \\ &\quad + \beta_2 \mathrm{NEIGHBOR\_REGULATION}_{it} \\ &\quad + \beta_3 \mathrm{PEER\_REGULATION}_{it} + \mathrm{X}_{it} + \mu_{it}\end{aligned} \tag{1}$$

$$\mu_{it} = \mathrm{v}_i + \mathrm{e}_{it} \tag{2}$$

As represented in Equation 1, in addition to the hypothesized effects, we include a one-year lag of the dependent variable because prior adoption of renewable energy can be an important driver of future dependence on such technologies. These prior choices may be realized only in future time periods when utility firms improve their productivity, embrace the choices with greater commitment, or complete multistage investment projects.[10] In this equation, X_{it} represents the remaining control variables that are included in the model. We include all previously described control variables and the interaction of $\mathrm{HOME\_RPS}_{it}$ and $\mathrm{OPERATIONAL\_CAPABILITY}_{it}$ because

[10] Many renewable energy–generating technologies involve multistage investments, whereby a portion of the generation will come online each year for two or three years. For instance, utility-scale wind farms generally have two or three stages that are completed over a period of time.

DOI: 10.1002/smj

Table 1. Descriptive statistics

Variable	Source	Mean	Standard deviation	Min	Max	Correlations for subset of variables (full correlation matrix online)			
$PERCENT\_RENEWABLES_{it}$	Platts, EIA, FERC, Utilipoint	6.441	11.435	0.000	72.000	1.00			
$HOME\_RPS_{it}$	EERE	4.785	8.149	0.000	30.000	0.26	1.00		
$OPERATIONAL\_CAPABILITY_{it}$	Platts, EIA, FERC, Utilipoint	−9.015	1.475	−10.000	−3.954	0.46	0.30	1.00	
$NEIGHBOR\_REGULATION_{it}$	EERE	3.318	4.806	0.000	21.000	0.02	0.16	0.06	1.00
$PEER\_REGULATION_{it}$	EERE, EIA	1.071	2.988	0.000	17.924	0.06	0.40	0.10	0.27
Control variables									
$RESIDENTIAL\_SALES_{it}$		33.751	7.661	0.583	53.756				
$INDUSTRIAL\_SALES_{it}$	EIA	29.801	15.397	0.000	98.966				
$MANUFACTURERS_{it}$	BEA	0.007	0.009	0.000	0.092				
$FIRM\_SIZE_{it}$	FERC	18.662	19.850	0.061	103.653				
$DEREGULATION_{it}$	EIA	0.449	0.490	0.000	1.000				
$VOLUNTARY\_REPORTING_{it}$	EIA	0.627	0.484	0.000	1.000				
$INVOLUNTARY\_REPORTING_{it}$	EERE	0.572	0.473	0.000	1.000				
$CO2\_EMISSIONS_{it}$	EIA	11.335	10.989	0.016	102.569				
$SIERRA\_CLUB_{it}$	Sierra Club	20.160	29.348	0.711	198.590				
$NUCLEAR\_MORATORIUM_{it}$	EIA	0.348	0.457	0.000	1.000				
$DEMOCRATS_{it}$	Book of the States	0.340	0.455	0.000	1.000				
$BUDGET_{it}$	BEA	0.003	0.004	0.000	0.024				
PUC_TENURE_{it}	Book of the States	4.160	2.433	0.333	14.667				
$ELECT\_PUC_{it}$	Book of the States	0.128	0.320	0.000	1.000				

an IOU's choice to improve its environmental performance may be jointly determined by environmental policy and operational competence (Fremeth, 2009). As noted in Equation 2, the error term in Equation 1, μ_{it}, can be decomposed into the unobserved firm-specific effects, v_i, and the observation specific error, e_{it}.

We employ the "difference" variant of the GMM estimator, which uses internal instruments in estimation following a first differencing of the data (Holtz-Eakin, Newey, and Rosen, 1988). These internal instruments are built from past observations of the variables and are valid when uncorrelated with future error terms but highly correlated with the variable being instrumented. The result is a series of moment conditions that are met when a zero correlation exists between the instrumenting variables and the error term. Two moment conditions are listed in Equations 3 and 4.

$$E\left(y_{i,t-s}\Delta\mu_{it}\right) = 0 \text{ for } s \geq 2;\ t = 3, \ldots .T \quad (3)$$

$$E\left(X_{i,t-s}\Delta\mu_{it}\right) = 0 \text{ for } s \geq 2;\ t = 3, \ldots .T \quad (4)$$

In our model, we considered all firm-specific variables as endogenous and all state-specific factors as exogenous. The instruments used are the second lag of the endogenous variables and their own values for the exogenous variables. The endogenous variables are instrumented in this manner because the second lag is not correlated with the current error term, whereas the first lag is. According to Roodman (2009), this treatment is the standard for instrumental variables in the difference GMM approach. The number of instruments used is listed with the results. Year dummies are included to control for temporal effects and to ensure no correlation across firms in the error term, which is necessary for the autocorrelation test (Roodman, 2009). Further, we focus on the results using the two-step robust estimator that corrects panel-specific autocorrelation and heteroskedasticity, as developed by Windmeijer (2005).

To assess whether the instruments are exogenous and to ensure the validity of the GMM estimates, we rely on the Hansen J-test. No well-established criteria is available to test for the strength of instruments for a difference GMM regression similar to that developed by Staiger and Stock (1997) or Stock and Yogo (2005) for a standard two-stage least squares regression. However, Linck *et al*. (2012) recently introduced a two-step process to test the strength of instruments in GMM regressions. This process begins with a regression of the endogenous variables on the instruments to examine the F-statistics. Next, a Cragg-Donald statistic is calculated from the first regressions and then compared to the critical values for instrument weakness developed by Stock and Yogo (2005). Together, these results can identify whether the estimates are driven by weak instruments.

RESULTS

Table 2 presents the results of the GMM regressions that assess renewable power use by IOUs between 2001 and 2006. The Hansen J-test statistic for overidentifying restrictions is not significant for all models. As a result, we cannot reject the null hypothesis that the overidentifying restrictions are valid and, thus, conclude that the instrumental variables are not correlated with the error term. In addition, the difference in the Hansen tests of exogeneity (which compares full and restricted models to assess the orthogonality of the instruments), also referred to as the C statistic, was not significant. This result further supports the adopted approach. The test for autocorrelation in the error structure is not significant for either first- or second-order autocorrelation, a finding consistent with the model's assumption of no second-order autocorrelation, which may otherwise invalidate some lags as instruments.

The two-stage test for instrument strength produces F-statistics in the first stage greater than the critical value of 10 as established by Staiger and Stock (1997), with the exception of $\text{OPERATIONAL\_CAPABILITY}_{it,}$ which had an F-statistic of 9.03. In the second stage of the test, the Cragg-Donald statistic is 18.78, well above the critical value of 5 set out by Stock and Yogo (2005). As a result, we can confidently interpret the results of the difference GMM models without concern that weak instruments drive the estimates. Together, the results of these specification tests lend confidence to our use of the GMM difference estimation approach.

Before interpreting the hypothesis tests, we wanted to confirm that capabilities and environmental policies affect firms' environmental

DOI: 10.1002/smj

Table 2. GMM regression models of renewable energy generated and purchased, 2001–2006

	Model 1	Model 2	Model 3	Model 4
NEIGHBOR_REGULATION$_{it}$			−0.010	−0.078*
			(0.025)	(0.040)
PEER_REGULATION$_{it}$		0.186**		0.163**
		(0.093)		(0.073)
PERCENT_RENEWABLES$_{it-1}$	0.239***	0.260***	0.225***	0.250***
	(0.030)	(0.018)	(0.030)	(0.017)
HOME_RPS$_{it}$	1.763***	1.622***	1.671***	1.366***
	(0.200)	(0.199)	(0.201)	(0.148)
OPERATIONAL_CAPABILITY$_{it}$	7.301***	6.778***	7.278***	6.850***
	(0.444)	(0.320)	(0.437)	(0.288)
(HOME_RPS$_{it}$) × (OPERATIONAL_CAPABILITY$_{it}$)	0.186***	0.181***	0.180***	0.150***
	(0.022)	(0.022)	(0.022)	(0.017)
RESIDENTIAL_SALES$_{it}$	−0.596**	−0.324**	−0.598**	−0.065
	(0.241)	(0.155)	(0.243)	(0.132)
INDUSTRIAL_SALES$_{it}$	−0.071	−0.091	−0.070	−0.006
	(0.083)	(0.078)	(0.082)	(0.050)
MANUFACTURERS$_{it}$	7.606	6.811	2.606	55.950
	(75.430)	(64.534)	(75.826)	(59.760)
FIRM_SIZE$_{it}$	−0.180**	−0.089	−0.180**	−0.035
	(0.090)	(0.076)	(0.089)	(0.059)
DEREGULATION$_{it}$	4.762***	2.965**	4.847***	3.713***
	(1.504)	(1.174)	(1.483)	(0.638)
VOLUNTARY_REPORTING$_{it}$	−1.249	−0.768	−1.298	−1.170
	(1.275)	(1.177)	(1.253)	(1.035)
INVOLUNTARY_REPORTING$_{it}$	−0.172	−0.129	−0.181	−0.159
	(0.402)	(0.373)	(0.400)	(0.301)
CO2_EMISSIONS$_{it}$	−0.008	−0.004	−0.003	−0.043
	(0.068)	(0.058)	(0.069)	(0.053)
SIERRA_CLUB$_{it}$	0.102***	0.100***	0.105***	0.109***
	(0.028)	(0.033)	(0.028)	(0.025)
NUCLEAR_MORATORIUM$_{it}$	9.535	9.129	9.471	7.459
	(6.893)	(7.008)	(6.932)	(6.073)
DEMOCRATS$_{it}$	0.241	0.337	0.256	0.381*
	(0.253)	(0.261)	(0.239)	(0.200)
BUDGET$_{it}$	−13.875	−1.368	−14.039	−7.197
	(16.538)	(15.365)	(16.549)	(16.715)
PUC_TENURE$_{it}$	−0.029	−0.030	−0.029	−0.026
	(0.027)	(0.026)	(0.027)	(0.021)
ELECT_PUC$_{it}$	−3.322	−18.740	−2.020	−2.967
	(20.046)	(25.165)	(20.370)	(17.693)
Observations	762	762	762	762
Chi-square	8363.03***	9354.56***	8428.11***	9842.24***
Instruments	54	55	55	56
AR(1)	−1.350	−1.396	−1.349	−1.453
AR(2)	−0.234	0.001	−0.239	0.183
Hansen J-test	24.670	33.192	24.884	30.296

Standard errors in parentheses. Year fixed effects are included in the analyses.
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$ (two-tailed test).

performance, which allows us to verify the consistency of our data with existing research and forms a basis from which to examine the effects of extrajurisdictional regulation. Model 1 in Table 3 confirms this expectation. The coefficient estimates of OPERATIONAL_CAPABILITY, HOME_RPS and their interaction are positive and statistically significant ($p < 0.01$). The marginal effect of an RPS policy on changes to renewable power ranges from −0.09 percent when the compliance capability measure is at the minimum (i.e., least fuel diversity) to 1.04 percent when at its maximum.[11] The marginal effect for the average

[11] Recall OPERATIONAL_CAPABILITY takes the values -10 to -1.

DOI: 10.1002/smj

firm (OPERATIONAL_CAPABILITY = −9.02) is 0.09.

For the hypotheses tests, we chose to initially present the results of NEIGHBOR_REGULATION and PEER_REGULATION separately because these variables are moderately correlated. Model 2 presents results from a specification that includes PEER_REGULATION. Model 3 presents results from a specification that includes NEIGHBOR_REGULATION. Model 4 presents results from a specification with both NEIGHBOR_REGULATION and PEER_REGULATION.

Model 2 shows support for Hypothesis 1. The positive and statistically significant ($p < 0.01$) coefficient of PEER_REGULATION demonstrates that firms increase their use of renewable power as their peers are subject to increasingly stringent RPS policies elsewhere. This finding is consistent with the existence of firms making the strategic choice to improve their environmental performance when peers are more strictly regulated.

In model 3, however, we do not find support for Hypothesis 2, which considered a firm's sensitivity to policies set in neighboring jurisdictions. The estimate of NEIGHBOR_REGULATION does not test differently from zero. Utility firms do not appear to alter their use of renewable power when neighboring jurisdictions increase their RPS requirements.

Model 4 includes NEIGHBOR_REGULATION and PEER_REGULATION in the same specification. We find that PEER_REGULATION remains positive and significant ($p < 0.01$). However, when controlling for the PEER_REGULATION, we find that the coefficient estimate of NEIGHBOR_REGULATION is negative and statistically significant ($p < 0.05$). Therefore, beyond utility firms making the strategic choice to improve their environmental performance, these firms appear to curb such actions when pressure emanates solely from neighboring jurisdictions.

Because previous studies have identified the importance of regulation and competence in improving environmental performance, it is worthwhile to interpret the effect vis-à-vis these established relationships. The economic significance of PEER_REGULATION is considerable. The coefficient of peer effect indicates that a 1 percent increase in RPS faced by peers increases a focal firm's use of renewable power by 0.16 percent. Recall that when a state's RPS increases by 1 percent, a firm of average compliance capability increases renewable power generation by only 0.09 percent, or just over half the magnitude. For the most capable firms, the effect of the focal state's RPS exceeds that of the peer's RPS (1.11% versus 0.16%). Although the focal effect is larger than the peer effect, the magnitude of both effects highlights the significance of the peer effect. For an average-sized utility, a unit increase to PEER_REGULATION is equivalent to powering 2,500 homes with renewable power for one year.

The negative coefficient estimate of NEIGHBOR_REGULATION is unexpected; however, its economic significance is relatively modest. An increase in a neighboring state's RPS by 1 percent decreases a firm's renewable power use by 0.08 percent. In light of the negative estimate of NEIGHBOR_REGULATION and the importance that firm capabilities play in responding to HOME_RPS, we investigate whether firms' operating capabilities affect their reaction to extrajurisdictional regulation. To do this, we examined the specification in model 4 for the firms in the highest and lowest quartiles of capability.[12]

Models 5 and 6 in Table 3 present these results. Consistent with the interactions presented in Table 2, operational capabilities magnify firms' reactions to regulations in other jurisdictions. The effect of PEER_REGULATION is significant ($p < 0.01$) for both the most capable and least capable firms; however, the magnitude of the effect is over 4.5 times as large for the most capable versus least capable firms, and they test different from each other ($p < 0.05$). Moreover, the negative effect of NEIGHBOR_REGULATION is manifest only for the most capable firms ($p < 0.05$). To summarize, we find evidence of the peer effect for both the most capable and least capable firms and the unanticipated negative effect only for the most capable firms. We interpret the negative neighbor effect in the discussion.

Returning to Table 2, we find that coefficient estimates of several control variables are consistent

[12] We choose this approach because the coefficient estimates across models were unstable when we interacted OPERATIONAL_CAPABILITY with HOME_RPS, NEIGHBOR_REGULATION, and PEER_REGULATION in the same specification, likely due to collinearity. We defined the quartiles of OPERATIONAL_CAPABILITY by taking the average of the yearly values by firm, then defining the quartiles with these firm-level data.

DOI: 10.1002/smj

Table 3. GMM regression models identifying role of firm capability

	Model 5 Top quartile of OPERATIONAL_ CAPABILITY (i.e., most capable)	Model 6 Bottom quartile of OPERATIONAL_CAPABILITY (i.e., least capable)
$NEIGHBOR\_REGULATION_{it}$	−0.093**	0.025
	(0.044)	(0.020)
$PEER\_REGULATION_{it}$	0.196***	0.042***
	(0.075)	(0.016)
$PERCENT\_RENEWABLES_{it-1}$	0.174***	0.011
	(0.052)	(0.009)
$HOME\_RPS_{it}$	0.046**	−0.005
	(0.021)	(0.005)
$OPERATIONAL\_CAPABILITY_{it}$	7.730***	5.320***
	(0.634)	(0.073)
$RESIDENTIAL\_SALES_{it}$	1.539*	0.015
	(0.855)	(0.027)
$INDUSTRIAL\_SALES_{it}$	0.108	−0.004
	(0.320)	(0.003)
$MANUFACTURERS_{it}$	1204.795	9.914
	(1055.376)	(45.261)
$FIRM\_SIZE_{it}$	0.954**	0.010
	(0.375)	(0.012)
$DEREGULATION_{it}$	26.212	−53.382
	(16.429)	(82.210)
$VOLUNTARY\_REPORTING_{it}$	−1.414	0.204
	(5.300)	(0.433)
$INVOLUNTARY\_REPORTING_{it}$	−3.984	0.136
	(2.709)	(0.273)
$CO2\_EMISSIONS_{it}$	−0.790**	−0.023
	(0.364)	(0.023)
$SIERRA\_CLUB_{it}$	0.372*	−0.001
	(0.199)	(0.008)
$NUCLEAR\_MORATORIUM_{it}$	104.611	28.881
	(385.420)	(48.911)
$DEMOCRATS_{it}$	4.096**	−0.182
	(2.022)	(0.203)
$BUDGET_{it}$	−414.021	−24.822
	(631.333)	(51.138)
PUC_TENURE_{it}	−0.283	−0.008
	(0.188)	(0.008)
$ELECT\_PUC_{it}$	12.341***	−16.921
	(4.955)	(28.891)
Observations	210	190
Chi-square	6308.661***	4387.649***
Instruments	55	55
AR(1)	−2.103	−0.840
AR(2)	1.314	−1.074
Hansen J-test	28.427	25.722

Standard errors in parentheses. Year fixed effects are included in the analyses.
$^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed test)

across model specifications and consistent with results in the existing literature. The coefficient of the lagged dependent variable is positive and statistically significant ($p < 0.01$) for all models.[13] This finding lends support to the expectation that current levels of renewable power are based on prior levels of its use. Thus, firms experienced with new generating technologies are likely to seek

[13] The results of a Levin, Lin, and Chu (2002) panel unit root test indicate that we can reject the null hypothesis ($p < 0.01$) that the dependent variable is nonstationary, further supporting the expectation of a dynamic process.

out these options in the future. Supporting this interpretation is the nature of renewable energy projects to often be multistage investments that come online over several years.

Interest group pressure results in diverging effects on renewable power use as the coefficient estimate for $\text{RESIDENTIAL\_SALES}_{\text{it}}$ is negative and marginally significant ($p < 0.10$), whereas the estimate for $\text{SIERRA\_CLUB}_{\text{it}}$ is positive and significant ($p < 0.01$). Therefore, firms that have greater ties to residential customers use less renewable power, which tends to be more expensive on a kilowatt-hour basis. Firms in jurisdictions with a stronger environmental lobby are likely to enhance their environmental performance, consistent with Sine and Lee (2009) and Maxwell *et al*. (2000). We also find that larger firms are less likely to adopt renewable power because the coefficient estimate for $\text{FIRM\_SIZE}_{\text{it}}$ is negative and marginally significant ($p < 0.10$). This finding is consistent with the interpretation that larger firms may be tied to the large-scale base load plants (i.e., nuclear and coal plants) and, consequently, face considerable inertia in efforts to modify organizational practices. Consistent with Delmas *et al*. (2007), we find that $\text{DEREGULATION}_{\text{it}}$ is positive and significantly related ($p < 0.01$) to the use of renewable power. In fact, IOUs that operate in deregulated states tend to use approximately 5 percent more renewable power. The coefficient for $\text{DEMOCRATS}_{\text{it}}$ is positive and significant ($p < 0.05$), indicating that a firm's choice to modify its environmental performance is sensitive to the political landscape. Year dummies are included in all models; although not reported in the tables, we find a positive and significant ($p < 0.01$) estimate for 2005. This estimate might be due to the passage of the Energy Policy Act of 2005, which allocated \$2.7 billion to extend the renewable electricity production credit program.

Alternative explanations and robustness tests

The theoretical mechanism central to our argument is that firms respond to regulations in jurisdictions in which they do not operate because these regulations foreshadow future regulation that the firm will face. A plausible alternative mechanism leading to the same empirical relationship is that firms choose to imitate other firms in these actions. Imitation is plausible because RPS policies become binding in the future, and whether these mandates will ultimately be enforced is uncertain. In all instances, the RPSs that have been enacted by states are implemented over a 5- to 15-year time horizon. This time frame allows firms the flexibility to make the operational changes they deem appropriate to meet their regulatory obligations or, alternatively, provides them with the ability to undertake actions to weaken the impending regulation. Under such conditions, firms might choose to mimic other firms in their efforts to insulate themselves from claims that they are behaving inappropriately in an uncertain environment. We conducted the following analyses to assess whether our results were more consistent with this mechanism than with our hypothesized mechanism.

First, if the imitation mechanism is prevalent in determining the relationship, we would expect firms to imitate the actions of peers, rather than following the regulatory requirements faced by peers. Our data allows us to directly assess this information. We redefined the $\text{PEER\_REGULATION}_{\text{it}}$ variable to measure peers' renewable power use ($\text{PEER\_RENEW\_USE}_{\text{it}}$) rather than the peers' regulatory obligations. We use both the average renewable power sold by peer firms and the maximum renewable power sold by peer firms. Table 4 presents GMM models with these variables and demonstrates that, in both cases, the redefined peer variable is not statistically different from zero. Therefore, this finding suggests that utility firms are making the strategic choice to respond to the expected use of renewable power by peers as established by their regulatory obligations and not by the actual renewable power that they are selling.

Second, the relationships presented so far could be driven by firms responding to stricter regulations or weaker regulations. However, our theoretical arguments center on firms responding to expectations for future regulation. Within this industrial context, if expectations of regulation are driving the results, we would expect that firms are responding to stricter regulations because we observe states only enacting or strengthening the RPS. In contrast, the imitation argument would be consistent with either situation. For this reason, we assessed whether the identified relationships were driven by states with weak RPSs pulling down environmental performance rather than states with strong RPSs pulling up requirements. To assess this effect, we estimated models that examined

DOI: 10.1002/smj

Table 4. GMM regression models substituting in average and maximum renewable power of sold by peer utilities

	Model 7 Average renewable power by peers	Model 8 Average renewable power by peers	Model 9 Maximum renewable power by peers	Model 10 Maximum renewable power by peers
$NEIGHBOR\_REGULATION_{it}$	−0.020	−0.025	−0.009	−0.024
	(0.022)	(0.022)	(0.026)	(0.026)
$PEER\_REGULATION_{it}$		0.060**		0.170**
		(0.026)		(0.082)
$PEER\_RENEW\_USE_{it}$	0.033	0.037	−0.022	−0.008
	(0.029)	(0.037)	(0.015)	(0.014)
$PERCENT\_RENEWABLES_{it-1}$	0.205***	0.210***	0.230***	0.269***
	(0.027)	(0.0267)	(0.029)	(0.018)
$HOME\_RPS_{it}$	1.614***	1.585***	1.726***	1.665***
	(0.224)	(0.217)	(0.213)	(0.213)
$OPERATIONAL\_CAPABILITY_{it}$	7.439***	7.397***	7.261***	6.766***
	(0.410)	(0.401)	(0.428)	(0.301)
$(HOME\_RPS_{it})$*$(OPERATIONAL\_CAPABILITY_{it})$	0.174***	0.172***	0.186***	0.183***
	(0.025)	(0.024)	(0.024)	(0.024)
$RESIDENTIAL\_SALES_{it}$	−0.528**	−0.443**	−0.562**	−0.268*
	(0.224)	(0.210)	(0.257)	(0.161)
$INDUSTRIAL\_SALES_{it}$	−0.074	−0.067	−0.028	−0.057
	(0.074)	(0.069)	(0.082)	(0.069)
$MANUFACTURERS_{it}$	26.842	37.381	−2.820	5.691
	(77.537)	(75.974)	(75.580)	(73.940)
$FIRM\_SIZE_{it}$	−0.140*	−0.116*	−0.206**	−0.091
	(0.077)	(0.065)	(0.101)	(0.087)
$DEREGULATION_{it}$	4.024***	3.956***	5.388***	3.369***
	(1.345)	(1.296)	(1.535)	(1.255)
$VOLUNTARY\_REPORTING_{it}$	−1.043	−0.809	−1.534	−1.069
	(1.254)	(1.146)	(1.280)	(1.131)
$INVOLUNTARY\_REPORTING_{it}$	−0.117	−0.047	−0.140	−0.145
	(0.383)	(0.358)	(0.391)	(0.359)
$CO2\_EMISSIONS_{it}$	−0.023	−0.032	0.002	0.003
	(0.070)	(0.068)	(0.069)	(0.057)
$SIERRA\_CLUB_{it}$	0.113***	0.108***	0.103***	0.110***
	(0.027)	(0.027)	(0.030)	(0.030)
$NUCLEAR\_MORATORIUM_{it}$	8.783	9.417	10.926	9.684
	(5.880)	(5.785)	(8.176)	(7.793)
$DEMOCRATS_{it}$	0.205	0.262	0.269	0.343
	(0.227)	(0.240)	(0.248)	(0.262)
$BUDGET_{it}$	−16.627	−13.559	−12.742	−4.157
	(16.271)	(15.677)	(17.179)	(16.071)
PUC_TENURE_{it}	−0.041	−0.037	−0.013	−0.025
	(0.025)	(0.024)	(0.029)	(0.028)
$ELECT\_PUC_{it}$	−1.089	3.076	−9.597	−18.831
	(18.349)	(19.383)	(27.017)	(26.889)
Observations	762	762	762	762
Chi-square	9500.72***	9581.33***	7627.76***	7678.82***
Instruments	56	57	56	57
AR(1)	−1.333	−1.333	−1.363	−1.412
AR(2)	−0.211	−0.210	−0.312	0.018
Hansen J test	25.954	25.95	25.078	33.54

Standard errors in parentheses. Year fixed effects are included in the analyses.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$ (two-tailed test)

DOI: 10.1002/smj

whether the PEER_REGULATION or NEIGHBOR_REGULATION was greater than the focal firm's exposure to an RPS. To do this, we included dummy variables that identified whether a focal firm's RPS obligations were less than those of its peers, $\text{PEER\_RPS}>\text{FOCAL\_RPS}_{it}$. Table S2 in the online supporting information presents these results. The estimated coefficients on this dummy variable are statistically significant ($p < 0.01$) and consistent with the results in Table 2. When the focal firm's RPS exposure is less than that of its peers, the firm increases its use of renewable power.

Third, if the imitation mechanism were prevalent, we might expect many comparisons relevant to insulate firms, especially comparisons to other firms that external stakeholders would subject a focal firm to. For instance, external interests (i.e., environmental groups, investment analysts, etc.) would be unlikely to compare a Fortune 500 firm to a local or regional firm. Therefore, we assessed whether firms were sensitive to actions of peers, based on the scale or scope of their operations. Because utility firms vary significantly depending on the magnitude of the operations, we redefined the PEER measure by assigning the firms in our sample to deciles by size (MWh sold) and sales (dollars). The deciles determined a utility firm's peer group, and we then calculated the average RPS obligations of each firm's peers with this definition, excluding any commonly shared jurisdictions. We then substituted this variable ($\text{ALTERNATIVE\_PEER\_REGULATION}_{it}$) into our original GMM specification. The results are presented in models 11 and 12 of Table 5. In both cases, the estimate for $\text{ALTERNATIVE\_PEER\_REGULATION}_{it}$ is not statistically different from zero. This finding helps to further rule out that the imitation mechanism drives the results, thereby lending support to the notion that firms are most sensitive to peers within the same regulatory jurisdiction and that they directly compete with in upstream markets.

A second alternative interpretation is that firms respond not to expectations of future regulation but to changes in the input market for renewable power. If input markets are geographically segmented, then our definition of peers, which is based on output markets (i.e., firms that sell electricity in a common state), might spuriously capture this effect. To assess this possibility, we take advantage of the U.S. electricity market being divided into a series of regional wholesale markets that are managed by Independent System Operators (ISO) or the Regional Transmission Organization (RTO). Firms with common membership in these organizations have greater overlap in the input market for renewable power but do not necessarily sell power in common states.[14] As a result, we consider whether the regulatory obligations of peers in the input market affect the environmental performance of a focal firm. If this were the case, then firms would not necessarily be making a strategic choice when responding to potential peer pressure on regulators by others selling power in a common market. In model 13 of Table 5, we include this measure as an additional $\text{ALTERNATIVE\_PEER\_REGULATION}_{it}$, which is computed as before but with the peer groups defined by their membership in a common ISO or RTO. The estimate on this variable is negative but not statistically significant. This finding suggests that firms are not responding to changes in the regulatory obligations of firms they overlap in input markets.

Along these lines, we are concerned that our results might be spurious if renewable resources are not distributed uniformly in the United States. We do not believe that this alternative explanation drives our results for the following reasons. First, multiple sources of renewable power exist in almost every state (Farrell and Morris, 2010). Second, our GMM estimator accounts for firm-specific factors, such as location. Third, utility firms are able to purchase renewable power from sources outside their operational footprint. For example, Indianapolis Power and Light has a 20-year agreement to purchase wind power from a source 700 miles away, in southwestern Minnesota. Similar purchase arrangements have become commonplace in this sector and have created geographical diversity to a firm's generation base.

Finally, we assessed the sensitivity of our results to different operationalizations of the key variables by re-estimating the models with a different measure of $\text{PEER\_REGULATION}_{it}$. Instead of using the most stringent RPS, the modified measure used a weighted average RPS faced by peer firms (based on the MWh of power sold in

[14] For instance, the Midwest Independent System Operator stretches across 14 states from Montana to Ohio.

DOI: 10.1002/smj

Table 5. GMM regression models substituting in alternative definitions of peers

	Model 11 Size peer	Model 12 Sales peer	Model 13 Transmission peer
$NEIGHBOR\_REGULATION_{it}$	−0.014	−0.012	−0.005
	(0.019)	(0.018)	(0.026)
$ALTERNATIVE\_PEER\_REGULATION_{it}$	−0.016	0.030	−0.034
	(0.018)	(0.054)	(0.031)
$PERCENT\_RENEWABLES_{it-1}$	0.250^{***}	0.221^{***}	0.225^{***}
	(0.016)	(0.018)	(0.029)
$HOME\_RPS_{it}$	1.424^{***}	1.313^{***}	1.612^{***}
	(0.122)	(0.149)	(0.185)
$OPERATIONAL\_CAPABILITY_{it}$	7.007^{***}	7.263^{***}	7.309^{***}
	(0.230)	(0.278)	(0.418)
$(HOME\_RPS_{it})*(OPERATIONAL\_CAPABILITY_{it})$	0.154^{***}	0.142^{***}	0.173^{***}
	(0.013)	(0.016)	(0.020)
$RESIDENTIAL\_SALES_{it}$	−0.067	-0.233^{*}	-0.541^{**}
	(0.125)	(0.123)	(0.247)
$INDUSTRIAL\_SALES_{it}$	0.016	0.016	−0.049
	(0.050)	(0.047)	(0.077)
$MANUFACTURERS_{it}$	45.471	47.000	10.445
	(59.740)	(67.570)	(78.397)
$FIRM\_SIZE_{it}$	−0.057	-0.119^{**}	-0.178^{**}
	(0.052)	(0.061)	(0.087)
$DEREGULATION_{it}$	3.471^{***}	3.851^{***}	4.724^{***}
	(0.798)	(0.870)	(1.460)
$VOLUNTARY\_REPORTING_{it}$	−1.049	−1.410	−1.511
	(0.821)	(0.996)	(1.188)
$INVOLUNTARY\_REPORTING_{it}$	−0.143	−0.432	−0.241
	(0.239)	(0.289)	(0.377)
$CO2\_EMISSIONS_{it}$	−0.036	−0.040	−0.008
	(0.054)	(0.060)	(0.071)
$SIERRA\_CLUB_{it}$	0.123^{***}	0.116^{***}	0.109^{***}
	(0.019)	(0.022)	(0.028)
$NUCLEAR\_MORATORIUM_{it}$	6.379	7.900	8.779
	(5.258)	(6.162)	(6.819)
$DEMOCRATS_{it}$	0.129	0.090	0.225
	(0.163)	(0.170)	(0.216)
$BUDGET_{it}$	−11.066	−14.450	−15.836
	(15.801)	(15.922)	(15.858)
PUC_TENURE_{it}	-0.034^{*}	-0.049^{**}	−0.034
	(0.019)	(0.020)	(0.024)
$ELECT\_PUC_{it}$	2.039	−1.835	−2.660
	(18.946)	(17.072)	(18.963)
Observations	762	762	762
Chi-square	18443.47^{***}	10480.42^{***}	8976.64^{***}
Instruments	56	56	56
AR(1)	−1.409	−1.381	−1.343
AR(2)	0.032	0.009	−0.204
Hansen J-test	41.429	32.657	25.244

Standard errors in parentheses. Year fixed effects are included in the analyses.
$^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed test)

each state), before averaging across a focal firm's peers. Similarly, we estimated the models with an alternative to $NEIGHBOR\_REGULATION_{it}$. This modified measure calculated the average RPS objectives for the states contiguous to the state where a focal firm had more than 50 percent of its retail sales. This model was based on the logic that firms would be more sensitive to outside pressures on their key market. In both statistical and economic significance, our results were robust and supported inclusion of these variables as substitutes for the two variables of

DOI: 10.1002/smj

interest. We also tried including a slightly different measure for $\text{OPERATIONAL\_CAPABILITY}_{it}$ by excluding renewable power from its calculation. This variable captured the competence of a firm to manage a diverse fuel mix, but including renewable power in its calculation may complicate its interpretation. Inclusion of this modified variable did not materially change the results.[15]

DISCUSSION

We demonstrate that firms choose to modify their environmental performance when policies set in other jurisdictions affect their peers' operations. In doing so, we document that firms respond to peers not only in product markets but also in nonproduct markets—such as the market for regulation. Thus, firms consider their peers' regulatory exposure, in addition to considering their peers' capabilities and strengths.

Our arguments center on forward-looking firms that may not only imitate what others are doing in an effort to appear legitimate, but also choose to act after assessing whether extrajurisdictional regulations foreshadow regulatory changes where they operate. Why is their choosing to act a strategic choice and not imitation? Institutional isomorphism emphasizes rational or ritualistic imitation as firms emulate successful firms. However, the null result on our ALTERNATIVE_PEER_REGULATION variable identifies that firms in our sample made no discernible effort to resemble the environmental performance of their peers. We find that, rather than imitating the practices of their peers, firms chose to take costly action consistent with how those peers would be statutorily bound elsewhere. Moreover, the finding on the PEER_RPS > FOCAL_RPS variable lends further support to this argument: firms that were less stringently regulated responded by improving their environmental performance when their peers were more stringently regulated elsewhere. Isomorphic pressures, on the other hand, would not necessarily have led to the directional effect we document as firms would be less discriminating when emulating peers.

Prevalence of forward-looking rather than imitative behavior

As we describe in the empirical setup of our study, our context is one where we plausibly might not see forward-looking behavior driving firms' actions. Nevertheless, we believe that certain elements in this setting make the behavior we document more pronounced than in other settings. We describe these factors below, both to better ground our study on strategic choices with existing research that documents imitative behavior and to generalize to the settings where the effects we demonstrate will potentially dominate.

A key element of our theorizing is that peer firms provide insight into how the regulatory environment is likely to change for a focal firm. To make this assessment, managers must be able to assess the environment their peers face and then reach informed expectations regarding how that environment will influence their own environment. In the context of regulatory pressures, these factors are easily satisfied. For example, firms find it relatively easy to assess regulations in jurisdictions where they do not operate. Likewise, although regulatory actors are political actors, in the setting we study, it is clear who the decision makers are. Moreover, it is possible to assess their goals. With these conditions satisfied, firms can make forward-looking assessments of how their regulatory environment can change.

Our conjecture is that in settings where these factors do not hold, we would be less likely to observe the forward-looking behavior and more likely to see imitative behavior. For instance, if the source of environmental change is exogenous (e.g., weather affects input markets) rather than from the choices of a regulator, we expect firms will find it much more difficult to reach informed expectations regarding future environmental conditions because there is no decision maker to assess. When the ability to form informed expectations is lacking, imitation becomes a more favorable strategy if it is an effective way to search and firms are able to learn vicariously (e.g., Asaba and Lieberman, 2011; Greve, 1996, 1998; Semadeni and Anderson, 2010).

Likewise, in settings without a coherent decision maker of environmental change, a focal firm would have greater difficulty understanding the

[15] This analysis is presented in the supporting information as Table S3.

incentives of the environmental actor, thereby mitigating its ability to be forward looking. Moreover, if environmental changes are influenced by diffuse actors, firms might seek to shape the decision makers' choices by undertaking similar actions. Here, firms can lead change by acting in concert, and their imitative behavior would be more pronounced. This would include settings such as corporate governance at industrial firms (Ocasio, 1999) or a new market entry by financial institutions (Haveman, 1993), where it has been demonstrated that isomorphic pressures are pronounced and firms opt to abide by "logic of appropriateness."

The forward-looking choices that we identify help to explain heterogeneity among firms in this mature field and are consistent with research identifying the limits of institutional theory. However, our findings go beyond current research on these limits (e.g., Kraatz and Zajac, 1996) because we identify that forward-looking firms make strategic choices based on their assessment of the landscape of regulations. Identification of this mechanism leads to questions regarding which rules or norms firms choose to follow and how firms strategically weigh these choices. This attribute of our context identifies that multiple logics are not ignored by firms as they consider future states of the world beyond that which they currently operate within. How firms make these types of choices and the influence, if any, of underlying institutional forces would be a worthwhile endeavor for further research. One possible route would be to examine the adoption of a novel practice where firms operate not only across jurisdictions, which vary in regulatory stringency, but also across industries, which vary in institutional pressure or norms.

Therefore, although we have a setting characterized by impediments to forward-looking behavior, we expect even greater impediments in other settings. Future research may contribute fruitful additions to the literature by examining whether the nature of focal firms' decision making is affected by exogenous sources of environmental change, coherence of environmental actors' preferences, or the ability of focal firms to assess peers' environments. This may also include examining other sectors facing multiple levels of regulation, such as banking, which has undergone significant recent regulatory upheaval at domestic and international levels.

Peer effect versus the neighbor effect

We find support for our hypothesis with respect to the peer effect, whereas we find an opposite effect for the neighbor effect in our fully specified models. We interpret this negative effect in the following manner. The adoption of an RPS in a nearby jurisdiction induces a premium in the marketplace for renewable power because many firms will source rather than generate renewable power. Holding all other factors constant, this effect might encourage firms to relinquish the amount of renewable power they source if the increased demand for this power becomes more expensive to source in the input market. For instance, Idaho Power cites in its 2010 Environmental Update the effects of the proliferation of RPS policies in the northwest United States on the overall demand and price for renewable power. Idaho Power claims that this effect has made it difficult to efficiently source renewable power.

Therefore, firms in neighboring jurisdictions might substitute more traditional forms of electricity generation, thereby avoiding increased competition in the input markets for renewable power. Two findings in our analyses lend support to this interpretation. First, the neighbor effect is only negative after we control for the peer effect. Therefore, it occurs only when neighboring states with no or few peers adopt an RPS. Second, the effect is pronounced only for the most capable firms. Again, we expect that these firms are most able to alter their generation portfolio to react to different pressures in the market for renewable inputs. Third, in results reported in the supporting information, we confirm that this result is driven by neighboring states where firms faced greater RPS obligations than a focal firm. Fourth, we conducted additional analyses and found these results pronounced for firms that neighbored states with relatively few renewable resources and nonexistent for firms that neighbored states with abundant renewable resources, which would be consistent with the substitution interpretation.[16]

The size of the PEER_REGULATION effect and its divergence from the NEIGHBOR_REGULATION effect also emphasize that firms' primary

[16] These analyses are presented in the supporting information as Tables S2 and S4.

DOI: 10.1002/smj

conduit for responding to extrajurisdictional regulation is through peer firms and not the policies of geographically proximate jurisdictions. Peer firms provide an accessible, relative comparison for how firms can be both expected to be regulated and expected to perform. Local policy makers who have close linkages to these differentially regulated firms through regulatory mandates or social ties can more easily interpret such a comparison and use it in their own policy formulation.

In some respect, the economic significance of the PEER_REGULATION variable relative to the NEIGHBOR_REGULATION and HOME_RPS variables speaks to the broader literature on rules and norms as authoritative parameters for social or economic behavior (Scott, 1987). This perspective is often used to consider the role of regulation in competitive environments, yet it is distilled to a level that eliminates the heterogeneity of firms. Firms differ not only in their own statutory obligations but also in the obligations of their most direct competitors. These differences can lead to an assortment of rules and norms that vary by firm and that must be accounted for when managers consider strategic choices. The firms in our sample were required to comply only with the RPS in states where they operated (i.e., HOME_RPS); however, we observe that they are sensitive to the RPSs that their peers are obligated to and to those RPSs in neighboring states—to a degree. Determining which rules firms choose to respond to remains an open question but should account for the possibility that these rules may diverge or even contradict each other.

Policy implications

Our findings also offer interesting implications for policy makers by suggesting that policy makers consider regulated firms to be forward-looking strategic actors. Without this appreciation, policy makers may incorrectly assess the economic and social impact of their policies. A firm will likely respond to regulation elsewhere; and such carefully considered regulation, enacted in the firm's own jurisdiction, can, in turn, influence another firm's actions elsewhere. To have the desired impact, policy makers must not myopically consider firms as simple regulation "takers." Instead, they may appreciate the broader competitive environment that includes participation by the firms they regulate. Moreover, policy makers could strongly consider the firms' revealed preferences as demonstrated by their actions rather than relying on their stated preferences that may appear in regulatory hearings, firm documents, or the media.

CONCLUSION

Unlike the traditional situation whereby a firm has legal responsibilities to respond to a policy, we document that firms make strategic choices to respond to public policy in jurisdictions where they do not operate. This result is strategically important because it highlights the opportunity for managerial discretion in responding to policy. In particular, we identify how forward-looking firms can alter competitive environments by acting on policies adopted elsewhere.

The management field has generally considered public policy as an element of institutional design that influences which organizations come into existence and how they evolve. North (1990) emphasizes how institutions are devised to reduce uncertainty by constraining choice sets. From this perspective, managers respond to public policy in an effort not to sway too far from accepted norms and to maintain the legitimacy of their organization relative to its competitors and interested parties. However, that calculus is complicated when policies differ by jurisdiction and firms are forward looking. Rather than simply complying with the most proximate public policy, firms need to consider a broader array of policies and recognize that policy makers may adopt policies established elsewhere. As a result, firms that consider a broader array of policies might be better able to sustain their competitive position. This logic is consistent with our finding that firms choose to respond to policies that their competitors face rather than those established in neighboring jurisdictions.

The significance of policy-related issues and the strategic choices they present to firms is likely to grow as governments and international bodies continue to promulgate novel policies to deal with such issues as financial regulation, climate change, and labor practices. These policies might introduce disparities between competitors that can reshape the basis of competition in sectors

DOI: 10.1002/smj

that are regulated by multiple bodies, including energy, banking, and consumer products. Although our focus has been the choice to improve a firm's environmental performance in response to growing environmental concerns, our results have implications on this broader array of regulatory policies and the strategic choices they present. In particular, further theorizing may consider how extrajurisdictional policy shapes strategic choices such as market entry or diversification. When making such choices, firms can make a forward-looking assessment that considers how future policy may influence performance in new markets.

To understand the wider impact of public policy on firm choice and performance, we need to consider the potential for firms to look beyond their current jurisdictional obligations. By supplementing the focus of a firm's policy requirements with an appreciation of the policy requirements facing its peers, we document a strategic choice that previous research has overlooked. We studied this strategic choice in the context of competitors' roles in a nonproduct market, a research area that is much less developed than competition in product markets. Moreover, this strategic choice represents an opportunity for firms to both reshape their own policy environment and respond to competition in policy and product markets.

ACKNOWLEDGEMENTS

We appreciate helpful comments from the anonymous reviewers, associate editor Anita McGahan, Guy Holburn, Rob King, Alfie Marcus, John Maxwell, Tom Murtha, Rachelle Sampson, and seminar participants at Indiana University and the University of Ottawa. This paper was presented and received helpful comments at the 2011 Academy of Management meeting, the 2011 International Society for New Institutional Economics meeting, the 2010 Strategy and Business Environment conference, and the 2010 Alliance for Research on Corporate Sustainability conference. We appreciate the financial support from Social Sciences and Humanities Research Council of Canada (grant #410-2011-0276).

REFERENCES

Arellano M, Bond S. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* **58**(2): 277–297.

Asaba S, Lieberman MB. 2011. Who imitates whom? An empirical study on new product introductions in the Japanese soft-drink industry. Working paper, Anderson School of Management, University of California, Los Angeles, CA.

Bonardi JP. 2004. Global and political strategies in deregulated industries: the asymmetric behaviors of former monopolies. *Strategic Management Journal* **25**(2): 101–120.

Bonardi JP, Holburn GLF, Vanden Bergh RG. 2006. Nonmarket strategy performance: evidence from US electric utilities. *Academy of Management Journal* **49**(6): 1209–1228.

Buysee K, Verbeke A. 2003. Proactive environmental strategies: a stakeholder management perspective. *Strategic Management Journal* **24**(5): 453–470.

Capron L, Chatain O. 2008. Competitors' resource-oriented strategies: acting on competitors' resources through intervention in factor markets and political markets. *Academy of Management Review* **33**(1): 97–121.

Case AC, Rosen HS, Hines J JR. 1993. Budget spillovers and fiscal policy interdependence: evidence from the states. *Journal of Public Economics* **52**(3): 285–307.

Caves RE. 1996. *Multinational Enterprise and Economic Analysis* (2nd edn). Cambridge, UK: Cambridge University Press.

Christmann P, Taylor G. 2001. Globalization and the environment: determinants of firm self-regulation in China. *Journal of International Business Studies* **32**(3): 439–458.

Delmas M, Russo MV, Montes-Sancho MJ. 2007. Deregulation and environmental differentiation in the electric utility industry. *Strategic Management Journal* **28**(2): 189–209.

Dowell G, Hart S, Yeung B. 2000. Do corporate global environmental standards create or destroy market value? *Management Science* **46**(8): 1059–1074.

Energy Information Administration. 2011. *Emissions of Greenhouse Gases in the United States 2008*. US Department of Energy: Washington, DC.

Eskeland GS, Harrison AE. 2003. Moving to greener pastures? Multinationals and the pollution haven hypothesis. *Journal of Development Economics* **70**(1): 1–23.

Farrell J, Morris D. 2010. *Energy Self-Reliant States*. Institute for Local Self-Reliance: Minneapolis, MN.

Fremeth AR. 2009. The dynamic relationship between firm capabilities, regulatory policy, and environmental performance: renewable energy policy and investment in the U.S. Electric Utility Sector. Doctoral diss., University of Minnesota: Minneapolis, MN.

Fremeth AR, Holburn GLF. 2012. Information asymmetries and regulatory decision costs: an analysis of U.S. electric utility rate changes 1980–2000. *Journal of Law, Economics and Organization* **28**(1): 127–162.

Galbraith K, Wald ML. 2008. Energy goals a moving target for states. *New York Times* 5 December: B1.

Greve HR. 1996. Patterns of competition: the diffusion of a market position in radio broadcasting. *Administrative Science Quarterly* **41**(1): 29–60.

Greve HR. 1998. Performance, aspirations, and risky organizational change. *Administrative Science Quarterly* **43**(1): 58–86.

Hannan MT, Freeman J. 1977. The population ecology of organizations. *American Journal of Sociology* **82**(5): 929–964.

Haveman HA. 1993. Follow the leader: mimetic isomorphism and entry into new markets. *Administrative Science Quarterly* **38**(4): 593–627.

von Hippel E. 1998. Economics of product development by users: the impact of "sticky" local information. *Management Science* **44**(5): 629–644.

Holburn GLF, Zelner BA. 2010. Political capabilities, policy risk, and international investment strategy: evidence from the global electric power generation industry. *Strategic Management Journal* **31**(12): 1290–1315.

Holtz-Eakin D, Newey W, Rosen HS. 1988. Estimating vector autoregressions with panel data. *Econometrica* **56**(6): 1371–1395.

Kim EH. Deregulation and differentiation: incumbent investment in green technologies. *Strategic Management Journal,* forthcoming.

King AA, Shaver JM. 2001. Are aliens green? Assessing foreign establishments' environmental conduct in the United States. *Strategic Management Journal* **22**(11): 1069–1085.

Klassen RD, Whybark DC. 1999. The impact of environmental technologies on manufacturing performance. *Academy of Management Journal* **42**(6): 599–615.

Kraatz MS, Zajac EJ. 1996. Exploring the limits of new institutionalism: the causes and consequences of illegitimate organizational change. *American Sociological Review* **61**(5): 812–836.

Levin A, Lin CF, Chu CS. 2002. Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of Econometrics* **108**(1): 1–24.

Linck JS, Netter JM, Winotki J. 2012. Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics* **105**(3): 581–606.

Majumdar SK, Marcus AA. 2001. Rules versus discretion: the productivity consequences of flexible regulation. *Academy of Management Journal* **44**(1): 170–179.

Maxwell JW, Lyon TP, Decker C. 2000. Self-regulation and social welfare: the political economy of corporate environmentalism. *Journal of Law and Economics* **43**(2): 583–617.

North DC. 1990. *Institutions, Institutional Change, and Economic Performance*. Cambridge University Press: Cambridge, UK.

Ocasio W. 1999. Institutionalized action and corporate governance: the reliance on rules of CEO succession. *Administrative Science Quarterly* **44**(2): 384–416.

Quinn JB. 1980. *Strategies for Change: Logical Incrementalism*. Richard B. Irwin: Homewood, IL.

Reger RK, Huff AS. 1993. Strategic groups: a cognitive perspective. *Strategic Management Journal* **14**(2): 103–123.

Roodman D. 2009. How to do xtabond2: an introduction to difference and system GMM in Stata. *The Stata Journal* **9**(1): 86–136.

Russo MV. 2001. Institutions, exchange relations, and the emergence of new fields: regulatory policies and independent power production in America, 1978–1992. *Administrative Science Quarterly* **46**(1): 57–86.

Russo MV. 2003. The emergence of sustainable industries: building on natural capital. *Strategic Management Journal* **24**(4): 317–331.

Scott WR. 1987. *Institutions and Organizations*. Sage: Thousand Oaks, CA.

Semadeni M, Anderson B. 2010. The follower's dilemma: innovation and imitation in the professional services industry. *Academy of Management Journal* **53**(5): 1177–1193.

Sharma S, Vredenburg H. 1998. Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. *Strategic Management Journal* **19**(8): 729–753.

Sine WD, David RJ, Mitsuhashi H. 2007. From plan to plant: effects of certification on operational start-up in the emergent independent power sector. *Organization Science* **18**(4): 578–594.

Sine WD, Lee BH. 2009. Tilting at windmills? The environmental movement and the emergence of the U.S. wind energy sector. *Administrative Science Quarterly* **54**(1): 123–155.

Staiger D, Stock JH. 1997. Instrumental variables regressions with weak instruments. *Econometrica* **65**(3): 557–586.

Stock JH, Yogo M. 2005. Testing for weak instruments in IV regression. In *Identification and Inference for Econometric Models: A Festschrift in Honor of Thomas J. Rothenberg*, Andrews DWK, Stock JH (eds). Cambridge University Press: Cambridge, UK; 80–108.

Volden C. 2006. States as policy laboratories: emulating success in the Children's Health Insurance Program. *American Journal of Political Science* **50**(2): 294–312.

Volden C, Ting MM, Carpenter DP. 2008. A formal model of learning and policy diffusion. *American Political Science Review* **102**(3): 319–332.

Walker JL. 1969. The diffusion of innovations among the American states. *The American Political Science Review* **63**(3): 880–899.

Windmeijer F. 2005. A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics* **126**(1): 25–51.

Zelner BA. 2001. Political Institutions, interest group competition and investment strategy: international and domestic applications to electric utilities. Doctoral diss., University of California, Berkeley: Berkeley, CA.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Table S1. Correlation matrix.
Table S2. GMM regression models identifying source of extra-jurisdictional regulatory pressure.
Table S3. GMM regression model with operational capability measure that does not include renewable power.
Table S4. GMM regression models with sample split by availability of renewable resources (% of total generating capacity from renewable sources by state).

DOI: 10.1002/smj