Whose Backyard and What's at Issue?: Spatial and Ideological Dynamics of Local Opposition to Fracking in New York State, 2010-2013*

Fedor A. Dokshin
Department of Sociology
Cornell University
349 Uris Hall
Ithaca, NY 14853
fad7@cornell.edu

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* Address correspondence to Fedor A. Dokshin, Department of Sociology, Cornell University, 349 Uris Hall, Ithaca, NY 14853. I wish to thank David Strang, Ben Cornwell, Sidney Tarrow, David Meyer, Alicia Eads, Dan Sherman, Roman Galperin, Chan Suh, Amanda Buday, Dan DellaPosta, the anonymous reviewers, and the *ASR* editors for valuable comments on previous drafts of the article. Early versions of the article were presented and received valuable feedback at the meeting of the American Sociological Association, San Francisco, August 2014, at the Young Scholars Conference, University of Notre Dame, May 2015, and in the graduate student research seminar at Cornell.

ABSTRACT

What drives local decisions to prohibit industrial land uses? This study examines the passage of municipal ordinances prohibiting gas development using hydraulic fracturing (“fracking”) in New York State. I argue that local action against fracking depended on multiple conceptions of the shale gas industry. Matching these alternative conceptions with prevailing spatial models of public response to industrial land uses—“Not in my backyard”, “Not in anyone’s backyard,” and “Please in my backyard”— improves our understanding of where local contention might emerge and how it contributes to policy change. Results from event history and logistic regression analyses show, first, that communities lying above favorable areas of the shale did not pass anti-fracking laws, because opposition to fracking was counteracted by significant local support for development. Fracking bans passed primarily in a geographic *sweet spot* in the periphery of the targeted region, where little or no compelling economic interest in development existed. Second, as fracking became the subject of a highly politicized national debate, local opposition increasingly reflected mobilization by political liberals. This trend is reflected in the increasing rate of ordinance adoption among Democratic-leaning communities outside of the geographic sweet spot.

INTRODUCTION

Understanding local responses to industrial projects is of long-standing interest to social scientists (Slovic 1987; Freudenburg and Pastor 1992). Divergent community responses to industrial siting contribute to the unequal distribution of health and environmental hazards (Gaventa 1980; Saha and Mohai 2005; Pais, Crowder, and Downey 2014) and shape the emergence and diffusion of new technologies and industries (Walsh, Warland, and Smith 1997; Sine and Lee 2009).

Prohibiting an industrial siting requires the mobilization of a critical mass of local residents, with sufficient resources, who share a common interest in stopping the proposed development. Traditionally, researchers have referred to industrial projects as locally unwanted land uses (LULUs) and described opposition to them as being motivated by “Not in my backyard” (NIMBY) attitudes (Freudenburg and Pastor 1992; Schively 2007). Recent scholarship, however, finds significant variation in residents’ perceptions of proposed sitings. While some residents focus on the negative impacts of a proposed siting (Esaiasson 2014), others may emphasize its economic benefits (Kunreuther and Easterling 1996; Jerolmack and Walker 2016), and many never develop or express a clear position one way or another (Boudet et al. 2014). These perceptions (and non-perceptions) of risk and benefit, moreover, do not only depend on local opinion about potential impacts, but may additionally reflect politicized debates about the industry that occur in the broader public sphere (Gamson and Modigliani 1989; Michaud et al. 2008; Jenkins-Smith et al. 2011; McAdam and Boudet 2012). Although we know that people develop different conceptions of industrial projects, we know little about how these conceptions trigger mobilization and contribute to local decisions to restrict industrial land uses.

I argue that different conceptions of risks and benefits of industrial projects correspond to alternative bases of opposition and support, and that delineating these alternative bases is key to explaining why some communities ban industrial land uses and others do not. I highlight two important distinctions in how community residents understand industrial projects. First, risk from an industrial project provides motivation for NIMBY opposition, but in contexts where economic benefits of industrial projects can be credibly framed, some community residents may express support even for risky projects (Gravelle and Lachapelle 2015; Boudet et al. 2016). Successful opposition thus depends on overcoming resistance from industry supporters, which will vary across different community contexts. Second, in addition to perceived local impacts, when an industry is politicized in national debates, ideology and/or political identity will provide an alternative basis for opposition (Michaud et al. 2010). Reflecting a "Not in anyone's backyard" (NIABY) attitude, opposition based on political identities is less geographically constrained.

I test these arguments in an event history analysis of adoptions of zoning ordinances prohibiting hydraulic fracturing ("fracking") in New York State. Fracking refers to the process of stimulating oil and gas wells by pumping liquid into the well at high pressure. The liquid, containing water, a mix of chemicals, and sand particles, shatters the rock and helps to release the gas locked inside. Technological innovations in horizontal drilling and fluid mechanics have expanded the potential of fracking for developing oil and gas reserves in the United States (Wilber 2012). This new technique is often called high-volume hydraulic fracturing (HVHF), to distinguish it from a technique that has been used in the industry since the 1940s, but on a much smaller scale. The use of HVHF has fueled a veritable energy revolution in the United States (Wilber 2012; Levi 2014). The technology is the main reason that the United States is projected to become a net energy exporter by 2019 for the first time since the 1950s (US Energy

Information Administration 2015). But fracking has also provoked intense opposition in some communities (Vasi et al. 2015). The tactic of banning fracking at the municipal level, in particular, counts as a significant threat to the burgeoning oil and gas industry across the United States with local ban campaigns recently spreading to key oil- and gas-producing states (Healy 2015).

While the municipal fracking ban movement is important in its own right, the setting also provides an ideal opportunity to advance research in environmental sociology and social movement scholarship. First, the sudden emergence of the shale gas industry allows me to examine local responses by hundreds of communities, which were put at varying degrees of risk by their proximity to proposed shale gas development and whose residents also faced different prospects of economic rewards from the development (Jacquet and Stedman 2011; Wilber 2012; Jerolmack and Walker 2016). I find that proximity to proposed gas wells, by structuring where risk and reward could be credibly framed, is a key predictor of whether a community adopted an ordinance. Strikingly, fracking bans rarely passed in region most likely to see intense development, but proliferated in a geographic *sweet spot* on the periphery of the potential development region. In these communities, little or no compelling economic interest in development existed, but residents still perceived potential risk and thus compelled their town board to pass protective ordinances. By contrast, local fights over fracking were highly divisive in the most favorable shale region, reflecting competing visions of gas development. Primary data on public participation in one town suggests that local support for fracking was significant and concentrated among large landowners.

Second, the setting provides a unique opportunity to examine the effect of an issue's politicization on social movement mobilization and local policy change (Kahan, Jenkins-Smith, and Braman 2011; Heaney and Rojas 2015). During the period of the local ban movement, shale gas development emerged from a local land use issue to become the subject of intense national debate (Boudet et al. 2014; Vasi et al. 2015). I leverage this temporal trend to show that the politicization of fracking led to a compositional change among fracking opponents. While locally perceived threats and benefits continued to be important, as the issue gained broader public attention the adoption of ban ordinances increasingly reflected mobilization by Democratic partisans.

EXPLAINING LOCAL DECISIONS TO PROHIBIT INDUSTRIAL PROJECTS

Drawing on existing research on public responses to industrial projects, I first examine the different conceptions of an industrial project's risks and benefits that may emerge. I then relate these conceptions to spatial models of public response and to develop expectations about how the mobilization of residents motivated by different conceptions contributes to local policy change.

The Local Sources of Opposition to and Support for Industrial Siting

One important thread in existing research on industrial siting is that the nature of public response reflects residents' beliefs about the *local* impacts associated with the proposed siting. Perhaps the most influential explanation of opposition to industrial siting is that residents are motivated by their self-interest to oppose projects. This view, embodied within the NIMBY ("Not in my backyard") framework, holds that residents perceive that a siting will adversely affect their quality of life, their health, and/or their property values, and they mobilize in an effort to prevent this from happening (Kraft and Clary 1991; Schively 2007; Esaiasson 2014).

Observing that residents do not always respond with opposition when faced with a risky project, recent scholarship has shifted the analytic focus to include factors that may inhibit the emergence of opposition (e.g., McAdam and Boudet 2012). Researchers draw on studies of risk perception under uncertainty (e.g., Slovic 1987) to argue that some elements of community context facilitate perception of threat while others predispose community members toward inaction (Auyero and Swistun 2008; McAdam and Boudet 2012). For instance, objective conditions, such as economic vulnerability and previous experience with the proposed industry may decrease the chances that a siting is perceived as a threat (e.g., Wright and Boudet 2012). Similarly, subjective dimensions, such as place attachment (e.g., Devine-Wright 2009) and place history (e.g., Molotch, Freudenburg, and Paulsen 2000; Auyero and Swistun 2008) influence residents' responses.

Although scholars have given less attention to local support for industrial projects, there is evidence that residents sometimes develop positive conceptions of a project through emphasizing its (usually economic) benefits (e.g., Gravelle and Lachapelle 2015; Boudet et al. 2016; Jerolmack and Walker 2016). Most directly, compensation to residents near a sited facility can win their acceptance of a project (Kunreuther and Easterling 1996). Other research finds that residents are more likely to support projects that promote local ownership of the facilities (Devine-Wright 2005; Warren and McFadyen 2010). The extensive literature on boomtowns also finds that enthusiasm for new development is a common stage experienced by local residents, especially in economically vulnerable communities (Gilmore 1976; Thompson and Blevins 1983). In sum, for both opposition and support, the distribution of perceived local impacts critically shapes the pattern of public response to a proposed industrial project.

Industry Politicization and Ideological Bases of Public Response

Although much existing research focuses on the perceptions of local impacts from industrial projects, scholars have also observed that the siting of many types of industries is amenable to being framed as an issue of broad popular concern (Gamson and Modigliani 1989; Michaud et al. 2008; Boudet 2011; Rootes 2013). Rather than a response to perceived local impacts, opposition may instead be grounded in political identities and/or ideological commitments and organized by non-local actors (Michaud et al. 2008; McAdam and Boudet 2012; Rootes 2013).

Previous studies show that connecting a siting dispute with more general issues of environmental management may help local opponents to enlist a broader set of constituents, spread opposition to a wider geographic area, and ultimately increase the chances of success (Walsh et al. 1997; Boudet 2011; McAdam and Boudet 2012). Research finds that people use partisan identification and ideology as essential lenses to process information about new industries and form opinions about them (Michaud et al. 2008; Jenkins-Smith et al. 2011; Boudet et al. 2014; Davis and Fisk 2014; Gravelle and Lachapelle 2015). In a study that directly compares NIMBY and ideological bases of opposition to industrial siting, Michaud and colleagues (2008) find no evidence that proximity predicts opposition to offshore drilling among California residents but do find that negative attitudes are strongly related to several measures of political orientation. They conclude that politicized, national discourse about the oil industry motivated Democratic partisans to oppose the drilling.

Partisan opposition to new industries is part of a broader trend in contemporary United States toward the increased importance of partisan identities for structuring political opinions and political activism (Kahan et al. 2011; McCright and Dunlap 2011; Feinberg and Willer 2012; Heaney and Rojas 2015). Americans' positions on one issue are increasingly predictive not only of their ideology and partisan identity (Baldassarri and Gelman 2008) but also of their lifestyle choices and cultural affinities (DellaPosta, Shi, and Macy 2015). Taking a stand on a politicized issue can be less about the perceived risks and benefits and more about affirming the kind of person you are (Kahan et al. 2011; Feinberg and Willer 2012). The implication for research on public response to industrial projects is that politicized discourse about an industry helps redefine the perceived stakes of the issue and thereby supplement local perceptions of risk as the basis for opposition.

Alternative Conceptions, Geography, and Local Policy Change

While research identifies different conceptions of industrial projects, scholars have paid little attention to how these alternative conceptions collectively shape local land use decisions. I emphasize the distinction between opponents and supporters of industrial projects and between local and politicized conceptions of industrial impacts. Combining this with spatial models of public response to industrial siting suggests specific expectations about where opposition emerges and where it leads to local decisions to prohibit industrial land uses.

Scholars conceive of public response to industrial projects in spatial terms, but disagree about the key relationship—geographic proximity to the proposed site and opposition. From one major perspective, most evocatively associated with the "Not in my backyard" (NIMBY) framework, industrial projects are understood as local grievances, suggesting that opposition should concentrate in the immediate proximity of the proposed project (e.g., Esaiasson 2014). Several studies, however, find evidence of a "Please in my backyard" (PIMBY) effect,[1] wherein residents closer to the siting are actually more likely to accept or support it (e.g., Gravelle and Lachapelle 2015; Boudet et al. 2016; Jerolmack and Walker 2016). While still other scholars offer a “Not in anyone’s backyard” (NIABY) account, based on research that finds little or no effect of proximity on opposition, but a strong effect of political identities (e.g., Michaud et al. 2008).

Findings of these different spatial patterns are often treated as evidence for competing explanations, but perhaps they are better seen as complementary—reflecting the fact that people oppose (and support) industrial projects for different reasons. In particular, political identity and perceived local impacts (positive and negative) may provide alternative bases of opposition or support, which give rise to different *types* of opponents and supporters. The theoretical importance of delineating alternative social bases of mobilization is stressed by Gould (1995) who argued that explaining mobilization requires specifying the social identification that defines a person’s interests within a specific contentious episode and furnishes her with the motivation and sense of obligation to mobilize (p. 13). A key implication of this theoretical point is that important distinctions can be drawn not only between opponents and supporters, but also among participants on the same side of the conflict.[2] In the context of industrial siting, opponents may, for example, mobilize as members of a bedroom community whose sense of place is incompatible with industrial development (Devine-Wright 2009) or as political liberals who view their opposition as an extension of their environmentalist ideology (Michaud et al. 2008). The researcher’s task is to unpack the alternative social bases that underlie mobilization on either side of a particular siting conflict and show which of the alternative appeals for mobilization can be credibly framed under the local conditions (Walder 2009; Wright and Boudet 2012).

From this perspective, the conflicting findings about the *average* effect of proximity on public response may conceal important heterogeneity of the effect by type of opponent or supporter. Gravelle and Lachapelle’s (2015) study of public attitudes toward the Keystone XL pipeline illustrates this heterogeneity in the context of a highly politicized industrial project. They find that residents in close proximity to the pipeline's route tend to favor the project. This result, which is evidence for a PIMBY effect, holds irrespective of political orientation. However, with greater distance from the pipeline route, liberal, but not conservative, respondents' attitudes turn negative, suggesting the presence of a NIABY-style opposition rooted in a liberal political orientation. Gravelle and Lachapelle suggest that proximate residents' greater knowledge of localized economic benefits from the pipeline supplanted an ideological response. More generally, we should expect that people express and act upon alternative conceptions of industrial projects and that these alternative conceptions have unique geographic signatures: NIMBY, PIMBY, and NIABY.

Geographic proximity is therefore an important variable for understanding public response to industrial projects, but its effect is conditioned by (1) the evaluation of localized risks and benefits and (2) the broader political debates that legitimize opposition or support as expressions of political identity. To understand where opposition to an industrial project might be successful requires us to consider how these alternative bases of opposition and support intersect within individual communities.

Opposition based on local conceptions is most likely to develop when the project's risks can be credibly framed in the local context (Wright and Boudet 2012). Similarly, local support is expected to concentrate where economic benefits of the project are salient. The size of the "backyard" (i.e., the relative geographic scale at which the risks or benefits are perceived) may be different for NIMBY and PIMBY responses, but both responses are a function of proximity to proposed development (Jacquet 2012; Gravelle and Lachapelle 2015). On the other hand, opposition based on politicized conceptions of industries will be less constrained by proximity to an actual project. Instead, in a given community, the strength of this NIABY-style opposition depends, first, on the prevalence of public debate that effectively frames the industry in ways that resonate with salient political identities (Benford and Snow 2000; Jenkins-Smith et al. 2011) and, second, on the volume of local residents who hold the relevant political identity.

In the empirical analyses that follow, I examine local decisions to prohibit fracking among communities in New York State. My main argument is that whether a community passed a ban on fracking depended in part on the different conceptions of the risks and benefits of fracking that prevailed among residents of the community. Below, I first introduce the empirical setting and then turn to a discussion of the alternative bases of opposition and support, their geographic distribution relative to potential shale gas development, and how the relative size of partisan opposition in particular changed as fracking became the subject of intense national debate.

NEW YORK STATE AND THE SHALE GAS REVOLUTION

The recent emergence of fracking, or HVHF, technology has unlocked so-called "unconventional" oil and gas reserves, most notably in shale rock formations deep beneath the earth's surface. Among the sources of natural gas that fracking has made accessible, the Marcellus Shale formation, a massive rock deposit underlying a large area of the American Northeast, is the most impressive (Engelder 2009; Wilber 2012). Pennsylvania, where the geology and the regulatory environment were most favorable, became an early leader in producing shale gas from the Marcellus. Buoyed by impressive production reports from Pennsylvania, enthusiasm for Marcellus gas quickly spilled across the border into New York. By

2007 gas companies were aggressively leasing acreage in the state, particularly in the region immediately adjacent to Pennsylvania, known as the Southern Tier (Wilber 2012).

New York's existing regulations were not favorable to shale gas development, but lawmakers quickly passed a critical bill in 2008 that made it easier to issue permits for shale gas wells. The Governor signed the bill into law, but ordered the New York Department of Environmental Conservation (DEC) to review the Generic Environmental Impact Statement governing well permitting guidelines. The review was publicly interpreted as a "cautionary yellow light" in the progress toward full-scale shale gas development in New York (Applebome 2008). Observers believed that fracking in New York was inevitable, and that the review—slated to be completed within a year—would not impede development in a serious way (Wilber 2012). These estimates proved wrong as the anti-fracking movement grew rapidly under the de facto moratorium. Opponents pressured the agency into multiple rounds of review; until, six years later in December 2014, New York banned the use of fracking in the state (Kaplan 2014). These state-level politics provide essential context for the municipal ban movement. The extended environmental review, in particular, created space for the municipal ban movement to emerge. Between March 2010 and July 2013, 164 towns and cities passed land use ordinances prohibiting fracking in New York (see Figure 1).

--Figure 1--

The Local Politics of Fracking

To understand how locally perceived risks and benefits shaped the adoption of anti-fracking land use ordinances requires some attention to the geography of shale gas development in New York.

Although much of upstate New York lies above the Marcellus Shale, and an even larger area lies atop the fossil-fuel-rich Utica Shale, critical geological factors constrain potential shale gas development in New York to the Southern Tier region along the border with Pennsylvania (Engelder 2009; Wilber 2012). The Marcellus Shale is deep enough only in this region to permit gas development and geologists estimate that the region of productive Utica Shale largely overlaps with that of the Marcellus (Wilber 2012). The gas well permit record provides further support for these estimates of the distribution of development potential in New York. Figure 2 shows the geographic extent of the Marcellus and Utica Shale and the concentration of HVHF well permits in New York State. Each circle represents a filed well application. Consistent with geologists' estimates of the fairway regions, the applications are limited to seven counties, mostly along the Pennsylvania border.[3]

--Figure 2--

NIMBY Opposition: Fracking is a vividly industrial activity. The drilling process itself, lasting about six weeks for a typical well, proceeds 24-hours a day causing significant noise and light pollution for proximate residents. Among the biggest local concerns is the massive influx of truck traffic, primarily for transporting water to and from the well sites. Development also brings an influx of transient workers, which strains local public services and has been associated with elevated crime rates (Jacquet 2014). Aside from these observable disturbances, uncertainty about potential health and environmental impacts provide additional motivation for local opposition (Wilber 2012; Boudet et al. 2014). In this way, fracking resembles the siting of projects involving other complex technologies (Walsh 1991; Sherman 2011; McAdam and Boudet 2012).[4]

Disruptions to daily life and health and environmental effects are expected to decrease with distance from proposed well sites, which is consistent with the idea of NIMBY-style opposition. However, it is important to note that the geographic scale at which people perceived the risks was substantial. A main reason for this is that the majority of the state's towns lie above at least one of the two targeted shale formations (Figure 2). Although most parts of the shale are not productive, few in the general public were aware of this. Another reason is that the shale gas industry would require additional infrastructure be built for storing and transporting the gas, which would potentially extend into the surrounding communities. This leads us to expect that, although the geographic scale at which risks from fracking could be credibly framed was necessarily limited, NIMBY-style opposition likely extended beyond the immediately targeted communities into the surrounding towns, especially those lying on one or both of the shale formations.

PIMBY Support: Gas development was also framed as having positive economic effects, which served as a basis of local support for fracking. Development may provide a new source of tax revenue for local governments and create new employment opportunities with gas companies and in related industries (Jacquet 2014). Perhaps most importantly, development offers substantial cash transfers in the form of lease and royalty payments to local landowners (Jacquet and Stedman 2011; Jerolmack and Walker 2016).[5] Appeals to economic benefits should especially resonate with residents of the economically depressed upstate New York region where development would concentrate (Wright and Boudet 2012). Indeed, research finds that residents of communities targeted for shale gas development sometimes adopted favorable conceptions of fracking. Residents in Pennsylvania, especially leaseholders, expressed significant support for the gas industry (Jacquet 2012; see also Willits et al. 2013; Jerolmack and Walker 2016).

In New York State, political support for the gas industry also accompanied favorable geologic conditions. Notably, landowner coalitions, which were organized during the early stages of the gas boom to collectively bargain for better lease terms with gas companies, emerged as strong supporters of gas development in communities lying above the most favorable regions of the shale (Jacquet and Stedman 2011; Wilber 2012). Signs distributed by the landowner coalitions quickly spread along country roads across much of the Southern Tier region, identifying property owners as "Friends of Natural Gas."

These observations lead us to expect that in communities targeted for development, PIMBY supporters of fracking may counter local opposition and decrease a community's likelihood of adopting an anti-fracking ordinance. PIMBY support, however, operates on a different geographic scale than NIMBY opposition. Whereas risk from fracking was perceived across much of the Upstate region, economic benefits of shale gas development could only be credibly framed in communities where the gas industry expressed an interest in leasing acreage. Considering local opposition and support together, we should expect that anti-fracking ordinances will be most likely to pass in the periphery of the targeted region, where perception of threat existed but promises of economic benefits were not credible.

Politicization of Fracking

During the period of the municipal ban movement, fracking evolved from an obscure issue concerning land use in rural upstate New York to become a popular and ideologically polarized issue (Mazur 2016). Fracking was slow to gain media and popular attention and initially lacked ideological salience and there are two key facts that remind us of this. First, the 2008 regulation enabling shale gas development, passed both houses with overwhelming bipartisan support and with little notice by the public at large. *The New York Times* reported on the law's passage at the time: "Sometimes big issues coalesce with people barely seeing them" (Applebome 2008). Reflecting the lack of the issue's political salience, the article was just the third ever that the newspaper published that mentioned "fracking" or "hydraulic fracturing." Second, there was no consensus about fracking within the environmental community. While some regional environmental groups pressed the New York Governor to slow development (Wilber 2012), the Sierra Club and other mainstream, national environmental organizations *endorsed* hydraulic fracturing, seeing natural gas as a potential alternative to the carbon-intensive coal industry (Sheppard 2012).

--Figure 3--

Though public debate about fracking was slow to start, it grew rapidly. As shown in Figure 3, whereas a total of just twenty-two articles about fracking appeared in *The New York Times* before 2010, nearly forty articles mentioning "fracking" or "hydraulic fracturing" were being published *every month* in 2012. A measure of Google search volume for the word "fracking" by New Yorkers mirrors the trend in newspaper coverage (bottom panel of Figure 3).

Meanwhile, the biggest environmental argument for developing natural gas—that it was a less carbon-intensive alternative to coal—was being challenged by new research suggesting that the amount of methane that leaks during production may offset the relatively lower carbon dioxide emissions of gas-powered power plants (Howarth, Ingraffea, and Engelder 2011). Popular films like the documentary *Gasland* and the fictional Hollywood production, *Promised Land*, contributed to the emerging environmentalist opposition to fracking (Vasi et al. 2015). By 2012 the Sierra Club could no longer sustain its endorsement of shale gas and retain legitimacy among its base, and it officially came out against hydraulic fracturing (Sheppard 2012).

As more people learned about fracking, they did so in an increasingly politically polarized information environment. In a study that compares attitudes of Pennsylvania residents between 2009 and 2012, Willits and colleagues (2013) identify a rapid learning process. They document increasing polarization on the issue and an increased emphasis on environmental impacts among opponents. Polls conducted after 2012 show a vast partisan divide on attitudes toward fracking, with liberals opposing the technology and conservatives supporting its use (Boudet et al. 2014; Davis and Fisk 2014). These developments signaled a substantial shift in the public debate surrounding fracking during the period of the local ban movement, 2010 to 2013.

I expect that politicization of fracking led to greater mobilization of political partisans. This shift should increase the likelihood of ordinance adoption among communities with large Democratic constituencies, independent of proximity to proposed development.

Policy Diffusion

While much of the research on opposition to industrial siting looks for explanatory factors within communities, I also expect that activities in surrounding communities might influence passage of protective ordinance. Previous research finds evidence for spatial policy diffusion in multiple domains and for different units of analysis (Vasi and Strang 2009; Andrews and Seguin 2015). One reason is that collective action spreads geographically (Hedstrom 1994), but also local learning processes influence decision makers (Tolbert and Zucker 1983). In the context of municipal fracking bans, interaction between town officials was especially important because zoning ordinances prohibiting fracking were controversial and faced legal challenge. Town officials learned about the legal rationale behind the ordinances from officials of neighboring towns and could develop the sense of a "safety in numbers," knowing that they were not acting alone in the face of lawsuit threats. This is precisely the setting where endogenous diffusion dynamics are expected.

DATA AND METHODS

In the main analysis, I examine the adoption of anti-fracking ordinances among communities in New York State. I focus on New York for several reasons. New York had the most extensive town ban campaign, which permits a quantitative analysis of local opposition. At the same time, focusing on a single state enables a more in-depth analysis characteristic of a case study. My analysis draws on field observations and primary documents and secondary sources related to the fracking debate in New York State. Specifically, I collected and reviewed over five hundred documents (including town-board minutes and local newspaper articles), and over the course of three years (2011-2013), I attended town board hearings on proposed fracking bans in five communities, and sat in on nine meetings of anti-fracking organizations and two meetings of organizations that supported fracking. In general, this dual-analytical framework contributes to recent calls to make studies of social movements more grounded methodologically (McAdam and Boudet 2012). While New York's anti-fracking movement was highly successful, because my primary outcome of interest is at the community level, the analysis avoids the common criticism that social movement studies select cases on the dependent variable by including all communities—those that passed bans and those that did not.

Event History Data

The population of communities at risk of adopting an anti-fracking law consists of New York's 994 municipalities—932 towns and 62 cities.[6] The event of interest is the passage of a town or city's first zoning ordinance prohibiting fracking, either a ban or a moratorium. During the period of analysis (March 2010 to July 2013), 164 municipalities passed an ordinance.[7] The dependent variable is a municipality's hazard of ordinance adoption—i.e., the probability that a particular town in the risk set adopt an ordinance in a particular time period. A town exits the risk set after adopting an ordinance. I used primary and secondary sources to compile data on the adoption of ordinances, referring to lists maintained by two independent organizations—Food and Water Watch, which took an early interest in the local campaign to ban fracking and kept a record of town laws, and Fractracker, which kept close track of New York's local ban movement. For each town or city thus identified, I obtained a copy of the meeting minutes from the session during which the ordinance was passed and/or an article in a newspaper that referenced the day of the law's passage.[8]

The inclusion in my analysis of all New York municipalities, large and small, distinguishes my research design from most recent studies of policy diffusion. Researchers often omit smaller communities from analysis due to data limitations and focus instead on larger political units—states, counties, or large cities (e.g., Tolbert and Zucker 1983; Vasi and Strang 2009). Studying small communities is important for several reasons. First, there is increased recognition that policy change at higher levels of the federal system is often precipitated by struggles at lower rungs of the system (Andrews and Seguin 2015). Second, exclusion of large amounts of political action that happens in smaller communities may yield biased estimates of diffusion effects. Finally, excluding small, sparsely populated communities is especially problematic in studying the spread of land use policies, because these communities comprise the largest share of the area where industrial projects are sited. As of the 2010 Census, 329 of New York's 994 municipalities have fewer than 2,000 residents and nearly two-thirds (628) have fewer than 5,000 residents. These sets of municipalities make up 34 and 68 percent of New York's entire land area, respectively. The inclusion of small communities is an important contribution of the present study.

Independent Variables

Proximity to Development and the Strength of NIMBY and PIMBY Constituencies

Proximity confounds two latent variables: (1) risk from fracking, which motivates NIMBY opposition and (2) potential economic benefits from fracking, which motivate PIMBY support. My proposed explanation suggests an approximately curvilinear relationship between proximity and the probability of passing a ban (Jenkins-Smith et al. 2011). The probability should be lower in communities that are most proximate to development due to PIMBY support for fracking, it should be higher as support subsides toward the periphery of the development region, and then lower again in very distant communities that do not perceive any credible risk from fracking. I measure proximity to development as a community's distance to the closest proposed gas well. There were a total of 92 HVHF well permit applications filed by the gas industry in New York State. For each community, I calculate the distance to all proposed well locations and choose the shortest distance. I include a quadratic term to test for the proposed curvilinear relationship (several alternative specifications of distance yield consistent results; see endnote 14 for details).

Although a curvilinear effect would be consistent with the proposed explanation, proximity alone does not permit us to distinguish between the countervailing effects of the two hypothesized mechanisms: support of fracking from those who view it as a benefit and opposition from those who emphasize its risks. Thus, to test these proposed mechanisms more directly, I include two measures to capture the perception of threat and the perception of economic interest in development separately. Being located on the targeted shale formations, while not a good predictor of actual shale gas development, contributed to residents' perception of risk. The Marcellus Shale was the primary targeted formation, but the more expansive Utica Shale also featured prominently in debates about fracking. I include two dummy variables, indicating a town's location on each formation.

In terms of economic interest, landowner coalitions represent the presence of a critical mass of local residents interested in developing the resource (Jacquet and Stedman 2011). A typical landowner coalition may include hundreds of members representing tens of thousands of acres. I include a dummy variable indicating the presence of a landowner coalition in the county.[9]

Community Political Profile

I measure the political profile of a community using precinct-level results of the 2010 New York State gubernatorial election, aggregated to the municipal level.[10] I use the vote share for the Green Party candidate, Howie Hawkins, as a measure of a community's presence of environmentalists. The Green Party of New York was an early opponent of fracking, endorsing a statewide ban in 2010. Its supporters may have been important for bringing attention to the issue early on. The vote share for the Democratic candidate, Andrew Cuomo, is used as a measure of the size of Democratic Party supporters. To test whether the effects of communities' political profiles changed as the debate over fracking became politicized, I interact both variables with time (see details in the modeling section below).

Diffusion

To model the diffusion process, I specify all municipalities in a town or city's county as its relevant set of reference municipalities. In other words, the diffusion variable is the number of other municipalities in the county that have adopted an anti-fracking ordinance prior to the present time period. There are several reasons that towns in the same county should form a particularly strong reference group for one another. First, especially in rural counties, the county seat acts as a commercial and cultural center for county residents. Additionally, informal institutions like councils of governments tend to be organized at the county level and provide forums for municipal officials to interact, exchange ideas, and develop cooperative relationships. In robustness analyses I specify the diffusion variable using spatial proximity with different radii (between 10 and 50 miles) and find consistent results.

Community Context Variables and Control Variables

Recent research identifies several community-level variables that condition residents' response to industrial siting (Wright and Boudet 2012). Specifically, previous research finds that residents of communities with historic experience of an industry tend to have more positive views of it (Molotch, Freudenburg, Paulsen 2000; Wright and Boudet 2012) and that residents of economically depressed regions and residents in rural areas are more likely to view industrial projects as economic opportunities (Wright and Boudet 2012; Davis and Fisk 2014). I include the level of unemployment as a measure of economic hardship. These data come from the ten-year American Community Survey (ACS). While more recent estimates would be preferred, the inclusion of small communities makes data based on such estimates unreliable.[11] I also include a dummy variable designating a town as being located in a rural county in accordance with the USDA's Rural-Urban Continuum Codes (RUCC). Finally, the historical presence of an industry may imprint a community and predispose residents to view it in a positive light (e.g., Wright and Boudet 2012). New York's western upstate region in particular has a rich history of oil and gas development, with thousands of oil and gas wells developed in New York since the nineteenth century. Using data from New York State's Department of Environmental Conservation (DEC) Oil and Gas database, I identify the location of all historic oil and gas wells drilled in New York State. For each municipality, I calculate the number of wells located within a ten-mile radius of the town. I designate any municipality that has at least 500 historic wells within a ten-mile radius as an oil/gas community.[12]

Additionally, I include two standard variables of local capacity for mobilization (McCarthy and Zald 1977). The first variable I include is a measure of educational attainment, operationalized as the percent of residents in a community with a bachelor degree and derived from the ten-year ACS. Second, existing organizations provide useful infrastructure that can be repurposed and mobilized toward a particular goal (McCarthy and Zald 1977). As in other examples of policy change (e.g., Vasi and Strang 2009), colleges and universities played an important role in spurring mobilization on the issue of hydraulic fracturing. I obtain data on the location of college and university campuses in New York State from the Integrated Postsecondary Education Data System (IPEDS) and include a logged number of campuses in the models. Finally, I include logged population size obtained from the 2010 Census.[13] Table 1 presents descriptive statistics and correlations of all variables.

--Table 1--

Modeling Strategy

I analyze the adoption of anti-fracking ordinances in an event history framework (Allison 2014). The outcome variable is the town's hazard of adopting an ordinance. The event history framework is particularly suitable for modeling diffusion processes (Strang and Tuma 1993). Equation 1 specifies the theorized diffusion process,

$$h_n(t) = h_0(\mathrm{t}) \exp\left(\beta_1 X_n + \sum_{s \in S(t)} \beta_2 Z_{ns}\right) \qquad \text{Equation 1}$$

where $h_0(\mathrm{t})$ represents the baseline hazard rate at time *t*, *n* specifies a focal community that has not passed an ordinance by time *t*, and *S(t)* represents the set of communities that have passed an ordinance prior to time *t*. Community-level covariates are entered into vector X_n. In the second term, Z_{ns} equals 1 if community *s* is in community *n*'s reference group (in our case, in the same county), otherwise Z_{ns} equals 0. Therefore, β_2 captures the effect that the prior passage of each additional ordinance within the county has on the focal community's hazard of adoption.

I use the Cox proportional hazards specification to estimate the model. The Cox model requires fewer assumptions than parametric specifications, because it does not restrict the baseline hazard to a particular functional form. However, because the Cox model assumes that effects are invariant over time (i.e., the estimated coefficients represent the average effect of a variable over the entire analysis period) the simple model in Equation 1 cannot be used to test the hypothesis that the effect of a community's political profile changes over the course of the adoption period. A standard modification that permits the estimation of time-dependent effects is to add an interaction term between a variable of interest and (some function of) time (Allison 2014). The final model, including diffusion and time variant effects for ideological variables is represented as:

$$h_n(t) = h_0(\mathrm{t}) \exp\left(\beta_1 X_n + \sum_{s \in S(t)} \beta_2 Z_{ns} + \beta_3 V_n + \beta_4 f(t_n) V_n\right) \qquad \text{Equation 2}$$

Equation 2 is identical to equation 1, except we distinguish a vector of covariates, V_n, which we interact with a function of time, $f(t_n)$. Therefore, the effect of V_n on the hazard at time *t* is equal to $\beta_3 + \beta_4 f(t_n)$, which reduces to β_3 when $f(t_n) = 0$. In our case, vector V_n includes two variables, vote shares for Democratic and Green Party candidates, and I adopt a simple linear function of time. I tested several alternative specifications of time, which yield consistent results (see endnote 16 for details).

RESULTS

Figure 2 displays the distribution of anti-fracking ordinances in New York State. Towns and cities that passed a zoning ordinance are shaded blue. The mismatch between likely location of gas development and the distribution of protective zoning ordinances is striking. Municipalities that passed protective bans and moratoria are concentrated in a belt surrounding the primary development region, with few ordinances passed in the targeted zone near the proposed wells. Some bans are in towns overlying parts of the Marcellus or Utica Shale formations that do not contain recoverable natural gas and a few are removed from the shale entirely.

In Table 2, I present the results of four event history models. The first includes just town-level covariates and does not interact vote shares with time. The second model adds the spatial diffusion component. The third, full model, includes diffusion and time-dependent effects of ideology. The fourth model retains all of the variables from the full model, but replaces the distance variables with separate proxies for perception of risk, on the one hand, and concentration of potential economic benefits, on the other. All variables in the models except dummy variables and miles to closest proposed well are standardized and mean-centered for ease of interpretation.

-- Table 2 --

Before turning to the primary effects of interest, I report three results that provide additional support for prior research. First, communities with more resources were more likely to mobilize against fracking. Both education and the presence of university campuses are associated with an increased hazard of ordinance adoption. Second, the results support recent research that identifies community context as important for developing motivation for mobilization (Wright and Boudet 2012). Effects of being in a rural county and having a history of oil and gas development are consistently negative, supporting the idea that residents in these communities were more likely to view gas development as an economic opportunity rather than a threat. Other than the effect of unemployment, which is never supported, the community context effects remain consistent as additional variables are added to the model. Third, there is strong evidence for spatial diffusion of municipal ordinances. Adding the diffusion variable dramatically increases the model fit (Model 2 vs. Model 1). In the full model (Model 3), for every additional town in the county that passes an ordinance, the remaining towns' hazard of adoption increases by 12 percent. Successful anti-fracking mobilization spilled from one community to its neighbors, particularly within the county. I now turn to the primary effects of interest.

Proximity effects: Statistically significant coefficients on both linear and squared terms indicate a curvilinear relationship between distance to a proposed well and the probability of passing an anti-fracking ordinance. In Figure 4, I plot the relative hazard of passing a protective ordinance against distance to the closest well from the full model (Model 3). Compared to towns that are nearest to proposed well sites, the adoption hazard increases with distance from the site, reaching its highest value about forty miles away, but remaining higher for towns at a distance of up to eighty miles away.

--Figure 4--

First, it is extremely difficult to pass an ordinance in communities that are closest to development. For instance, of the sixty-five communities that are within a ten-mile radius of a proposed well only three (4.6%) have passed an anti-fracking ordinance. In contrast, 16.5% of *all* New York communities have passed an ordinance. Second, despite ordinance adoption in places that are unlikely to see shale development, results suggest that distance does impose some restriction on successful mobilization against fracking. The hazard of adoption declines beyond about forty miles and communities farther than eighty miles are less likely to pass bans than the most proximate communities. Nonetheless, the results suggest that in the case of opposition to fracking the size of the relevant "backyard" is vast. For all but the most remote communities, the hazard of adopting an ordinance is higher than in towns that actually have proposed wells within their borders. Nine towns that did not lie on either the Marcellus or Utica Shale passed anti-fracking ordinances. However, as Figure 4 indicates, bans were most likely to pass in a geographic sweet spot that was neither too close nor too far from development.[14]

The models that use the proximity variable, however, do not directly test the latent processes that are expected to give rise to this geographic pattern. Model 4 attempts to distinguish between the negative effects of landowner (PIMBY) support, on the one hand, and positive effects of local (NIMBY) opposition, on the other hand. The results show, first, that communities lying on top of shale formations were much more likely to pass bans. Compared to communities not lying on any shale, municipalities lying atop the Marcellus Shale are 12.5 times more likely to pass an anti-fracking ordinance, while municipalities that lie above the Utica but not the Marcellus Shale are 3.8 times more likely to pass an ordinance. The presence of a landowner coalition, on the other hand, is associated with more than a two-fold decrease in a municipality's probability of passing an ordinance. Together, these findings support the idea that the geographic sweet spot for passing anti-fracking ordinances emerged from the countervailing effects of landowner support for the industry in favorable shale regions and of a relatively diffuse perception of threat that motivated residents in surrounding communities to mobilize against fracking.

Politicization and the changing effect of a community's political profile: While the distribution of local impacts across communities (i.e., potential risks and benefits) importantly shaped the pattern of ban adoption, my results suggest that residents' political orientation also influenced the strength of opposition. In Models 1 and 2, a greater share of votes for the Democratic candidate increases the hazard of adopting an anti-fracking ordinance. Results from these models show no significant effect of the Green Party vote. The more substantial and original findings come from models that consider how the effects of vote share change as the national debate over fracking intensifies (Model 3 and 4). The effect of the ideological composition of a community is not constant over time.[15] Figure 5 presents the estimated over time trends in the relative hazards associated with a one standard deviation change in the two vote share variables. Green Party vote share has a large and positive effect on the adoption of an anti-fracking ordinance, but the effect is limited to the early part of the episode. In March 2010, a standard deviation increase in the Green Party vote share (1.05%) corresponded to a 70% increase in the hazard of adoption. The effect decreased and was not statistically distinguishable from zero within the first year of the analysis period. This result is consistent with literature on policy diffusion, which finds that in the earliest stages of adoption the presence of strong advocates is essential (e.g., Tolbert and Zucker 1983).

--Figure 5--

The effect of Democratic vote share, by contrast, increased dramatically over the course of the adoption period. At the beginning, adoption of anti-fracking ordinances was non-partisan; communities with more Democratic supporters were not more likely to pass anti-fracking ordinances. But the effect of Democratic vote share increased rapidly as the fracking debate unfolded (Figure 5). By the end of the study period (July 2013), a one standard deviation difference in Democratic vote share (11.78%) corresponds with an impressive 143% increase in the probability of adopting an anti-fracking ordinance. These results support the idea that the composition of the local anti-fracking movement changed over time. Aside from the role that Green Party supporters played in bringing attention to the issue in 2010, early opposition to fracking appears to have been based on local concerns, not political identities. As the debate surrounding fracking politicized, however, opponents of fracking found allies among Democrats.

This shift corresponds with the acceleration in the diffusion of anti-fracking ordinances observed in Figure 1.[16]

A complementary interpretation of the increasing effect of Democratic vote share for ordinance adoption is that conservative communities became less likely to ban fracking over time. Due to multicollinearity, it is not possible to distinguish these effects statistically. A model that specifies Republican vote share instead of Democratic vote share yields results that are symmetrical to the ones presented in Table 2. Republican vote share has no effect on adopting an ordinance at the beginning of the episode, but a standard deviation increase in Republican vote share predicts a 64% decrease in the probability of adoption by the end of the analysis period (see SM Table 4 in the supplementary materials for results of models using Republican vote share).

What effect did the mobilization of political partisans have on the geographic distribution of ban adoptions? If, as I have argued, political partisans mobilized on the basis of politicized rather than local conceptions of fracking and its impacts, the distribution of "objective" risks and benefits should have less influence on their mobilization. Communities with large Democratic constituencies should thus be more likely to pass bans outside of the geographic sweet spot identified above. In distant communities, where industry poses little or no credible threat to residents, partisan mobilization may still provide an impetus for taking symbolic action against fracking (e.g., Vasi and Strang 2009). And in proximate communities, sufficient mobilization of partisans may tip the balance in favor of fracking opponents.

--Figure 6--

To test this idea I examine the dispersion of town bans around the sweet spot for communities that have different political profiles. Figure 6 presents the geographic distribution of ordinance adoption over time. The scatterplot shows that, as the fracking issue gained broad media attention, the geographic range of ordinance adoption expanded in both directions, but liberal communities (blue circles; defined as having > 50.9% [mean plus .5 SDs] Democratic vote share) are overrepresented among the outliers. For simplicity, I split the time period in two. In the first half, ending in November of 2011, the standard deviations of proximity to a proposed well were not significantly different between liberal communities and the rest of the communities that passed bans (SD=12.2 and SD=12.1 miles for liberal and other communities, respectively). In the second half, however, bans passed by liberal communities were significantly more dispersed around the sweet spot than bans passed by other communities (SD=23.0 and SD=15.7 miles for liberal and other communities, respectively).[17] The four closest and seven farthest bans were passed by communities where voters gave absolute majorities to the Democratic candidate.

Mobilization of partisans thus played a key role in the spread of anti-fracking laws. The "Not in anyone's backyard" attitude of partisan opponents helps explain the increased geographic dispersion of town bans. They strengthened the opposition in proximate communities, and even more strikingly, they enabled the town ban movement to spread to ever more distant communities—communities that would likely not have perceived a stake in the debate over fracking had it not become politicized.

Supplementary Analyses

Consistent with the proposed explanation, event history analyses show that ordinances passed in communities where one should expect significant local opposition—either due to perceived risk or due to partisan mobilization—but little support. However, because the dependent variable in the analyses is adoption of an ordinance (a successful outcome of anti-fracking mobilization), the results cannot distinguish between cases where local opposition mobilized only to be thwarted by counter-mobilization from supporters and cases where no mobilization against fracking ever emerged. This distinction is especially important in the region targeted for development, because it implies different interpretations of my results. If local decisions in the targeted region were highly contentious, it implies that, indeed, residents mobilized based on competing local conceptions of shale gas development and that geographically concentrated support for development was formidable. The alternative, that opposition to fracking never emerged in the targeted region, however, would suggest that risks were either not perceived or not acted upon.

To rule out this alternative, I examine the emergence of town ban movements, including in towns that ultimately failed to adopt an ordinance. Fractracker kept a record of towns that had an organized movement for a fracking ban, based on whether local residents had actively lobbied the town board for a local ordinance. I use this information to create an indicator variable for a ban movement in the town. As of July 2013, Fractracker documented movements for a ban in 245 New York communities, of which 81 failed to pass an ordinance.

--Table 3--

Where did movements emerge but fail to achieve a local ban? I present results from logistic regression models predicting a ban movement in Table 3. Model 1 includes a linear spline with two knots, at 40.6 miles and 72.7 miles, for the proximity variable. These knots are evenly spaced by percentile (33.3% and 66.6% of the proximity variable), and the first knot at 40.6 miles represents approximately the middle of the sweet spot for passing an ordinance. If mobilization was equally likely in the targeted area as in the sweet spot, we should observe a flat slope before the first knot.[18] Results confirm that there is no effect of distance to the well on the probability of movement emergence until the first knot at 40.6 miles. The probability of movement emergence then decreases with distance, as indicated by significant negative coefficients on the second and third spline variables. Thus, communities within a 40-mile radius of a proposed well were equally likely to develop movements against fracking (conditional on the other variables), but the more proximate of these are much less likely to succeed. Model 2 replaces the proximity variables with dummies for location on shale formation and a dummy for the presence of a landowner coalition. Results from this model show that emergence of movements was much higher in communities lying atop one or more of the shale formations. However, in contrast to models predicting adoption of laws, presence of landowner coalitions does *not* have a significant deterrent effect on movement emergence. In other words, movements emerged but were defeated.

Examining the other predictors of movement emergence, we find, not surprisingly, that many of the factors found to be important for movement success predict movement emergence. Democratic vote share and Green Party vote share predict the emergence of a movement, and community context (aside from unemployment) and organizational capacity variables are also significant and in the expected direction.

Model results suggest that, in the region closest to proposed wells, anti-fracking mobilization was met with countermobilization by supporters of shale gas development. To assess this contentiousness directly, I examined the roll call votes of town boards that passed anti-fracking laws. Drawing on the public documents and newspaper articles about each town that adopted an ordinance, I obtained a record of the roll call vote on the law for 137 of the 164 communities. As expected, communities closer to proposed wells had much higher incidence of contentious town board votes. Of the twelve communities that passed ordinances within twenty miles of a proposed well (and for which roll call data is available), seven included dissenting town board members (58%). By contrast 85% of ordinances were adopted with unanimous town board support,

But what was the nature of local support for fracking in communities targeted for development? Although in lobbying in favor of shale gas development landowner coalitions purported to represent the interests of a broad segment of town residents, classic accounts favor the idea that development is endorsed by the business and political elites. Elites are positioned to capture a larger share of the economic benefits from development and can also better protect themselves and their property from potential adverse impacts (Gaventa 1980). While resolving this issue is beyond the scope of this study, I offer some preliminary evidence from a community that was one of the most proximate to proposed development among communities that passed a ban (15 miles to nearest well) and had over 40% of its land under gas company lease.[19]

Town board meetings were contentious affairs in this community. Over the course of four months, four public hearings on the proposed local ban were held and a total of ninety-five residents spoke at least once. Twenty-one spoke in favor of fracking (and against the proposed ban). Considering that a typical town board hearing draws no more than a couple public comments, this is evidence of a significant level of mobilization. One difference is very clear: supporters of fracking tended to be large landowners. In comparison to the median fracking opponent who owned just 2.6 acres of land, the median supporter owned 86.8 acres.[20] This provides some evidence that economic interests were an important source of motivation for supporters of fracking.

However, despite the large number of acres that supporters owned, this should not be taken as clear evidence that fracking supporters were community elites. In the rural economy of upstate New York, many large landowners better fit the profile of "land-rich but cash poor". So these results may also reflect findings from previous studies (e.g., Wright and Boudet 2012) that experience of economic hardship leads residents to emphasize economic benefits over potential costs of risky projects. Nonetheless, data from this heavily leased community show that support for fracking had a substantial base among the local residents and that large landowners were overrepresented among supporters.

DISCUSSION AND CONCLUSIONS

The municipal anti-fracking movement provides an ideal opportunity to examine why some communities prohibit industrial land uses and others do not. Results from event history analyses of anti-fracking ordinance adoption in New York State demonstrate the importance of delineating alternative bases of opposition and support for industrial projects. People mobilize for different reasons, based on multiple conceptions of the risks *and rewards* of industrial projects. Explaining local policy change requires attention to the distribution of objective risks and benefits, but also to the nature and scale of politicized debates surrounding the proposed industry.

In the context of the local opposition to fracking in New York, a framework that incorporates risks and rewards as well as politicization permits us to explain a key empirical puzzle: communities that faced the greatest likelihood of seeing shale gas development were unlikely to pass restrictive ordinances, while communities on the periphery of the development region were much more successful at banning the industry. Previous research has paid little attention to local support for industrial projects, but I find that support for gas development played a critical role in preventing communities in the targeted region from passing anti-fracking ordinances. What some residents viewed as a locally unwanted land use (LULU) others saw as an economic opportunity (see also Wright and Boudet 2012; Jerolmack and Walker 2016). My results offer several specific insights into the conditions under which a positive conception of fracking prevailed. First, the results support recent findings that elements of local context can lead residents to emphasize economic benefits of proposed industrial projects (e.g., Wright and Boudet 2012). Particular to fracking, a rural economy and historic experience with the oil and gas industry decreased the chances that a community would mobilize for and pass a ban. Second, support for fracking was motivated by a material interest in shale gas development and thus was strongest in communities where the prospects for development were most favorable. Evidence based on individual-level data from one community further suggests that support concentrated among large landowners who stood to gain financially from leasing their land.

My finding about the emergence of a sweet spot for ordinance adoption in the periphery of the development region reinforces recent calls for greater attention to spatial scale for understanding social processes (Downey 2006; Andrews and Seguin 2015). The sweet spot reflected the divergent geographic scales at which risks and economic benefits of shale gas development could be credibly framed. While the inherently regional nature of shale gas development provided a diffuse geographic basis for perceiving risks, the scale at which risk can be credibly framed may be smaller in other cases (e.g., Gravelle and Lachapelle 2015). In general, different distributions of perceived risks and rewards would lead to different spatial patterns of movement emergence and success.

My findings also contribute to recent scholarly debates about the impact of politicized discourse and ideological polarization on contentious politics. Challenging the view that residents put aside their ideological differences in the face of a local industrial threat, my results suggest that partisanship was an essential lens that colored residents' perceptions and contributed to local land use decisions. By leveraging the temporal variation in politicized public debate about fracking, I identify a shift over time toward Democratic partisans as a major basis of opposition to fracking. Reflecting a "Not in anyone's backyard"-style of mobilization by Democratic partisans, majority-Democrat communities outside of the geographic sweet spot—including some communities that do not lie on either of the targeted shale formations—became more likely to pass anti-fracking ordinances. Rather than contributing to a consensus about the impacts of shale gas development, the highly politicized debate about fracking thus created an environment where the composition of residents' political orientations emerged as a key factor driving local land use decisions. The state-level ban on fracking recently adopted by Vermont can also be interpreted in this light. Vermont holds no unconventional oil or gas reserves, but, as one of the most liberal states in the country, became the first state to ban the practice—a move that was entirely symbolic.

Whereas my focus has been primarily on the positive effect that the mobilization of Democratic partisans had on ordinance adoption, the increasing negative effect of Republican vote share provides a complementary interpretation. The Town of Covert, a rural community on the periphery of the targeted development region, offers a vivid illustration of the salience of partisan identities in local debates over fracking. In Covert, supporters of shale gas development sent postcards to all town residents, which warned, "Liberals are coming to Covert!" and included politically laden images of peace signs and a flower-patterned 1960s Volkswagen Beetle. The campaign urged conservative residents to reject anti-fracking candidates for the town board by suggesting that the fracking ban movement represents the extreme political left.

Several limitations in this study suggest important directions for future research. First, I do not directly measure the different conceptions of fracking behind the alternative bases of opposition and support. Instead I rely on the variation of underlying risks and benefits across space and the variation of public discourse about fracking over time to argue that different contexts were more or less amenable to particular conceptions. Different conceptions, however, should be observable directly in how residents construct the issue, and future research should seek to measure how such constructions vary across and within communities. Ethnographic approaches in particular would help unpack how divergent assessments of the industry emerge (e.g., Auyero and Swistun 2008; Jerolmack and Walker 2016). Additionally, research that elicits open-ended responses (e.g., Boudet et al. 2014) could complement common survey approaches to uncover important heterogeneity in respondents' conceptions of an industry.

Relatedly, while the current study documents the increasing salience of political identities in local contests over shale gas development, it does not address *why* popular positions toward the industry became polarized. Previous work suggests some potential explanations. One line of research finds that positions on a controversial issue can become entrenched along partisan lines when intense debates about the issue expose local political divisions (Baldassarri and Bearman 2007; McVeigh, Cunningham, and Farrell 2014). These locally salient divisions then come to represent the broader partisan divide that people perceive. Other recent research suggests that framing efforts by political elites encourage polarization on contested political issues (Walker

2014; Farrell 2015). Future research might examine how the interaction of these two factors contributed to the partisan polarization surrounding fracking as well as the long-term effects it might have on partisan politics within communities where the battle lines were drawn most starkly. In general, the politically polarized climate in the United States calls for greater attention to how mobilization of partisan identities affects movements' abilities to build effective coalitions and contribute to policy change (e.g., Heaney and Rojas 2015).

Finally, the current study does not directly examine the mobilizing structures of fracking opponents and supporters. The results do suggest that landowner coalitions were critical to organizing support for fracking. However, to the extent that NIMBY and ideological opponents formed alternative bases of opposition, we might expect that they learned about and mobilized through different organizations and networks (Gould 1995). Recent research suggests that partisans are especially amenable to "supply side" grassroots mobilization, where the supply is a pool of ideologically committed activists who have a history of participation in grassroots campaigns (Brady, Schlozman, and Verba 1999; Walker 2014). It also identifies the role of multi-issue progressive organizations in targeting and mobilizing these activists (Karpf 2012; Heaney and Rojas 2015). It seems likely that the increased engagement of such organizations may account for the increased role of partisanship. Alongside small neighborhood associations of "concerned residents," the list of organizational members in the umbrella group "New Yorkers against Fracking" includes organizations previously identified by Heaney and Rojas (2015) as key for mobilizing political partisans in the anti-war movement (e.g., MoveOn.org). It remains an open question, however, whether these organizations disseminated and reinforced alternative conception of fracking and what role they played in mobilizing participation across different communities.

ENDNOTES

[1] This pattern of local support for a project is also sometimes called “Yes in my backyard” or “reverse NIMBY”.

[2] Gould (1995) focused on the structure of personal networks in his empirical analyses, but he defined participation identity more broadly. In particular, he focused on the material interests and/or collective identities that define a structurally equivalent class of actors that mobilize during a political contest. Walder (2009) provides a useful discussion of this element of Gould’s work.

[3] Although these applications likely overrepresent more favorable locations, they include applications for both targeted formations and were filed by six different gas companies, suggesting that they are representative of the broad geographic pattern of the industry’s interest in New York shale gas.

[4] Recent scientific studies have documented adverse environmental impacts from fracking (Llewellyn et al. 2015) as well as adverse health effect, which include respiratory conditions and skin rashes (Rabinowitz et al. 2015) and animal deaths (Bamberger and Oswald 2012).

[5] There is evidence that the potential economic benefits from shale gas development are overstated. Early research suggests, for example, that fracking-enabled development is prone to the boom-bust cycle that is common to extractive industries and that the jobs that do accompany development tend to go to transient out-of-state workers (e.g., Christopherson 2011; Jacquet 2014).

[6] An alternative approach to constructing the risk set is to include only the communities that lie above the targeted shale formations rather all 994 New York municipalities. I present results using this alternative specification, which are consistent with the findings based on the larger risk set, in SM Table 1 of the supplementary materials. Given that nine communities passed bans even when not on any shale deposits it is not clear where the boundary for the risk set should be drawn. It seems, therefore that a more principled approach is to include all municipalities and include variables that model communities’ relatively lower probability of adoption. The different specifications of the proximity variable effectively capture this lower probability.

[7] Some towns passed multiple moratoriums (temporary bans, typically for a term of six to twelve months) during the study period, and some first passed moratoriums and then passed a ban. In all cases the event is defined as the instance of the first passage of either kind of ordinance. A few additional municipalities passed ordinances since July 2013, but as Figure 1 clearly shows, the adoption slowed substantially by July 2013.

[8] I was unable to obtain either the official minutes or a newspaper article confirming the dates of 7 of 164 towns that were identified as passing a ban or moratorium by at least one of the organizations. These towns are omitted from the analysis. These exclusions reduce the number of total municipalities to 987 and the number of towns with adopted bans to 157.

[9] The list of coalitions comes from a directory compiled by Marcellus Drilling News, a pro-gas website: http://marcellusdrilling.com/landowner-groups/ (Retrieved on November 1, 2013)

[10] These data are collected and maintained by Harvard Election Data Archive (Ansolabehere and Rodden 2011).

[11] Unfortunately, even the ten-year ACS estimates have high margins of error for some of the smaller municipalities in my sample. To make sure that noise in the ACS variables (unemployment and education) did not influence my results, I re-ran the analyses only on communities with greater than 5,000 and greater than 10,000 residents and all of the effects of interest are consistent with the presented results.

[12] The variable is meant to capture a significant level of historic gas/oil activity. Thresholds above 250 wells yield consistent results. In robustness analyses, I used an alternative measure—the logged number of oil and gas industry establishments within the county (obtained from the Bureau of Labor Statistics). Models using this alternative variable yield consistent results.

[13] I take the natural log of these last two variables, because of the high levels of skewness they display and indication from tests of Martingale residuals that log-transformed variables offer better model fit.

[14] To ensure that the assumption of quadratic curvature is not driving this result, I fit several models using quantiles and linear splines, varying the number and positions of the knots (see SM Table 2 in the supplementary materials for results). Results reinforce the substantive interpretation of the quadratic relationship—the probability of passing an ordinance increases with distance from proposed wells, reaches a high point in a sweet spot region between about 30 and 50 miles and declines beyond this plateau. Additionally, as further validation of the proximity variable as a measure of likely development, I present a ranking of Marcellus potential, plotted against the proximity variable for towns that passed bans (see SM Figure 1).

[15] Results of a test of Schoenfeld residuals are reported in Appendix A.

[16] In the supplementary materials (SM Table 3), I present an alternative specification that interacts the vote share variables with dummy variables for each year. This model finds a consistent trend for the Democratic vote share effect—an approximately linear increase over the four years. The effect is only significantly positive in 2012 and 2013. This model further suggests that the effect of Green Party vote share concentrates in the first year (2010) of the study period and is approximately zero during the other years—a nuance that is not picked up by the linear time specification presented here. I present this model's estimates of the marginal effects of the two vote share variables by year in the supplementary materials (SM Figure 2). In alternative specifications (not reported), I interacted the two variables with two other function of time. First, my theory predicts that the effect of Democratic vote share would change with the volume of political debate surrounding fracking. To capture this directly, I specified the time function as the cumulative number of articles published in *The New York Times*. This alternative specification yields nearly identical fit to the simple linear function of time and entirely

consistent results. Second, a model interacting the political profile variables with time squared also yielded significant interaction coefficients, but fit slightly less well than the interaction with linear time.

[17] Results from Levene's test confirm that the differences are statistically significant for the latter period ($p < .01$) and not for the former.

[18] Alternative specifications of the proximity variable (including splines with different number and location of knots and quantiles) yielded results with a consistent substantive interpretation.

[19] Details about how these data were collected are found in Appendix B.

[20] Medians are presented because the mean values (10.7 acres and 197.8 acres for opponents and supporters, respectively) are skewed by outlier values.

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Table 1. Summary of (Non-standardized) Variables and Correlations

Variable	Mean	S.D.	Min	Max	1	2	3	4	5
1. Log population	8.25	1.32	3.64	15.92	1.00				
2. Rural town dummy	0.48	0.50	0.00	1.00	-0.49	1.00			
3. Unemployment	3.57	1.50	0.00	10.91	-0.06	0.06	1.00		
4. Oil/gas town dummy	0.09	0.29	0.00	1.00	-0.04	0.19	-0.05	1.00	
5. Education (% with bachelor's)	15.85	8.38	0.00	53.79	0.43	-0.33	-0.31	-0.07	1.00
6. Log number of colleges/universities	0.07	0.29	0.00	4.50	0.48	-0.15	0.00	-0.02	0.23
7. Miles to nearest well	63.08	40.26	0.00	191.00	0.15	-0.07	0.01	-0.20	0.19
8. Democratic vote share	44.73	11.95	13.88	84.99	0.37	-0.17	0.02	-0.46	0.35
9. Green Party vote share	1.64	1.05	0.00	7.33	-0.10	-0.04	-0.04	-0.10	0.04
10. Number of prior ordinances in county	0.93	2.37	0.00	21.00	0.04	-0.08	-0.02	-0.04	0.02
11. On Utica Shale dummy	0.27	0.45	0.00	1.00	0.25	-0.39	0.04	-0.18	-0.01
12. On Marcellus Shale dummy	0.45	0.50	0.00	1.00	-0.27	0.32	-0.02	0.33	-0.21
13. Land owner coalition dummy	0.29	0.46	0.00	1.00	-0.20	0.29	0.07	0.22	-0.22

Variable	6	7	8	9	10	11	12	13
6. Log number of colleges/universities	1.00							
7. Miles to nearest well	0.09	1.00						
8. Democratic vote share	0.28	0.42	1.00					
9. Green Party vote share	-0.02	-0.21	0.10	1.00				
10. Number of prior ordinances in county	-0.04	-0.19	-0.01	0.18	1.00			
11. On Utica Shale dummy	0.00	0.08	0.06	0.08	0.07	1.00		
12. On Marcellus Shale dummy	-0.11	-0.71	-0.41	0.08	0.12	-0.56	1.00	
13. Land owner coalition dummy	-0.06	-0.64	-0.34	0.06	0.06	-0.34	0.66	1.00

Table 2. Partial Likelihood Estimates of the Passage of Anti-Fracking Ordinances among New York Municipalities, March 2010 - July 2013

Variable	Model 1	Model 2	Model 3	Model 4
Log population	-0.254*	-0.386**	-0.391**	-0.317**
	(0.114)	(0.117)	(0.117)	(0.122)
Rural (D)	-0.831**	-0.646**	-0.645**	-0.440
	(0.208)	(0.213)	(0.214)	(0.228)
Unemployment	-0.073	-0.066	-0.078	-0.006
	-0.093	-0.092	-0.092	(0.090)
Oil/gas town (D)	-1.944**	-1.611*	-1.607*	-1.548*
	(0.738)	(0.742)	(0.742)	(0.741)
Education	0.342**	0.365**	0.376**	0.330**
	(0.086)	(0.087)	(0.086)	(0.089)
Log number of colleges/universities	0.234**	0.251**	0.241**	0.240**
	(0.078)	(0.077)	(0.078)	(0.070)
Miles to nearest well	0.121**	0.105**	0.106**	
	(0.018)	(0.018)	(0.018)	
Miles to nearest well squared	-0.00156**	-0.00131**	-0.00133**	
	(0.000199)	(0.000197)	(0.000197)	
On Utica Shale (D)				1.564**
				(0.400)
On Marcellus Shale (D)				2.602**
				(0.386)
Land owner coalition (D)				-0.731**
				(0.243)
Democratic vote share	0.340**	0.434**	-0.196	-0.251
	(0.119)	(0.123)	(0.315)	(0.305)
Green Party vote share	0.0694	0.0268	0.532**	0.540**
	(0.066)	(0.066)	(0.171)	(0.169)
Number of prior ordinances in county		0.116**	0.117**	0.153**
		(0.017)	(0.017)	(0.017)
Democratic vote share*Month			0.0271*	0.0234*
			(0.012)	(0.012)
Green Party vote share*Month			-0.022**	-0.0203**
			(0.007)	(0.007)
Likelihood ratio	260.62	301.05	312.66	274.20
df	10	11	13	14

N = 117,214

Standard errors in parentheses

** p<0.01, * p<0.05

All variables are standardized and centered at the mean except distance to well, prior number of adoptions, and all dummy variables

Table 3. Logistic Regression Models of a Movement toward an Anti-Fracking Ordinances among New York Municipalities

Variable	Model 1	Model 2
Log population	-0.285*	-0.161
	(0.132)	(0.130)
Rural (D)	-0.896**	-0.980**
	(0.204)	(0.219)
Unemployment	-0.0166	0.00368
	(0.0929)	(0.0923)
Oil/gas town (D)	-2.650**	-2.786**
	(0.769)	(0.753)
Education	0.383**	0.251*
	(0.112)	(0.108)
Log number of colleges/universities	0.188	0.107
	(0.105)	(0.0965)
Miles to nearest well < 40.6 mi	0.00307	
	(0.00874)	
Miles to nearest well 40.6 mi to 72.7 mi	-0.0439**	
	-0.0107	
Miles to nearest well > 72.7 mi	-0.161**	
	-0.035	
On Utica Shale (D)		1.417**
		(0.347)
On Marcellus Shale (D)		3.169**
		(0.346)
Land owner coalition (D)		-0.199
		(0.231)
Democratic vote share	0.423**	0.323*
	(0.138)	(0.129)
Green Party vote share	0.175*	0.322**
	(0.0844)	(0.0852)
Constant	0.195	-2.732**
	(0.289)	(0.312)
Likelihood ratio	309.70	263.74

N = 994
Standard errors in parentheses
** p<0.01, * p<0.05
All variables are standardized and centered at the mean except the distance to well spline variables and all dummy variables. Coefficients for spline variables should be interpreted as marginal but cumulative.

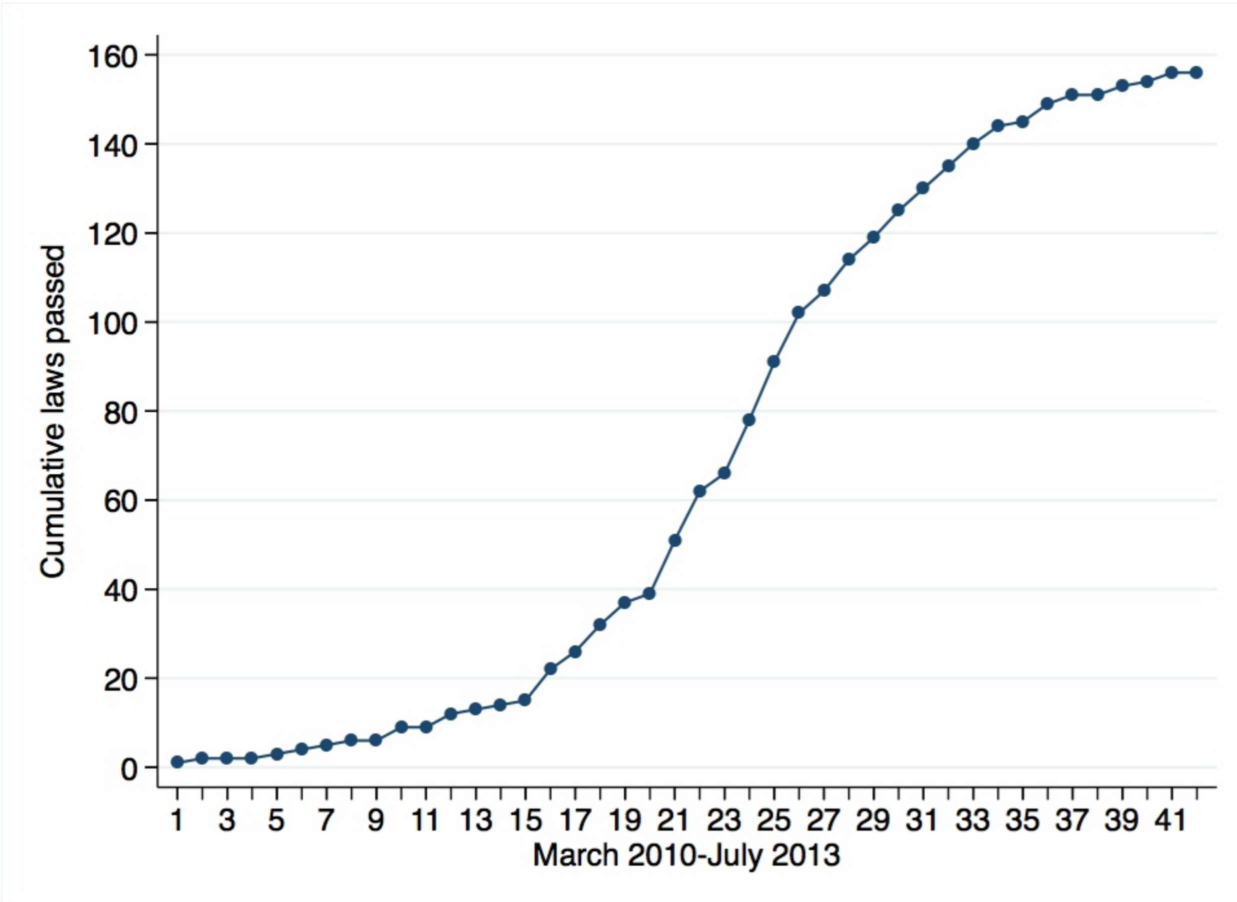


Figure 1. Adoption of municipal anti-fracking ordinances in New York State

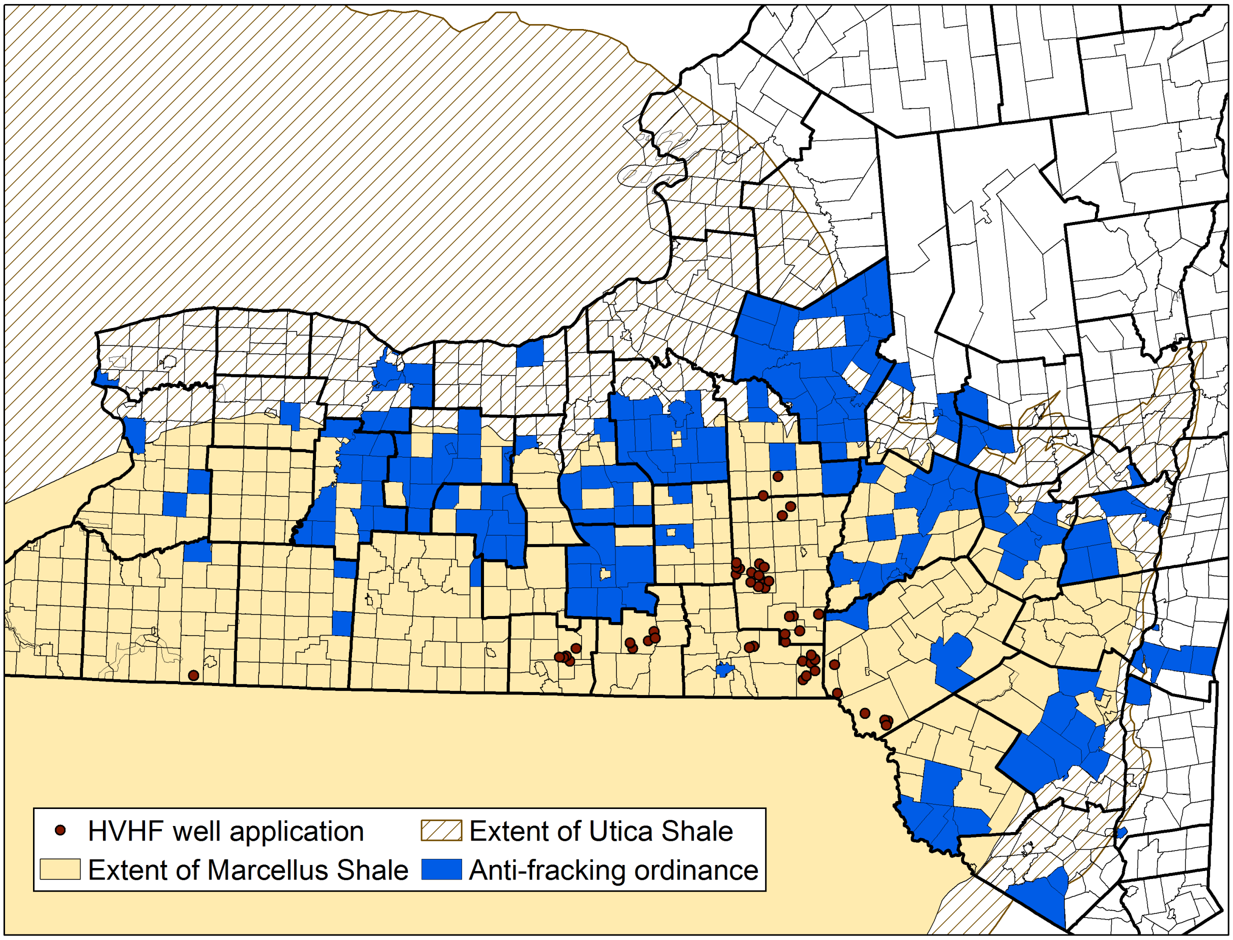


Figure 2. Geographical diffusion of anti-fracking ordinances and the geology of shale gas development in New York State. Red dots indicate locations of HVHF well application and blue shading designates towns that passed a local ordinance prohibiting fracking. Counties are marked by thicker black lines and municipalities are the smaller entities with thinner boundaries inside county lines.

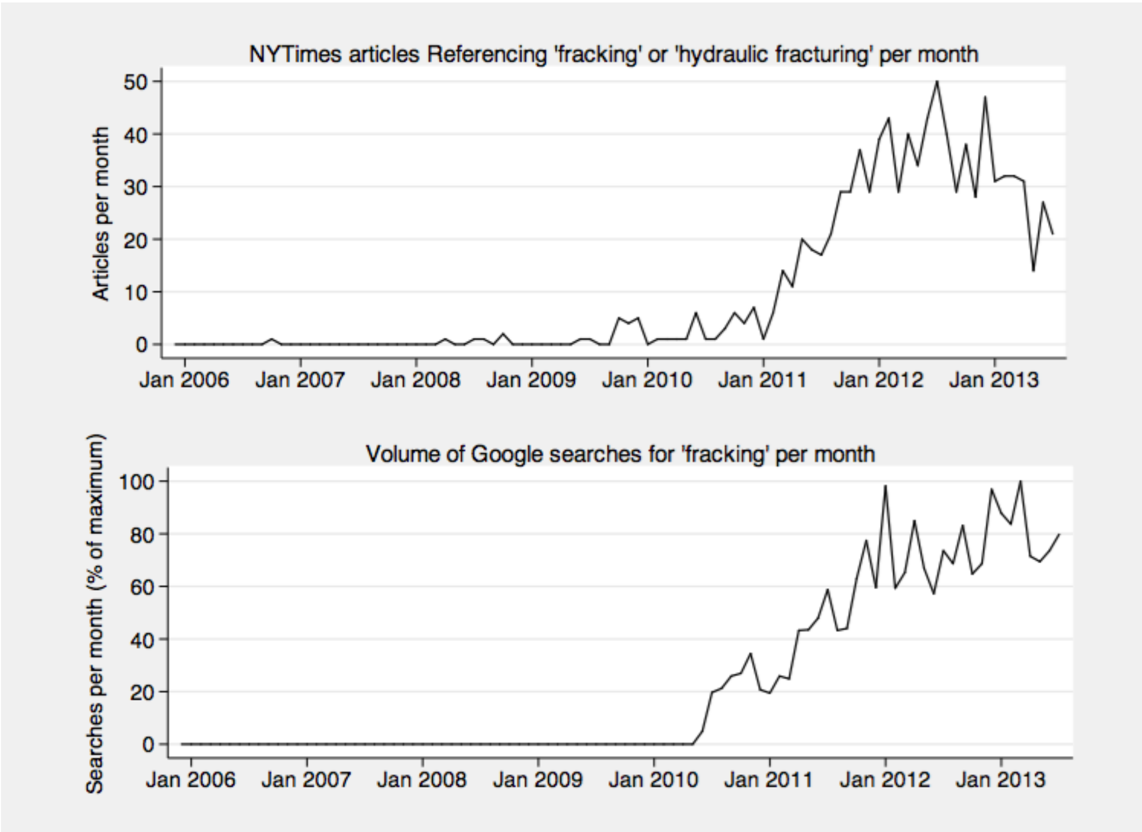


Figure 3. Top panel displays the distribution of the number of articles published in *The New York Times* that contain the words "fracking" or "hydraulic fracturing" per month. Bottom panel displays the volume of Google searches for the term "fracking" in New York State. The scale of the Y-axis is normed by the maximum search volume achieved in the time period.

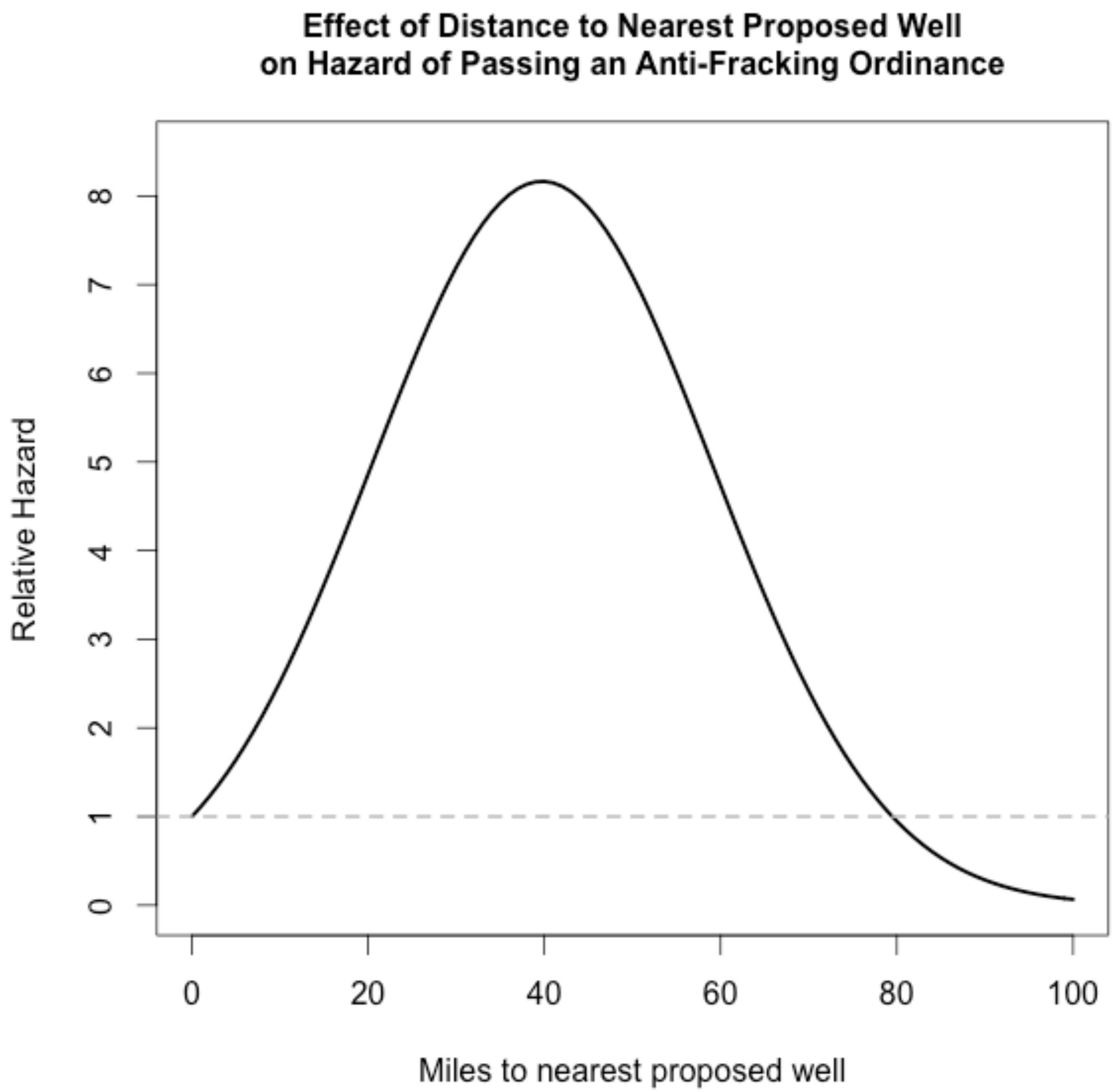


Figure 4. Effect of distance to nearest proposed well on hazard of passing an anti-fracking ordinance (Model 3).

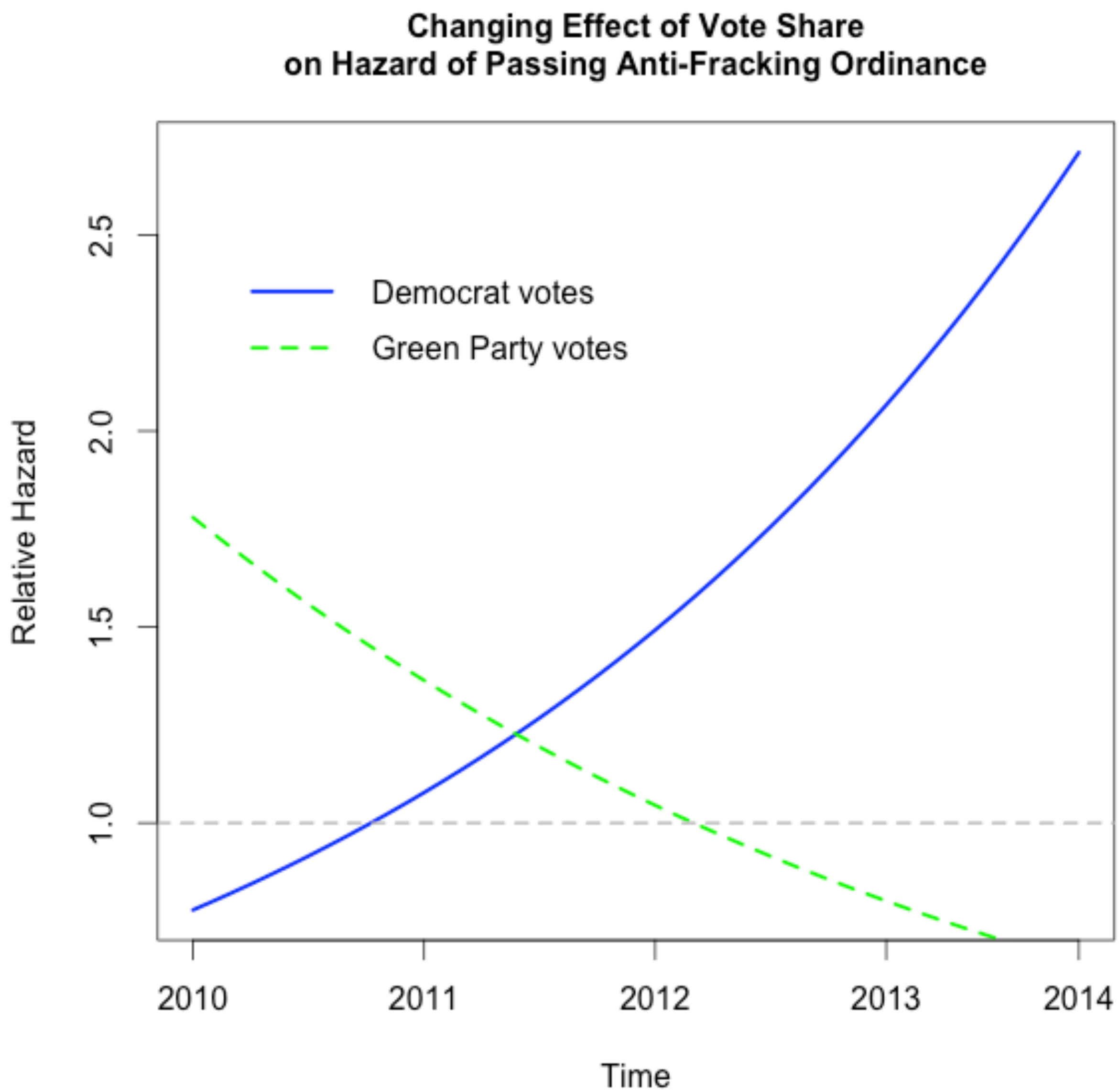


Figure 5. Changing effect of vote share on hazard of passing an anti-fracking ordinance (Model 3).

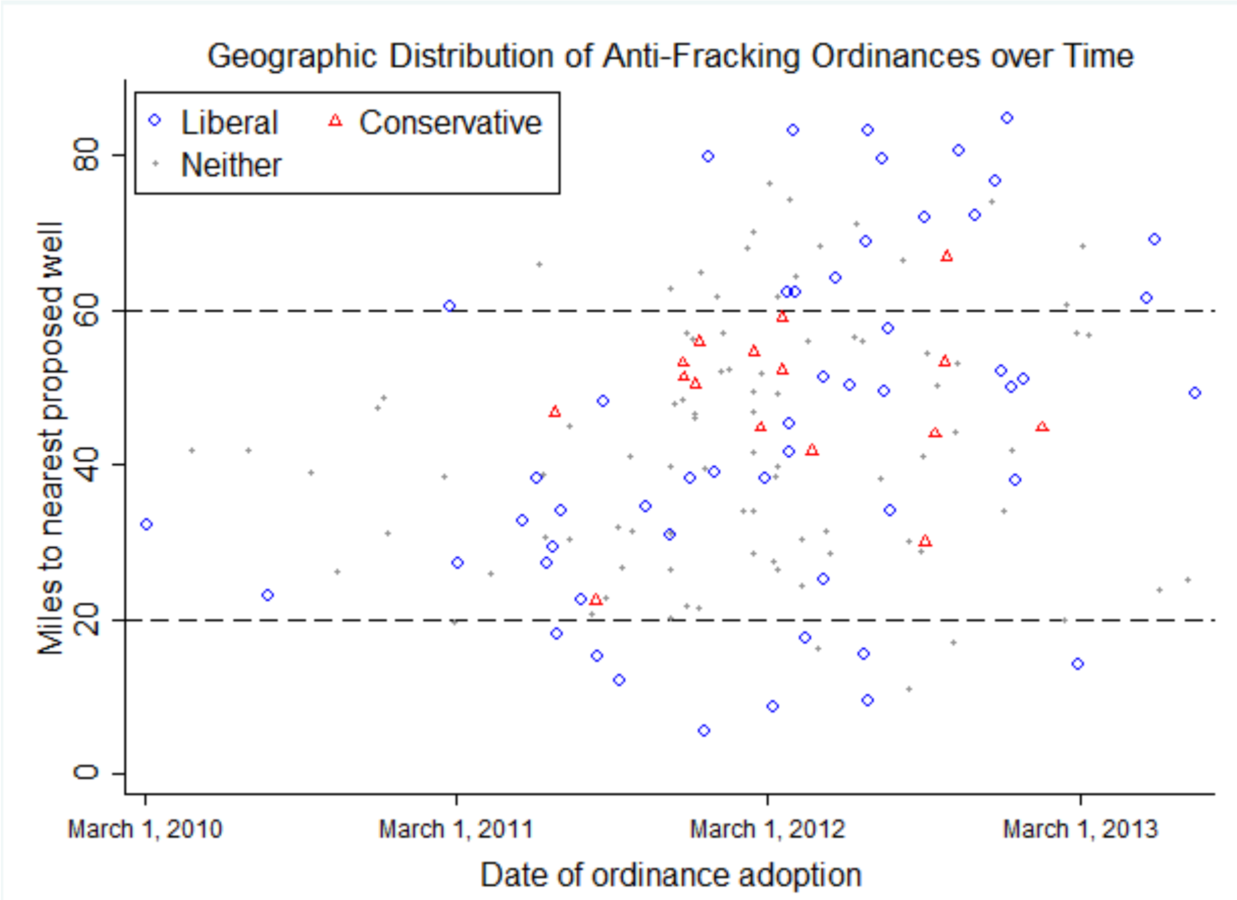


Figure 6. Scatterplot shows the geographic distribution of towns that passed an anti-fracking ordinance over time. Blue circles indicate communities with greater than 50.9% Democratic vote share (mean plus .5 SDs of variable). Red triangles indicate communities with greater than 53.7% Republican vote share (mean plus .5 SDs of variable). Other towns that passed bans are represented as grey dots.

Appendix A. Test of Proportional Hazards Assumption

Variable	ρ	Prob > χ2
Log population	-0.081	0.368
Rural (D)	0.032	0.662
Unemployment	0.062	0.425
Oil/gas town (D)	0.038	0.639
Education	-0.056	0.512
Log number of colleges/universities	-0.047	0.539
Miles to nearest well	-0.072	0.444
Miles to nearest well squared	0.139	0.145
Democratic vote share	0.183	0.029
Green Party vote share	-0.117	0.121
Number of prior ordinances in county	-0.133	0.162
	χ2	Prob > χ2
Global test	28.340	0.003

Appendix B. Data sources for community case study

Data on public participation in town board hearings comes from copies of the official town board minutes book, which I obtained in April 2013 by filing a Freedom of Information Law (FOIL) request. The town board held four official public hearings about fracking. From the minutes, I identified the ninety-five unique speakers and their addresses. I coded each speaker's comment as either for or against the proposal to ban fracking in the town. Of the ninety-five comments, all but four included a clear statement in favor or in opposition of the ban, leaving 21 fracking supporters and 70 opponents.

Using the speakers names and addresses, I identified each speaker in the county's tax assessment rolls. Tax assessment rolls are public documents used to determine local property taxes. They identify and appraise the value of each land parcel in the locale, and thus include all landowners in the town. Of the 91 speakers who expressed a clear position, 83 were property owners in the town (64 opponents and 19 supporters). The reported average acreage is based on these property owners.

SUPPLEMENTARY MATERIALS

SM Table 1. Partial Likelihood Estimates of the Passage of Anti-Fracking Ordinances
(Risk set limited to communities lying above at least one of the targeted shale formations)

Variable	Model 1	Model 2	Model 3	Model 4
Log population	-0.259*	-0.393**	-0.397**	-0.312*
	(0.116)	(0.119)	(0.119)	(0.129)
Rural (D)	-0.974**	-0.771**	-0.769**	-0.536*
	(0.221)	(0.227)	(0.227)	(0.240)
Unemployment	-0.0934	-0.0820	-0.0958	-0.0322
	(0.0964)	(0.0959)	(0.0964)	(0.0948)
Oil/gas town (D)	-2.033**	-1.708*	-1.701*	-1.599*
	(0.741)	(0.745)	(0.745)	(0.743)
Education	0.392**	0.423**	0.436**	0.366**
	(0.0877)	(0.0883)	(0.0878)	(0.0917)
Log number of colleges/universities	0.295**	0.310**	0.305**	0.315**
	(0.0843)	(0.0834)	(0.0848)	(0.0798)
Miles to nearest well	0.109**	0.0894**	0.0888**	
	(0.0182)	(0.0184)	(0.0184)	
Miles to nearest well squared	-0.00140**	-0.00111**	-0.00111**	
	(0.000214)	(0.000211)	(0.000211)	
On Marcellus Shale (D)				1.089**
				(0.217)
Land owner coalition (D)				-0.690**
				(0.244)
Democratic vote share	0.264*	0.356**	-0.197	-0.244
	(0.120)	(0.125)	(0.320)	(0.317)
Green Party vote share	0.0435	0.00309	0.518**	0.528**
	(0.0685)	(0.0674)	(0.177)	(0.175)
Number of prior ordinances in county		0.114**	0.113**	0.148**
		(0.0170)	(0.0170)	(0.0172)
Democratic vote share*Month			0.0242	0.0221
			(0.0126)	(0.0125)
Green Party vote share*Month			-0.0229**	-0.0211**
			(0.00749)	(0.00741)
Likelihood ratio	194.21	231.28	241.56	241.56
df	10	11	13	13

N = 85,348
Standard errors in parentheses
** p<0.01, * p<0.05
All variables are standardized and centered at the mean except distance to well, prior number of adoptions, and all dummy variables

SM Table 2. Partial Likelihood Estimates of the Passage of Anti-Fracking Ordinances among New York Municipalities, March 2010 - July 2013 (Alternative specification of proximity to well variables)

Variable	Model 1	Model 2	Model 3
Log population	-0.413**	-0.414**	-0.384**
	(0.116)	(0.116)	(0.116)
Rural (D)	-0.609**	-0.684**	-0.648**
	(0.213)	(0.219)	(0.219)
Unemployment	-0.0824	-0.0771	-0.0723
	(0.0916)	(0.0921)	(0.0922)
Oil/gas town (D)	-1.574*	-1.566*	-1.536*
	(0.743)	(0.743)	(0.743)
Education	0.387**	0.381**	0.374**
	(0.0871)	(0.0872)	(0.0855)
Log number of colleges/universities	0.261**	0.233**	0.209**
	(0.0795)	(0.0814)	(0.0726)
2-knot linear spline			
0-42.2 miles to nearest well	0.0316**		
	(0.00917)		
42.2-74.9 miles to nearest well	-0.0358**		
	(0.0107)		
74.9 or more to nearest well	-0.189**		
	(0.0535)		
3-knot linear spline			
0-33.4 miles to nearest well		0.0589**	
		(0.0153)	
33.5-58.5 miles to nearest well		-0.0273*	
		(0.0129)	
58.5-84.3 miles to nearest well		-0.0582**	
		(0.0180)	
84.3 or more to nearest well		-0.601	
		(0.413)	
*Quantiles**			
2nd quantile (26.7 to 46.3 miles) (D)			0.492*
			(0.233)
3rd quantile (46.5 to 65.1 miles) (D)			0.402
			(0.236)
4th and 5th quantile (65.2 to 191.0 miles) (D)			-1.414**
			(0.308)

(continued)

Democratic vote share	-0.210	-0.184	-0.169
	(0.318)	(0.319)	(0.310)
Green Party vote share	0.547**	0.517**	0.547**
	(0.171)	(0.171)	(0.171)
Number of prior ordinances in county	0.125**	0.116**	0.138**
	(0.0169)	(0.0173)	(0.0170)
Democratic vote share*Month	0.0277*	0.0273*	0.0222
	(0.0123)	(0.0123)	(0.0120)
Green Party vote share*Month	-0.0220**	-0.0216**	-0.0206**
	(0.00714)	(0.00713)	(0.00714)
Likelihood ratio	308.42	315.49	259.67
df	14	15	14

N = 117,214

Standard errors in parentheses

** $p<0.01$, * $p<0.05$

All variables are standardized and centered at the mean except distance to well, prior number of adoptions, and all dummy variables.

First quantile (0 to 26.7 miles from a well) is the reference group. Since no towns in the fifth quantile adopted an ordinance, I collapse it with the fourth.

SM Table 3. Partial Likelihood Estimates of the Passage of Anti-Fracking Ordinances among New York Municipalities, March 2010 - July 2013 (Alternative specification of time interaction effect)

Variable	Model 1	Model 2
Log population	-0.398**	-0.413**
	(0.117)	(0.117)
Rural (D)	-0.641**	-0.621**
	(0.214)	(0.214)
Unemployment	-0.0712	-0.0841
	(0.0916)	(0.0920)
Oil/gas town (D)	-1.642*	-1.543*
	(0.742)	(0.746)
Education	0.384**	0.372**
	(0.0866)	(0.0869)
Log number of colleges/universities	0.249**	0.252**
	(0.0785)	(0.0783)
Miles to nearest well	0.106**	0.107**
	(0.0180)	(0.0181)
Miles to nearest well squared	-0.00133**	-0.00135**
	(0.000198)	(0.000199)
Democratic vote share	1.157*	
	(0.475)	
Republican vote share		-1.428*
		(0.563)
Green Party vote share	0.180	0.0304
	(0.284)	(0.315)
Number of prior ordinances in county	0.118**	0.118**
	(0.0167)	(0.0167)
Democratic vote share*2010	-1.072	
	(0.556)	
Democratic vote share*2011	-0.865	
	(0.490)	
Democratic vote share*2012	-0.550	
	(0.489)	
Republican vote share*2010		1.257
		(0.645)
Republican vote share*2011		1.093
		(0.577)
Republican vote share*2012		0.700
		(0.576)

(continued)

Green Party vote share*2010	0.444	0.571
	(0.321)	(0.353)
Green Party vote share*2011	-0.293	-0.183
	(0.299)	(0.330)
Green Party vote share*2012	-0.252	-0.191
	(0.296)	(0.327)
Likelihood ratio	325.37	328.42
df	17	17

N = 117,214
Standard errors in parentheses
** p<0.01, * p<0.05
All variables are standardized and centered at the mean except distance to well, prior number of adoptions, and all dummy variable. 2013 is the reference year for vote share variables.

SM Table 4. Replication of Models from Table 2 with Republican Vote Share Instead of Democratic Vote Share

Variable	Model 1	Model 2	Model 3	Model 4
Log population	-0.266*	-0.399**	-0.402**	-0.317**
	-0.114	-0.117	-0.117	-0.122
Rural (D)	-0.806**	-0.624**	-0.626**	-0.428
	-0.208	-0.213	-0.213	-0.228
Unemployment	-0.084	-0.078	-0.089	-0.01
	-0.093	-0.092	-0.093	-0.09
Oil/gas town (D)	-1.838*	-1.502*	-1.511*	-1.508*
	-0.742	-0.746	-0.746	-0.746
Education	0.330**	0.355**	0.365**	0.323**
	-0.086	-0.087	-0.087	-0.09
Log number of colleges/universities	0.237**	0.257**	0.246**	0.243**
	-0.078	-0.077	-0.078	-0.07
Miles to nearest well	0.122**	0.106**	0.107**	
	-0.018	-0.018	-0.018	
Miles to nearest well squared	-0.00158**	-0.00133**	-0.00135**	
	-0.000199	-0.000197	-0.000198	
On Utica Shale (D)				1.552**
				-0.399
On Marcellus Shale (D)				2.614**
				-0.386
Land owner coalition (D)				-0.725**
				-0.243
Republican vote share	**-0.417****	**-0.513****	**0.195**	**0.273**
	-0.132	**-0.137**	**-0.342**	**-0.329**
Green Party vote share	0.018	-0.034	0.553**	0.568**
	-0.071	-0.07	-0.182	-0.178
Number of prior ordinances in county		0.116**	0.117**	0.154**
		-0.017	-0.017	-0.017
Republican vote share*Month			**-0.0304***	**-0.0256***
			-0.013	**-0.0128**
Green Party vote share*Month			-0.026**	- 0.0229**
			-0.008	-0.007
Likelihood ratio	262.71	302.96	314.99	274.51
df	10	11	13	14

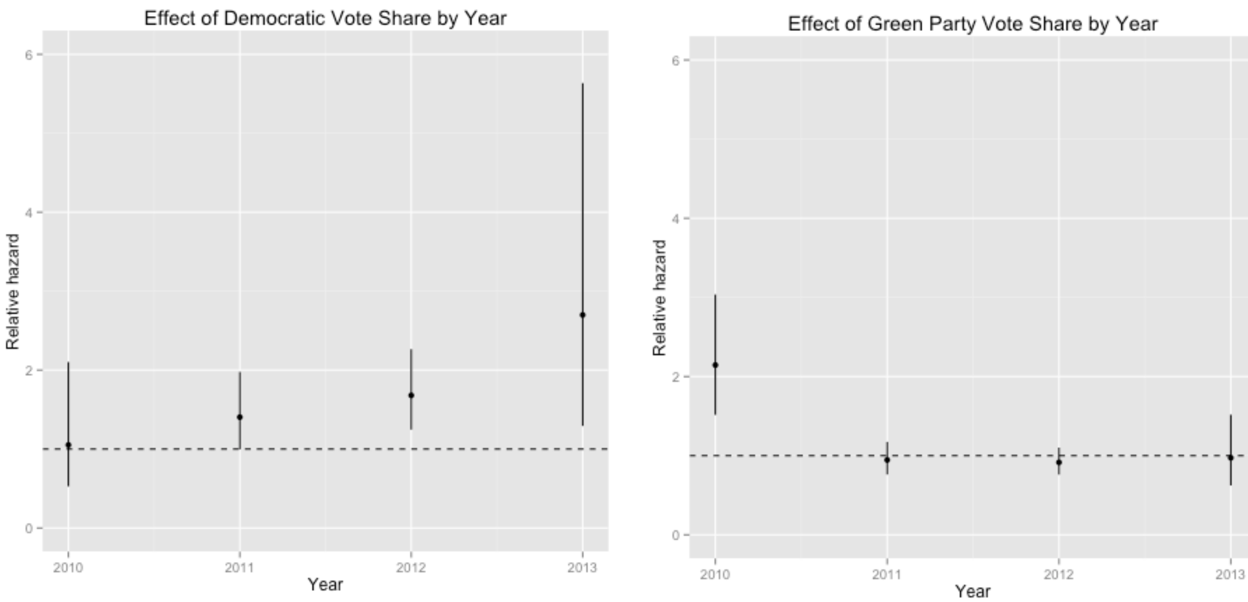
N = 117,214

Standard errors in parentheses

** p<0.01, * p<0.05

All variables are standardized and centered at the mean except distance to well, prior number of adoptions, and all dummy variables.

SM Figure 1. In a well publicized report, Engelder (2009) classified New York counties into six tiers based on Marcellus development potential. Seventeen of New York's sixty-two counties were ranked. Counties in Tiers 1-4 are considered to constitute the core of the potential development region and unranked counties hold no development potential, either because they do not lie over any shale or because the shale does not contain recoverable gas. The tiers are presented on the Y-axis of the scatterplot, with unranked counties coded as 7. No NY county was rated better than Tier 3. The X-axis is the distance to the nearest proposed well and each black dot represents a New York municipality that passed an anti-fracking ordinance. Munitipalities that did not pass an ordinance are plotted in gray (dots are jittered around the tier value to aid visualization). The fractions on the right side show the rate of ordinance adoption for each of the tiers. Because these rankings do not consider Utica Shale potential, the tier ranking does not perfectly capture the likelihood of development. Nonetheless, the figure suggests that proximity is related to development potential. Moreover, it shows that the most lucrative areas were unlikely to pass bans and that the majority of the bans passed in communities outside of the projected core of the Marcellus development region.



SM Figure 2. Marginal effects of political profile variables by year. Error bars represent 95% confidence interval. Estimates are from Model 1 of SM Table 3.