

The Great Divide

Public Perceptions of Shale Gas Extraction and Hydraulic Fracturing in Pennsylvania and New York

ERICK LACHAPPELLE

University of Montreal

This study compares public perceptions of shale gas extraction and hydraulic fracturing in two of the most populous states with significant shale gas reserves but with vastly different approaches to developing this resource. Drawing on data from a comparative survey administered to two statewide samples in Pennsylvania (n = 411) and New York (n = 404), the study examines the correlates of support for hydraulic fracturing, as well as general levels of public awareness, and perceptions of effects of hydraulic fracturing within the Marcellus shale play. Though the level of awareness of the fracking issue among residents of Pennsylvania and New York is found to be similarly high, levels of support for fracking differ, mirroring distinctive policy approaches found in these neighboring states. The correlates of support for fracking include being Republican, having a conservative ideology, and being male. The study also finds that residents of New York are more aware of fracking policy and debate in Pennsylvania than vice versa, with many New York residents perceiving negative effects on their home state as a result of fracking in neighboring Pennsylvania. This asymmetric level of awareness and concern raises new questions on the role of cross-border perceptions in shaping opinion toward hydraulic fracturing in adjacent states.

The Marcellus formation in the northeastern corner of the United States contains one of the most robust deposits of natural gas found in North America. Stretching from West Virginia northward to

central New York State, the Marcellus shale deposit contains an estimated 141 trillion cubic feet of natural gas (U.S. Energy Information Administration 2012). While the deposit is a unified geographic feature, it lies under an array of political jurisdictions including at least some portion of nine states and one Canadian province. With little federal intervention in the regulation of the extraction of natural gas from shale, state governments have played a primary role in overseeing drilling activity within the Marcellus shale play (Rabe 2014; Warner and Shapiro 2013). This situation has created striking differences in policy approaches throughout the Marcellus region, with the most extreme example of policy variation occurring on both sides of the 306-mile border that separates the State of New York and the Commonwealth of Pennsylvania. This state border, which intersects the heart of the Marcellus play, has become a divide between one of the most active hydraulic fracturing regions in the United States and a neighboring state where the shale play remains largely untouched. This geography is such that some New York residents living on the border can see drill sites across the state line, as rigs in Pennsylvania drill for natural gas in the same shale formation that sits beneath their property.

In light of the substantial economic, environmental, and social costs and benefits of hydraulic fracturing (or “fracking”) for natural gas (Eaton 2013; Sovacool 2014), it is not surprising that this matter has become a major political issue. In this context, this study compares public perceptions of shale gas extraction and hydraulic fracturing in two Marcellus states that have adopted vastly different approaches to developing this resource. Analyzing data from the National Survey on Energy and the Environment (NSEE), the study examines comparative views on such matters as public awareness of hydraulic fracturing, general support for shale gas drilling, and perceptions of effects of hydraulic fracturing within the Marcellus shale play. This includes a series of innovative questions that explore, for the first time, what Pennsylvanians and New Yorkers know and think about hydraulic fracturing activity in their neighboring states, allowing for the examination of how experience with fracking and proximity to active shale plays in one state can influence opinions in neighboring jurisdictions.

Hydraulic Fracturing: The Pennsylvania and New York Context

Involving the injection of water and chemicals at high pressure to crack open shale rock and release oil and gas deep below the surface, the process of hydraulic fracturing has been used by industry for decades. However, the

fairly recent introduction of horizontal drilling techniques combined with high-volume hydraulic fracturing has enhanced oil and gas recovery from reserves previously considered inaccessible. The technological developments in hydraulic fracturing have enabled the growth of efforts to extract gas from shale deposits in many regions of the United States. In fact, the oil and gas exemptions in the 2005 Energy Policy Act have removed regulatory power from the Environmental Protection Agency, thus leaving state governments largely in control of the regulation of this practice (Warner and Shapiro 2013; Rabe 2014).

Despite the growing use of these techniques, and though sharing similar access to the Marcellus shale deposit, Pennsylvania and New York have adopted strikingly different approaches to hydraulic fracturing over the last decade. Indeed, Pennsylvania has seen broad and intense expansion in the use of hydraulic fracturing since the process was first applied in the Commonwealth in 2003 (Harper 2008; Rabe and Borick 2013). In 2012 natural gas from shale accounted for more than 90% of the state's natural gas production (U.S. Energy Information Administration 2014). The growth in shale gas drilling has led to large-scale public debates within Pennsylvania that have in turn produced a number of highly controversial policies, most notably, the state's Oil and Gas Act.

Passed by the state government in early 2012, the Oil and Gas Act, or Act 13, established the framework for governance of unconventional gas drilling in Pennsylvania. The legislation creates an impact fee on wells drilled, with revenue primarily going to local governments where drilling takes place. Act 13 also provides baseline water supply protections and limited fracking fluid chemical disclosure; establishes statewide environmental standards with respect to fracking; and outlines processes for well inspections, permitting, environmental protections, well location restrictions, and water-use regulations. Overall, these regulations have generally been considered pro-industry. Indeed, former governor Tom Corbett, a principle architect and strong supporter of Act 13, prioritized shale gas exploration and development throughout his term as governor, receiving numerous campaign donations from those aligned with the oil and gas industry (Rabe and Borick 2013). Ultimately, Corbett's continued opposition to an extraction tax—despite growing pressure from within his own party—opened the door to his electoral defeat to Tom Wolf, who successfully exploited Corbett's lax shale policies on his road to becoming governor. Nevertheless, the Keystone state continues to harbor a permissive approach to the industry, despite recent declines in drilling that resulted from a combination of low oil and gas prices and the declining rate of production from older wells in the state.

Across the border, the picture in New York is considerably different. Despite an abundant supply of shale gas within its share of the Marcellus play, New York has not permitted high volume hydraulic fracturing for unconventional gas and oil exploration. Although no unconventional gas drilling is taking place in the Empire State, there has been considerable study and debate regarding hydraulic fracturing. Indeed, after a New York State legislature decision to pass a temporary moratorium on fracking was passed in 2010, the legislative session 2013–2014 featured an array of proposed bills, perhaps in anticipation of an eventual removal of the moratorium following a regulatory review conducted by the New York State Department of Environmental Conservation (DEC). The DEC currently regulates the drilling, operation, and plugging of natural gas wells and would manage hydraulic fracturing-related regulations if the ban were lifted. Yet after seven years of review, the DEC released a statement concluding that New York should not proceed with hydraulic fracturing in the state (DEC 2015), creating the basis for a comprehensive ban on use of this technology in New York, and setting up a legal battle among fracking opponents and proponents in the state (Coin 2015).

Research Questions and Literature Review

The strikingly different policy approaches present an ideal opportunity for analyzing differences in state-level public attitudes toward hydraulic fracturing. Existing literature has begun to flesh out these policy differences, examining policy efforts in Pennsylvania (Rabe and Borick 2012, 2013) as well as regulatory efforts in New York (Boscarino 2013; Barnes 2013). Efforts to link these policy differences to differences in public opinion, however, are rare. While there is growing literature on public opinion on this issue, relatively few studies are based on representative state-level samples that maximize comparability within and across state populations. Moreover, questions about perceptions of fracking activity happening out of state are even scarcer. This study contributes to the emerging literature on public attitudes toward hydraulic fracturing by examining responses to a comparative survey administered to statewide representative samples of the Pennsylvania and New York populations in 2014.

Given the relative novelty of high-volume hydraulic fracturing with horizontal drilling, it may not be surprising to find that the number of studies on public opinion on this matter is fairly limited. Nevertheless, a growing body of literature has provided insight into how Americans view this matter. Some of this research examines nationally representative samples to paint a high-level picture of how Americans perceive this issue. For instance, The

Pew Research Center for the People and the Press (2012, 2015) has conducted a number of national-level studies that have examined awareness of and support for hydraulic fracturing in the United States. Among other things, this research has found that while Americans are divided on whether they support increased use of fracking, only about a quarter (26%) report having heard a lot about this issue, while pluralities have heard a little (37%) or nothing at all (37%). These findings are generally corroborated in one of the most comprehensive scholarly studies of public attitudes regarding hydraulic fracturing conducted to date (Boudet et al. 2014). In this study, a nationally representative sample of over 1,000 adult Americans were found to have very limited awareness of hydraulic fracturing within the United States, and mixed levels of support for the practice. The study also found that support is affected by a number of factors, including having a conservative political ideology, while increased familiarity with fracking, having egalitarian worldviews, reading the newspaper, and being female was found to increase opposition. Other national-level studies have found evidence of partisan polarization on this issue (Clarke et al. 2016; Borick and Clarke 2016) and that the term “fracking” itself (as opposed to framing the question around shale oil or gas development) heightens opposition to this practice among Americans (Clarke et al. 2015; Climek et al. 2014).

While contributing to our understanding of the factors that help shape public attitudes toward hydraulic fracturing, these nationally representative samples potentially overlook important differences at the state level. Given the non-uniform distribution of shale gas deposits and fracking activity across the continental United States, one might expect fracking-related knowledge and awareness to vary spatially. In particular, levels of awareness and support are likely to be heterogeneous across states, varying with the degree of experience and familiarity with the issue.

To better explore the role of such geographic context in shaping public attitudes toward fracking, numerous studies have begun to explore public attitudes at the state and local levels. For instance, a series of studies in Pennsylvania by the Muhlenberg College Institute of Public Opinion and The Center for Local State and Urban Policy at the University of Michigan have examined public opinion of hydraulic fracturing in that state. These studies have found that most Pennsylvanians tend to see hydraulic fracturing as positive for the Commonwealth but also harbor substantial concerns about the policies and risks associated with shale gas extraction (Brown et al. 2013; Muhlenberg College Institute of Public Opinion 2011). Comparative studies drawing on the same data have shown that the role of information varies depending on place, exerting a powerful effect in Quebec, but not in Michigan and Pennsylvania (Lachapelle and Montpetit 2014).

Other studies focus on the substate level. One of the first efforts to analyze public opinion at this more local level is a study by Jacquet (2012), which administered a mail survey to landowners in a region in northern Pennsylvania that had experienced simultaneous development of both the wind and natural gas development industries. This study found that proximity explained little variation in attitudes toward wind and natural gas development in the region, but that individuals with environmental attitudes, and those leasing their land, had, respectively, significantly more negative and significantly more positive attitudes toward the gas industry. In another study, Stedman et al. (2012) use a random sample of New York and Pennsylvania residents within the Marcellus shale region to compare views on shale gas issues between these states. They found New Yorkers were more likely than Pennsylvanians living on the same shale play to have negative views of both hydraulic fracturing and the shale gas industry, but that there were no differences across state lines in knowledge and awareness about the subject. Employing a similar research design, Brasier et al. (2013) examine risk perceptions in counties located in the core of the Marcellus shale play in Pennsylvania (21 counties) and New York (8 counties). This study also found that residing in New York increases the probability of seeing greater risk from gas drilling. In addition, Brasier et al. (2013) found that awareness of nearby gas wells is weakly associated with lower risk perceptions in bivariate correlations but that this effect disappears when additional variables are included in a regression model. A final study by Kriesky et al. (2013) compares views across residents living in adjacent Washington and Allegheny counties. This study finds that attitudes are more positive where drilling activity is relatively more intense (i.e., in Washington County), that this is especially true when individuals have leased their mineral rights, and that perceived economic benefits drive support among respondents.

Overall, existing studies help identify the factors that help shape public attitudes and perceptions toward hydraulic fracturing. Several important questions, however, remain. For instance, how does the structure of public opinion in Pennsylvania compare to that in New York, at the *state level*? To what extent do these opinions map onto the different policy approaches adopted by each state? What is the role of information and experience with hydraulic fracturing in shaping attitudes toward this industry? How much attention do residents of Pennsylvania and New York pay to fracking developments across the border, and how do these views affect perceptions of risk and overall support?

In pursuing answers to these questions, the present study seeks to accomplish a number of goals. First it seeks to directly compare statewide attitudes,

beliefs, and preferences regarding hydraulic fracturing in both New York and Pennsylvania, using statewide representative surveys. This represents an important difference with much of the existing literature, which tends to rely on national samples, or otherwise focus on targeted subsets of state populations. Given that statewide policy decisions are likely to reflect statewide public opinion and not just opinion in a section of the state where there is actual (or potential) fracking taking place, it is valuable to measure opinion and explore the correlates of support for and opposition toward hydraulic fracturing among representative samples of all residents in two Marcellus shale states. This study is thus explicitly designed to better address how residents in both New York and Pennsylvania respond to identical questions fielded at the same time to allow direct comparison of the structure of opinion on hydraulic fracturing within these states.

Second, beyond providing a more complete understanding of the differences in areas such as issue awareness and policy support, the direct comparisons of statewide opinion on hydraulic fracturing allow for inquiry into the alignment between state policies and public opinion. A large body of political science research has found a linkage between state-level public opinion and policy adoption across an array of policy domains (Burstein 2003; Pacheco 2013; Wright, Erikson and McIver 1993; Johnson, Brace and Arceneaux 2005). Given the vastly different policy approaches toward shale gas extraction in these two Marcellus shale play states, one might anticipate varied opinion among the residents of New York and Pennsylvania that generally aligns with these divergent policy outcomes.

A third major goal of this study, and perhaps a unique offering to the literature, is to compare the level of knowledge and opinion that residents of New York and Pennsylvania have about hydraulic fracturing levels and policy in their neighboring state and to explore the effect of that knowledge and opinion on policy preferences within their own states. A robust body of literature has examined the diffusion of public policies between states (Gray 1973; Mintrom 1997; Mooney 2001; Glick and Frieland 2014). A variety of internal political, economic, and social factors helps to explain why state-level policymaking behavior resembles a “system of emulation” (Walker 1969), as neighbors imitate policies found in other jurisdictions. In more recent work, Glick and Friedland (2014) demonstrate that learning from other states facilitates policy diffusion and that this scenario is most likely to occur among policymakers in adjacent states. While considerable evidence shows that policymakers do learn from and emulate others, little research examines what citizens themselves know about issues and policies in neighboring states. A study by Schneider, Jacoby, and Lewis (2011) uses a national survey to provide

insight into what Americans prefer in terms of intergovernmental relations, including state-to-state relationships, but does not delve into what individuals may know and think about policies in other states. The present study seeks to fill this gap, by examining the extent to which knowledge of what is occurring across state lines influences policy preferences within adjacent states.

Data and Methods

To answer these questions, this study draws on data from an April and May 2014 telephone survey conducted by the Muhlenberg Institute of Public Opinion, in collaboration with the University of Michigan Center for Local, State, and Urban Policy (CLOSUP) as part of the National Surveys on Energy and Environment (NSEE) series. This survey secured responses from 405 New York residents and 411 Pennsylvania residents, drawn from all regions of each state and comprising statistically representative profiles of the respective citizens. Land lines and cell phones were sampled in both states; the New York sample was made up of 252 land lines and 153 cell phones, and the Pennsylvania sample was made-up of 242 land lines and 141 cell phones. The American Association of Public Opinion Research (AAPOR) RR3 response rate for the combined sample was 16%.

Support for Hydraulic Fracturing in Pennsylvania and New York

This study begins with an examination of overall levels of knowledge and support for shale gas extraction in Pennsylvania and New York. In contrast to the limited awareness of hydraulic fracturing found among Americans in national samples (Pew 2012; Boudet et al. 2014) results from the two statewide NSEE surveys reveals that roughly half of the population in Pennsylvania (49%) and New York (44%) are following the issue of hydraulic fracturing in their state either very or somewhat closely. Moreover, New Yorkers and Pennsylvanians also report similar levels of awareness of the process of hydraulic fracturing, with a little over a third of Pennsylvanians (37%) and New Yorkers (34%) saying that they have heard a lot about the process, and majorities in both states reporting that they have heard at least a little about the process (55% in New York and 52% in Pennsylvania). While a plurality (39%) of Americans in a national-level survey report hearing “nothing at all” about fracking (Boudet et al. 2014), the proportion of Pennsylvanians and New Yorkers reporting similarly low levels of awareness is comparatively smaller (about one in ten).

Across Pennsylvania and New York, familiarity with and attention to the fracking issue are thus relatively high. When these two variables are

standardized on a 0–1 scale and combined into an index ($\alpha = 0.75$), no significant difference across residents of Pennsylvania ($M = 1.18$, $SD = 0.55$) and New York ($M = 1.20$, $SD = 0.54$) in mean levels of awareness ($t(805) = 0.60$, $p = 0.545$) is observed. Of course, the relatively high level of issue awareness observed in both Pennsylvania and New York is to be expected, given that the debate over the relative benefits and risks of “fracking” is likely to be more salient in states that sit atop important shale resources (Evensen, Clarke and Stedman 2014).

While Pennsylvanians and New Yorkers report similar levels of awareness of hydraulic fracturing, they differ considerably in overall views on the extraction of natural gas from shale deposits in their states. Results indicate that a slim majority (54%) of Pennsylvania residents support shale gas extraction in their state in comparison to only three out of ten (30%) New Yorkers who feel the same. However, whether or not individuals live on a shale play appears (at least at first) to make a difference.

Using data from the U.S. Energy Information Administration Shale database, the Geological Survey of Canada, and self-reported postal codes, respondents were located on a map of the Marcellus and Utica shale plays underlying parts of Pennsylvania and New York using Arc GIS software. Individuals living atop the shale play were coded as 1, and those not living on the play were coded as 0. Respondents were then plotted on the layered map, and color-coded those supporting the use of hydraulic fracturing in their state (white circles), and those in opposition (dark circles). As shown in Figure 1, there appear to be more white circles (and thus more support) on the colored portions of the map representing the presence of a shale play. Further evidence of this relationship is provided in a bivariate cross-tab (Table 1).

As shown in Table 1, there appears to be some relationship between living on a shale play and supporting the use of hydraulic fracturing. Indeed, those not living on either the Marcellus or Utica plays are more likely to oppose, and those living on one of these plays are more likely to support, use of hydraulic fracturing in their state. Though clearly visible, this relationship is somewhat weak and barely significant at conventional levels. Moreover, the bivariate analysis ignores the potential role of other predictors. To ascertain what shapes attitudes toward hydraulic fracturing in Pennsylvania and New York, a logistic regression was estimated to model support for hydraulic fracturing as a function of political, demographic, and geographic factors.

Figure 2 presents the results of the logistic regression in which the dependent variable identifies all respondents who indicated support for the use of hydraulic fracturing (i.e., “Strongly” and “Somewhat” support). To facilitate interpretation, the average marginal effects for each predictor are plotted

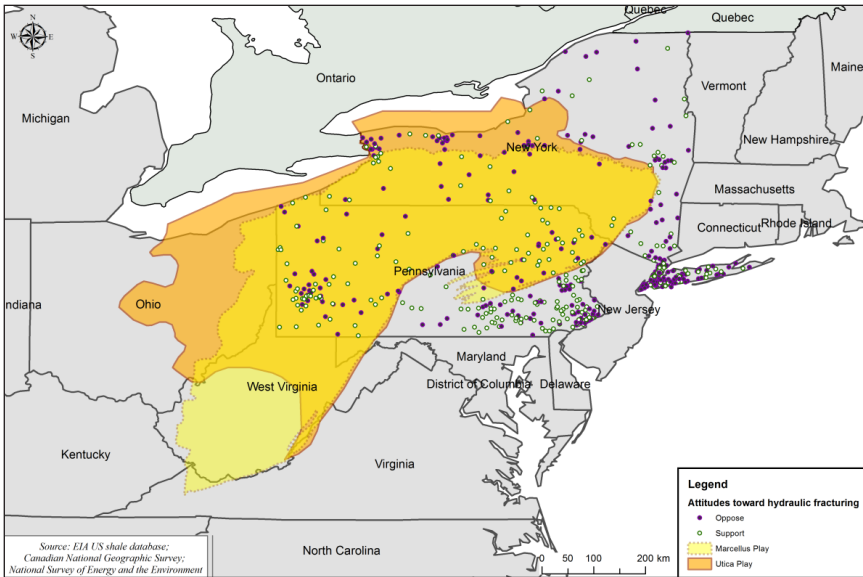


Figure 1. Spatial Distribution of Support for and Opposition to Hydraulic Fracturing in Pennsylvania and New York. (EIA U.S. shale database; Canadian National Geographic Survey; National Survey of Energy and the Environment.)

Table 1. Support for Hydraulic Fracturing by Residence over Shale Play		
	Not on Shale Play (n = 519)	On Shale Play (n = 297)
Oppose (n = 354)	46%	39%
Support (n = 350)	39%	48%
Not sure (n = 111)	14%	13%
<p>Q4: In general, would you say that you strongly support, somewhat support, somewhat oppose, or strongly oppose the extraction of natural gas from shale deposits in New York/Pennsylvania?</p> <p>Source: National Survey of Energy and the Environment.</p> <p>Note: $\chi^2 = 5.24$; $df = 2$; $p = 0.073$.</p>		

along with 95% confidence intervals. Where these confidence bands do not overlap the zero line, the model suggests the particular relationship (positive or negative) is statistically significant. Overall, these estimates represent the expected change in the likelihood of any one respondent indicating support, given a one-unit change in each of the predictor variables.

As can be seen, several of the variables included in the model help explain variation in support for hydraulic fracturing at the individual level. Consistent with past research (Boudet et al. 2014), the data suggest that Republicans are more likely than Democrats to support hydraulic fracturing in their state, and

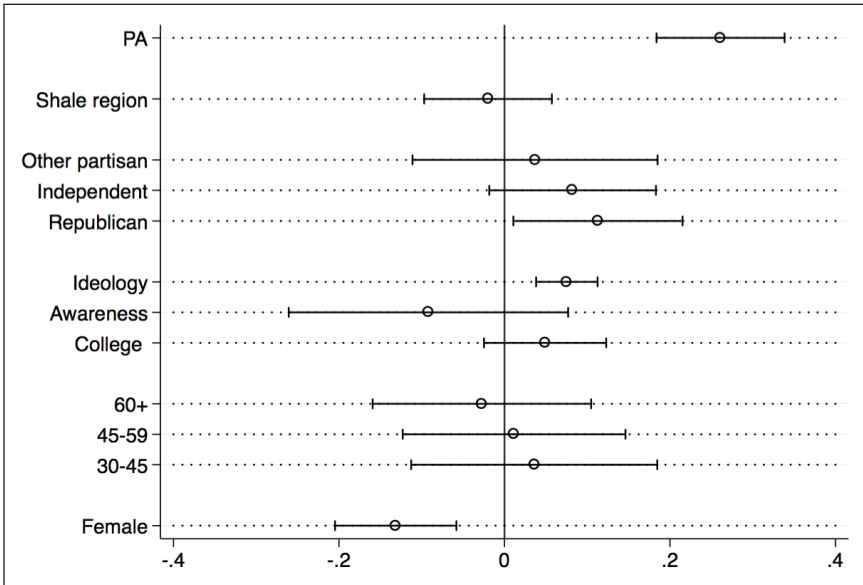


Figure 2. Marginal Effects on the Probability of Support for Hydraulic Fracturing. (*National Survey of Energy and the Environment*.)

the likelihood of support increases moving from left to right along the 5-point (very) liberal to (very) conservative ideology scale. The level of self-reported awareness, in contrast, offers more limited analytical leverage on predicting support. Indeed, in cross-tabulations (not shown here) an increased level of awareness is associated with *both* heightened support and opposition. In other words, familiarity and awareness do not uniformly increase or decrease support, but can be polarizing, resulting in a net non-effect (since more awareness is found among those who support and oppose fracking, the effects cancel each other out). In terms of demographics, there is no difference between college- and non-college-educated groups, nor can a significant difference across categories of age be observed. However, the analysis finds that being female, rather than male, significantly decreases the chances of support.

What stands out most from Figure 2, however, is that being a resident of Pennsylvania, as opposed to living in the state of New York, is associated with a higher probability (about 20%) of indicating support for hydraulic fracturing in their state. After controlling for state of residence, the effect of living on the Marcellus or Utica shale play (examined in Table 1) disappears. These results are broadly consistent with previous research that found a similarly robust relationship between state of residence and risk perception associated with fracking, which held even when controlling for awareness of nearby gas wells. That this relationship can be observed in a statewide sample, however,

provides more direct evidence that public opinion and policy are fairly well aligned in terms of the shale gas issue in Pennsylvania and New York. As might be expected in a representative democracy, a more permissive fracking regime in Pennsylvania is aligned with broad support in the Keystone state, while the ban on such methods in New York is broadly in line with opinions there. But why do such large differences exist across these two adjacent states with similar resources? To what extent might cross-border perceptions be influenced by what's happening across state lines?

Cross-Border Perspectives

Given the controversy over fracking in Pennsylvania and New York, one might expect residents of these two states to also be more aware of similar debates occurring in adjacent states. To explore this possibility, this study examines opinions of shale gas policies and activities across the Pennsylvania-New York state border. In particular the survey allows for the comparison of how residents in these two states view the fracking activities in neighboring jurisdictions and assess the impact of such activities on life in their own state.

Respondents in both states were thus asked how aware they believe themselves to be concerning the level of hydraulic fracturing taking place in their neighboring state. Response options for this self-reported item included “Very aware,” “Somewhat aware,” “Not very aware,” and “Not aware at all.” Relative to residents of Pennsylvania, those living in New York generally report being more aware of the level of fracking activity in the neighboring state. In fact, New Yorkers are 20% more likely than Pennsylvanians to say that they are “Very” or “Somewhat” aware of the level of hydraulic fracturing taking place across the border (Table 2). This level of asymmetric awareness suggests that

	Pennsylvania (n = 411)	New York (n = 405)
Very aware	11%	24%
Somewhat aware	25%	32%
Not very aware	20%	14%
Not aware at all	39%	25%
Not sure	5%	5%

Q11: Beyond New York/Pennsylvania hydraulic fracturing has been a public issue in neighboring states, including New York/Pennsylvania. Are you very aware, somewhat aware, not very aware, or not aware at all about the level of hydraulic fracturing in New York/Pennsylvania?

Source: National Survey of Energy and the Environment.

the high-profile debate over fracking in Pennsylvania has penetrated deeper into the psyche of New Yorkers rather than the other way around.

The validity of self-assessed measures of the level of awareness of fracking in neighboring states was tested by examining responses to factual questions. Essentially, this involves testing if those reporting they are aware of hydraulic fracturing across the border actually know what is happening. Overall, a high correlation between self-assessed awareness and ability to answer two factual questions on actual level of fracking activity and policy can be observed (Table 3). Respondents were first asked to identify the level of hydraulic fracturing taking place across the border. Response options included “A high level,” “A moderate level,” “Very little,” and “No” hydraulic fracturing. For the purpose of Table 3, New York respondents reporting “High” and “Moderate” levels of fracking in Pennsylvania were coded as reporting a correct answer, while Pennsylvania respondents reporting “Very little” or “No” hydraulic fracturing occurring in New York were similarly coded. All others (including “Not sure”)

Table 3. Ability to Correctly Answer Factual Questions on Hydraulic Fracturing in Neighboring State by Self-Reported Awareness						
	0 Correct Responses		1 Correct Responses		2 Correct Responses	
	PA (n = 266)	NY (n = 138)	PA (n = 71)	NY (n = 57)	PA (n = 74)	NY (n = 209)
Not aware at all	49%	63%	28%	19%	11%	2%
Not very aware	20%	18%	31%	23%	11%	9%
Somewhat aware	20%	6%	24%	25%	42%	51%
Very aware	3%	2%	17%	26%	35%	38%
Not sure	8%	11%	<1%	7%	1%	<1%

Q11: Beyond New York/Pennsylvania hydraulic fracturing has been a public issue in neighboring states, including New York/Pennsylvania. Are you very aware, somewhat aware, not very aware, or not aware at all about the level of hydraulic fracturing in New York/Pennsylvania? Q12: In terms of your perception of hydraulic fracturing in New York/Pennsylvania, would you say that there is a high level of hydraulic fracturing, a moderate level of hydraulic fracturing, very little hydraulic fracturing, or no hydraulic fracturing at all? Q13: Which of the following do you think best describes New York/Pennsylvania policy regarding hydraulic fracturing? NY [PA] allows hydraulic fracturing, NY [PA] does not allow hydraulic fracturing?

Source: National Survey of Energy and the Environment.

Note: The number of correct answers is computed from the ability of respondents to correctly answer Q12 and Q13. For Pennsylvania: $\chi^2 = 107.76$; $df = 8$; *Cramer's V* = 0.362 $p = 0.000$. For New York: $\chi^2 = 246.96$; $df = 8$; *Cramer's V* = 0.553; $p = 0.000$.

were coded as unable to offer a correct answer. Next, respondents were asked to indicate whether they thought their neighboring state allows (or does not allow) hydraulic fracturing. Respondents able to correctly identify the permissiveness (or not) of policy in the neighboring jurisdiction were again coded as able to offer a correct answer, while all others were coded as unable to provide an accurate response.

Table 3 shows that self-assessed levels of awareness map onto actual levels of knowledge about fracking activity and policy across the Pennsylvania/New York border. Specifically, among Pennsylvanians and New Yorkers who were unable to offer accurate responses to the two factual questions, a majority in Pennsylvania (69%) and in New York (71%) accurately identified themselves as being “Not very” or “Not aware at all” of fracking activity across the border. Similarly, among those who correctly answered the questions, a majority in Pennsylvania (77%) and New York (89%) accurately reported being either “Somewhat” or “Very” aware of the level of hydraulic fracturing in the neighboring state. Table 3 also demonstrates, however, that awareness of cross-border fracking policy and activity is much higher in New York relative to Pennsylvania. In fact, a majority (52%) of New Yorkers in the sample correctly answered the two questions pertaining to fracking activity and policy in Pennsylvania, compared to a small minority (18%) of Pennsylvanians who correctly answered the same two factual questions about fracking in New York. Overall, the data in Table 3 highlight a convergence between the self-assessed measure of awareness and the ability to accurately identify the level of fracking activity and associated policy in the neighboring state. The data also suggest the level of cross-border awareness in fracking activity between Pennsylvanians and New Yorkers is asymmetric, with New Yorkers generally more able to accurately report on levels of fracking activity across state lines.

To what extent might these differential levels of awareness among Pennsylvanians and New Yorkers about activities occurring across the border drive broader perceptions of fracking? Examining responses to questions pertaining to the perceived impact of fracking for the quality of life across the border, this line of questioning is pursued in Table 4, which highlights some intriguing differences. While a majority of both Pennsylvanians and New Yorkers are either not sure or see no effect on their state from the level of hydraulic fracturing across the border, New Yorkers are about three times as likely (29% vs. 9%) to say hydraulic fracturing levels in Pennsylvania have a negative rather than a positive effect on life in New York, while Pennsylvanians are more evenly split (15% negative and 14% positive) on the impact of fracking levels in New York on life in Pennsylvania. Moreover, New Yorkers are about twice

Table 4. Views on the Effects of Hydraulic Fracturing Levels in Neighboring State on Quality of Life in Respondent's State		
	New York (n = 411)	Pennsylvania (n = 405)
Positive effect	9%	14%
Negative effect	29%	15%
No effect	30%	32%
Not sure	32%	38%

Q14: In general do you think that the level of hydraulic fracturing in New York/Pennsylvania has a positive effect, a negative effect, or no effect on quality of life in New York/Pennsylvania?

Source: National Survey of Energy and the Environment.

Notes: $\chi^2 = 23.57$; $df = 3$; $p = 0.000$.

as likely (29% vs. 15%) as Pennsylvanians to think that the level of hydraulic fracturing in their neighboring states has a negative effect on quality of life in their state.

Next, the relationship between individuals' expressed awareness of hydraulic fracturing across the state border and their views on the impact of the level of shale gas extraction on quality of life in their state is examined. The results outlined in Table 5 indicate some differences between Pennsylvania

Table 5. Views on Effects of Fracking for Overall Quality of Life in Home State by Perceived Level of Hydraulic Fracking in Neighboring State										
	High Level of Fracking in Neighboring State		Moderate Fracking in Neighboring State		Very Little Fracking in Neighboring State		No Fracking in Neighboring State		Not Sure	
	PA (n = 10)	NY (n = 120)	PA (n = 60)	NY (n = 112)	PA (n = 52)	NY (n = 17)	PA (n = 71)	NY (n = 8)	PA (n = 218)	NY (n = 146)
Positive effect	30%	11%	23%	13%	25%	24%	14%	13%	9%	3%
Negative effect	20%	44%	27%	27%	21%	18%	18%	13%	9%	19%
No effect	20%	28%	33%	38%	40%	47%	51%	25%	25%	24%
Not sure	30%	17%	17%	21%	14%	12%	17%	50%	57%	53%

Q14: In general do you think that the level of hydraulic fracturing in New York/Pennsylvania has a positive effect, a negative effect, or no effect on the quality of life in New York/Pennsylvania?

Source: National Survey of Energy and the Environment.

Note: For Pennsylvania: $\chi^2 = 84.23$; $df = 12$; $p = 0.000$. For New York: $\chi^2 = 70.75$; $df = 12$; $p = 0.000$.

and New York perspectives. Among New Yorkers who accurately perceive a high level of hydraulic fracturing in Pennsylvania, a plurality (44%) think that this activity has a negative impact on quality of life in New York, with only 11% of this group expressing the view that the high levels of hydraulic fracturing have a positive effect on New York. However, among Pennsylvanians who accurately perceive New York as having no hydraulic fracturing, most (51%) think that this outcome has no effect on life in their commonwealth, with only (14%) saying that the absence of activity has a positive impact on Pennsylvania quality of life and (18%) indicating that no shale gas extraction in New York has a negative effect on life in Pennsylvania. These findings are consistent with what might be expected from an attentive public. They also provide some context in which to interpret the difference in levels of support for hydraulic fracturing in Pennsylvania and New York. Specifically, the perceived negative effect of fracking in Pennsylvania for residents of New York might help explain, at least in part, the relatively greater level of opposition to fracking observed in the Empire state.

The possibility that cross-border perceptions of hydraulic fracturing activities influence perceptions of likely effects for the home state raises novel questions regarding spillover and diffusion. Specifically, while policy-makers actively look to other jurisdictions to learn from policies elsewhere, to what extent might citizens similarly inform their policy preferences by looking at other jurisdictions? While not offering an explicit test, analysis of questions in this comparative survey finds an interesting relationship between individuals' support for hydraulic fracturing and their views on the role that fracking policy in their neighboring state should play in their own state. For instance, among Pennsylvanians who strongly support hydraulic fracturing in their state, only 9% believe New York's moratorium policy (at the time) should have a major effect on Pennsylvania's policy in this area. On the other hand, 62% of Pennsylvanians who strongly support hydraulic fracturing in the Commonwealth believe that New York's moratorium on fracking should have no effect on Pennsylvania policy on this matter. At the other end of the spectrum, a plurality of Pennsylvanians (39%) who strongly oppose fracking in their state think that the New York moratorium should have a strong effect on policy in their state. In New York this relationship is somewhat less pronounced. Among the New Yorkers who strongly support fracking in their state, equal pluralities (of 42%) think the permissive policy in Pennsylvania should have a major and no effect on New York policy, respectively. Among those New Yorkers who strongly oppose fracking in New York, a plurality (39%) maintain the view that Pennsylvania's policies

Table 6. Support for Hydraulic Fracturing by Views on the Extent to Which Hydraulic Fracturing Policy in Neighboring State Should Influence Home State Policy								
	Policy in Neighboring State Should Have MAJOR Effect on Your State Policy		Policy in Neighboring State Should Have MINOR Effect on Your State Policy		Policy in Neighboring State Should Have NO Effect on Your State Policy		Not Sure	
	PA (n = 88)	NY (n = 97)	PA (n = 95)	NY (n = 111)	PA (n = 162)	NY (n = 135)	PA (n = 66)	NY (n = 61)
Strongly support hydraulic fracturing in your state	9%	42%	16%	11%	62%	42%	13%	5%
Somewhat support hydraulic fracturing in your state	26%	29%	24%	33%	39%	26%	11%	12%
Somewhat oppose hydraulic fracturing in your state	26%	16%	35%	34%	15%	29%	23%	21%
Strongly oppose hydraulic fracturing in your state	40%	24%	20%	27%	32%	39%	9%	10%
Not sure	10%	12%	23%	26%	36%	32%	31%	30%

Q18: Should the fact that there is a great deal of hydraulic fracturing in Pennsylvania [a moratorium on hydraulic fracturing in New York] have a major effect, minor effect, or no effect on Pennsylvania's decision to allow or not allow hydraulic fracturing in the state? Q4: In general, would you say that you strongly support, somewhat support, somewhat oppose, or strongly oppose the extraction of natural gas from shale deposits in New York/Pennsylvania?

Source: National Survey of Energy and the Environment.

Note: For Pennsylvania: $\chi^2 = 15.74$; $df = 3$; Cramer's $V = 0.196$ $p = 0.001$. For New York: $\chi^2 = 53.61$; $df = 3$; Cramer's $V = 0.364$; $p = 0.000$.

to allow this form of natural gas extraction should have no effect on New York policy (Table 6).

Conclusion

Building on previous research, and drawing on comparative surveys, this study provides some new perspective on public attitudes toward hydraulic fracturing in the United States, at the state level. Analyzing statewide representative data, it finds that Pennsylvanians and New Yorkers express similarly high levels of awareness of hydraulic fracturing, especially when compared to results drawn from similar questions asked to national samples. Moreover, the results show a fairly aligned relationship between levels of public support for

hydraulic fracturing and New York and Pennsylvania policy regarding this matter. Most New Yorkers remain opposed to hydraulic fracturing with the state moratorium (at the time the survey was conducted) reflecting this broad public opinion. Across the 306-mile state border with New York, a majority of Pennsylvanians support the hydraulic fracturing that has been allowed by permissive state regulations. Thus some convergence of public opinion and public policy regarding hydraulic fracturing in these Marcellus shale play states can be observed. These findings are consistent with what might be expected from representative democracies sitting atop significant shale rock formations.

Of course this does not imply perfect alignment between public preferences and details of state policy toward shale gas extraction. Indeed results from the analysis demonstrate that opinions in New York and Pennsylvania are not uniform, with Republicans, men and those with a more conservative ideology significantly more likely to support the use of hydraulic fracturing in their home state. Moreover, other studies demonstrate that, in some instances, public opinion and specific policies does not align, as is the case for Pennsylvanians who are opposed to particular policy approaches adopted by their state, including the lack of a severance tax and limited chemical disclosure rules (Rabe and Borick 2011; Muhlenberg College Institute of Public Opinion 2011). At a general level, though, opinions are broadly consistent with existing policy approaches in both states, with higher support in Pennsylvania corresponding with a more permissive policy approach, and greater opposition in New York corresponding to greater restrictions.

The results also provide insight into the level of cross-border knowledge and opinions about hydraulic fracturing in New York and Pennsylvania. The findings suggest that residents of these states give moderate levels of attention to the levels of hydraulic fracturing activity and policy on the other side of the New York/Pennsylvania border. However, this attention to hydraulic fracturing matters in the neighboring state is not equal among residents of the states, with New Yorkers significantly more likely than Pennsylvanians to know more about shale gas issues in their neighboring state. This asymmetric awareness raises new questions on the role of cross-border perceptions in shaping opinion toward hydraulic fracturing in adjacent states. While policy diffusion is an important topic of study in the literature, the potential spillover from policy debates occurring in adjacent states at the level of public opinion deserves greater inquiry. In particular, this study has not explored the potential mediating role of proximity to the New York/Pennsylvania border, which may add more explanatory power and nuance. Does proximity to the state border impact both individuals' knowledge about hydraulic fracturing

levels and policies in the neighboring state, and in turn does that affect their views about shale gas extraction in their own states? What is the relationship between awareness, proximity, and perceptions of risk? Future researchers may wish to pursue these questions to better capture the role of cross-border perceptions in shaping public attitudes toward controversial issues like hydraulic fracturing in the United States.

NOTE

Acknowledgments: I thank Chris Borick for permission to use the NSEE data and Irena Nedeva for helpful research assistance.

REFERENCES

- Barnes, Matthew. 2013. "Hydrofracking and Policymaking in New York Municipalities." Paper presented at the 2013 Annual Meeting of the American Political Science Association. Chicago, IL, August 29 to September 1, 2013.
- Borick, Christopher, and Chris Clarke. 2016. "American Views on Fracking." *Issues in Energy and Environmental Policy* 28 (May): 1–9.
- Boscarino, Jessica. 2013. "Last Line of Defense: Regulating Hydrofracking through the Use of Home Rule." Paper presented at the 2013 Annual Meeting of the American Political Science Association. Chicago, IL, August 29 to September 1, 2013.
- Boudet, Hilary, Christopher Clarke, Dylan Bugden, Edward Maibach, Connie Roser-Renouf, and Anthony Leiserowitz. 2014. "'Fracking' Controversy and Communication: Using National Survey Data to Understand Public Perceptions of Hydraulic Fracturing." *Energy Policy* 65 (February): 57–67.
- Brasier, Kathryn J., Diane K. McLaughlin, Danielle Rhubarb, Richard C. Stedman, Matthew R. Filteau, and Jeffrey Jacquet. 2013. "Risk Perceptions of Natural Gas Development in the Marcellus Shale." *Environmental Practice* 15 (June): 108–122.
- Brown, Erica, Kristine Hartman, Christopher Borick, Barry G. Rabe, and Thomas Ivacko. 2013. "Public Opinion on Fracking: Perspectives from Michigan and Pennsylvania." *Issues in Energy and Environmental Policy* 3 (May): 1–26.
- Burstein, Paul. 2003. "The Impact of Public Opinion on Public Policy: A Review and an Agenda." *Political Research Quarterly* 56 (March): 29–40.
- Clarke, Christopher E., Dylan Budgen, P. Sol Hart, Richard C. Stedman, Jeffrey B. Jacquet, Darrick T. N. Evensen, and Hilary S. Boudet. 2016. "How Geographic Distance and Political Ideology Interact to Influence Public Perception of Unconventional Oil/Natural Gas Development." *Energy Policy* 97 (October): 301–309.
- Clarke, Christopher E., Philip S. Hart, Jonathon P. Schuldt, Darrick T. N. Evensen, Hilary S. Boudet, Jeffrey B. Jacquet, and Richard C. Stedman. 2015. "Public Opinion on Energy Development: The Interplay of Issue Framing, Top-of-Mind Associations, and Political Ideology." *Energy Policy* 81 (June): 131–140.
- Climek, Michael, Lina Brou, Maxwell Means, and Kirby Goidel. 2014. "Fracking and Polarization of Public Opinion." Louisiana State University Public Policy Research Lab. Available at <http://lsureillycenter.com/wp-content/uploads/20S5/>

- 12/National-Fracking-Report-7-24-13-Public-Policy-Research-Lab-at-LSU.pdf. Accessed August 12, 2016.
- Coin, Glenn. 2015. "New York State Officially Bans Fracking." *Syracuse.com*, June 29. Available at www.syracuse.com/news/index.ssf/2015/06/new_york_officially_bans_hydrofracking.html. Accessed October 20, 2016.
- Department of Environmental Conservation (DEC). 2015. "Final Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program: Findings Statement," New York. Available at www.dec.ny.gov/energy/75370.html. Accessed October 3, 2016.
- Eaton, Timothy T. 2013. "Science-Based Decision-Making on Complex Issues: Marcellus Shale Gas Hydrofracking and New York City Water Supply." *Science of the Total Environment* 461/462 (September): 158–169.
- Evensen Darrick T., Christopher E. Clarke, and Richard C. Stedman. 2013. "A New York or Pennsylvania State of Mind: Social Representations of Gas Development in the Marcellus Shale." *Journal of Environmental Studies and Sciences* 4 (March): 65–77.
- Glick, David, and Zoe Friedland. 2014. "How Often Do States Study Each Other? Evidence of Policy Knowledge Diffusion." *American Politics Research* 42 (November): 956–985.
- Gray, Virginia. 1973. "Innovation in the States: A Diffusion Study." *American Political Science Review* 67 (December): 1174–1185.
- Harper, John A. 2008. "The Marcellus Shale—an Old 'New' Gas Reserve in Pennsylvania." *Pennsylvania Geology* 38 (Spring): 2–13.
- Jacquet, Jeffrey B. 2012. "Landowner Attitudes toward Natural Gas and Wind Farm Development in Northern Pennsylvania." *Energy Policy* 50 (November): 677–688.
- Johnson, Martin, Paul Brace, and Kevin Arceneaux. 2005. "Public Opinion and Dynamic Representation in the American States: The Case of Environmental Attitudes." *Social Science Quarterly* 86 (March): 87–108.
- Kriesky, Jill, Bernard Goldstein, Katrina Zell, and Scott Beach. 2013. "Differing Opinions about Natural Gas Drilling in Two Adjacent Counties with Different Levels of Drilling Activity." *Energy Policy* 58 (July): 228–236.
- Lachapelle, Erick, and Eric Montpetit. 2014. "Public Opinion on Hydraulic Fracturing in the Province of Quebec: A Comparison with Michigan and Pennsylvania." *Issues in Energy and Environmental Policy* 17 (October): 1–21.
- Mintrom, Michael. 1997. "Policy Entrepreneurs and the Diffusion of Innovation." *American Journal of Political Science* 41 (July): 738–770.
- Mooney, Christopher Z. 2001. Modeling Regional Effects on State Policy Diffusion. *Political Research Quarterly* 54 (March): 103–124.
- Muhlenberg College Institute of Public Opinion. 2011. "Pennsylvania Marcellus Shale Survey." Available at www.muhlenberg.edu/main/aboutus/polling/surveys/pennsylvania/public_policy.html. Accessed August 18, 2016.
- Pacheco, Julianna. 2013. "The Thermostatic Model of Responsiveness in the American States." *State Politics and Policy Quarterly* 13 (September): 306–332.
- Pew Research Center for the People and the Press. 2012. "More Opposition to Increased Use of Fracking." Available at www.people-press.org/2013/09/26/continued-support-for-keystone-xl-pipeline/9-26-13-7/. Accessed August 18, 2016.

- . 2015. “How Americans View the Top Energy and Environmental Issues.” Available at www.pewresearch.org/key-data-points/environment-energy-2/. Accessed August 18, 2016.
- Rabe, Barry G. 2014. “Shale Play Politics: The Intergovernmental Odyssey of American Shale Governance.” *Environmental Science and Technology* 48 (15): 8369–8375.
- Rabe, Barry G., and Christopher Borick. 2011. “Fracking for Natural Gas: Public Opinion on State Policy Options.” Ann Arbor, MI: Center for Local, State, and Urban Policy, Gerald R. Ford School of Public Policy, University of Michigan.
- . 2012. “Pennsylvania’s Fracking Case: State and Local Governance Challenges.” *Brookings: Upfront*, December. Available at www.brookings.edu/blogs/up-front/posts/2013/12/24-pennsylvania-fracking-state-local-governance-challenges.
- . 2013. “Conventional Politics for Unconventional Drilling? Lessons from Pennsylvania’s Early Move into Fracking Policy Development.” *Review of Policy Research* 30 (May): 321–340. doi: 10.1111/ropr.12018.
- Schneider, Sandra, William G. Jacoby, and Daniel C. Lewis. 2011. “Public Opinion toward Intergovernmental Policy Responsibilities.” *Publius: The Journal of Federalism* 41 (Winter): 1–30.
- Sovacool, Benjamin K. 2014. “Cornucopia or Curse? Reviewing the Costs and Benefits of Shale Gas Hydraulic Fracturing (Fracking).” *Renewable and Sustainable Energy Reviews* 37 (September): 249–264.
- Stedman, Richard C., Jeffrey B. Jacquet, Matthew R. Filteau, Fern K. Willits, Kathryn J. Brasier, and Diane K. McLaughlin. 2012. “Marcellus Shale Gas Development and New Boomtown Research: Views of New York and Pennsylvania Residents.” *Journal of Environmental Practice* 14 (December): 287–298.
- U.S. Energy Information Administration. 2012. *Annual Energy Outlook 2012*. Available at [www.eia.gov/forecasts/aeo/pdf/0383\(2012\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf). Accessed August 20, 2016.
- . 2014. “Natural Gas Gross Withdrawals and Production.” U.S. Energy Information Administration, 2014. Available at www.eia.gov/dnav/ng/ng_prod_sum_dcu_smi_m.htm. Accessed August 20, 2016.
- Walker, Jack L. 1969. “The Diffusion of Innovations among the American States.” *American Political Science Review* 67 (September): 1174–1185.
- Warner, Barbara, and Jennifer Shapiro. 2013. “Fractured, Fragmented Federalism: A Study in Fracking Regulatory Policy.” *Publius: The Journal of Federalism* 43 (Summer): 474–496.
- Wright, Gerald C., Robert S. Erikson, and John P. McIver. 1993. *Statehouse Democracy: Public Opinion, Politics and Policy in the American States*. New York: Cambridge University Press.

Erick Lachapelle, PhD, is an associate professor of political science at the University of Montreal where he teaches courses on comparative environmental politics, research methods, and public policy. He is the lead researcher behind the Canadian Surveys on Energy and the Environment. Erick’s research examines the comparative politics of climate change, environmental public opinion, and political communication around climate policy and the transition toward a clean economy. Erick’s research has appeared in such venues as *Policy Sciences*, *Policy Studies Journal*, *Energy Policy*, *Climate Policy*, and *Global Environmental Politics*, among others.