The role of policy attributes in policy adoption and diffusion: Learning from anti-fracking municipality policymaking in New York

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Overview

- **Main question:** To what extent can municipalities' policy adoption, and the policies' interjurisdictional diffusion, be explained by policy observability, trialability, complexity, and compatibility?

- **Main answers:**
  - Observability speeds up diffusion.
  - Trialability and complexity have a secondary or minimal impacts.
  - For low observability policies, jurisdiction-level factors (linked to policy compatibility) are just as (if not more) more adoption-promoting than neighbor effects.

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Policy innovation and diffusion

- Policy innovation involves a jurisdiction's commitment to the establishment and/or use of a policy that is new to the jurisdiction (Walker 1969).

- Policy diffusion "occurs if the probability of adoption of a policy by one governmental jurisdiction is influenced by the policy choices of other governments in the system" (Berry and Berry 2014, 310).

Motivation

- This question and issue are understudied: Scholars have minimally addressed the association between policy attributes and policy adoption and diffusion.

- The current view on adoption is obtuse/blunt: It sees adoption as a dichotomous outcome where policy makers must choose whether to act or not. In reality, policy makers are faced with numerous options, including the status quo option of abstention.

- Delving into the relationship between policy adoption and policy attributes addresses these shortcomings.

Rogers's attribute framework

- Observability (content): visibility of policy and its impacts
- Trialability (content): durability of impacts from policy adoption
- Complexity (content): relative policy conceptual intricacy and implementation difficulty
- Compatibility (relational): extent to which policy aligns with values, past experiences, and needs of focal municipalities
- Relative advantage (relational): the extent to which a policy is superior to existing policy

Take-aways from relevant literature

- Widespread empirical support for Rogers's framework in innovation uptake studies in marketing, consumer choice, public health, and technology innovation.

- Policy attributes are generally ignored in quantitative adoption/diffusion studies except when stringency is the DV (e.g., Carley and Miller 2012).

- Key exceptions: Pierce and Miller (1999), Taylor et al. (2012), Boemke and Witmer (2004), Nicholson-Crotty (2008), Pankratz and coauthors (2012), and Makse and Volden (2011).

Take-aways from relevant literature

- Makse and Volden (2011)
  - 27 criminal justice policies adopted by states over 3 decades
  - Expert survey used to score them on the 5 attributes
  - Complexity hinders uptake; other 4 facilitate
  - Policy attributes do NOT influence neighbor effects
  - Policy attributes DO influence the consequence of total past adoptions
    - Observability (+), complexity (-), trialability (+), compatibility (NS), and relative advantage (unexpected -).

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- How this study is different from Makse and Volden
  - Focuses on a suite of substitutable policies with different attribute configurations
  - Examines the role of attributes in the choice among policy options
  - Explores cross-policy neighbor effects
  - Explores potential unequal influence of attributes

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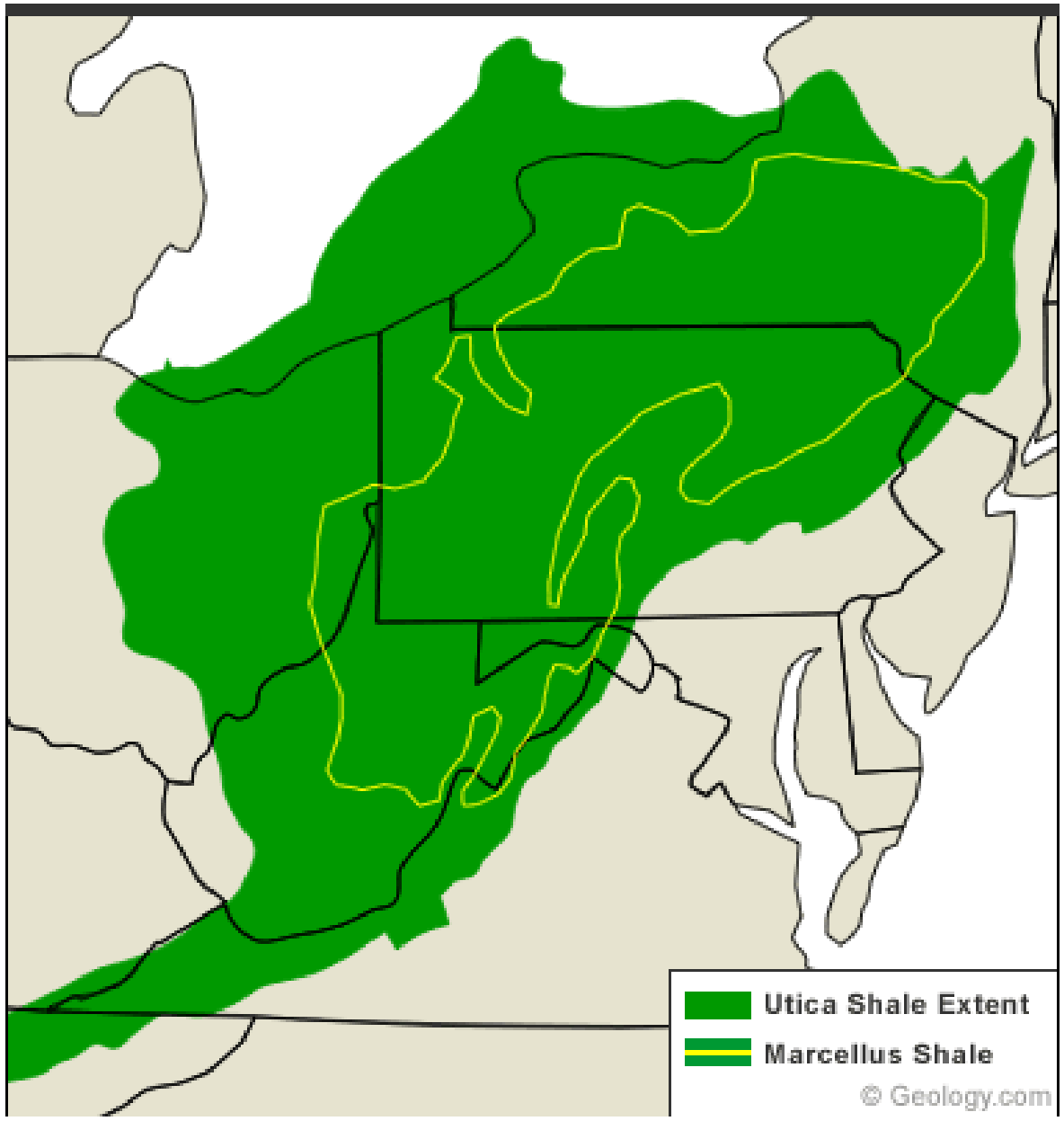
Utica Shale Extent
Marcellus Shale
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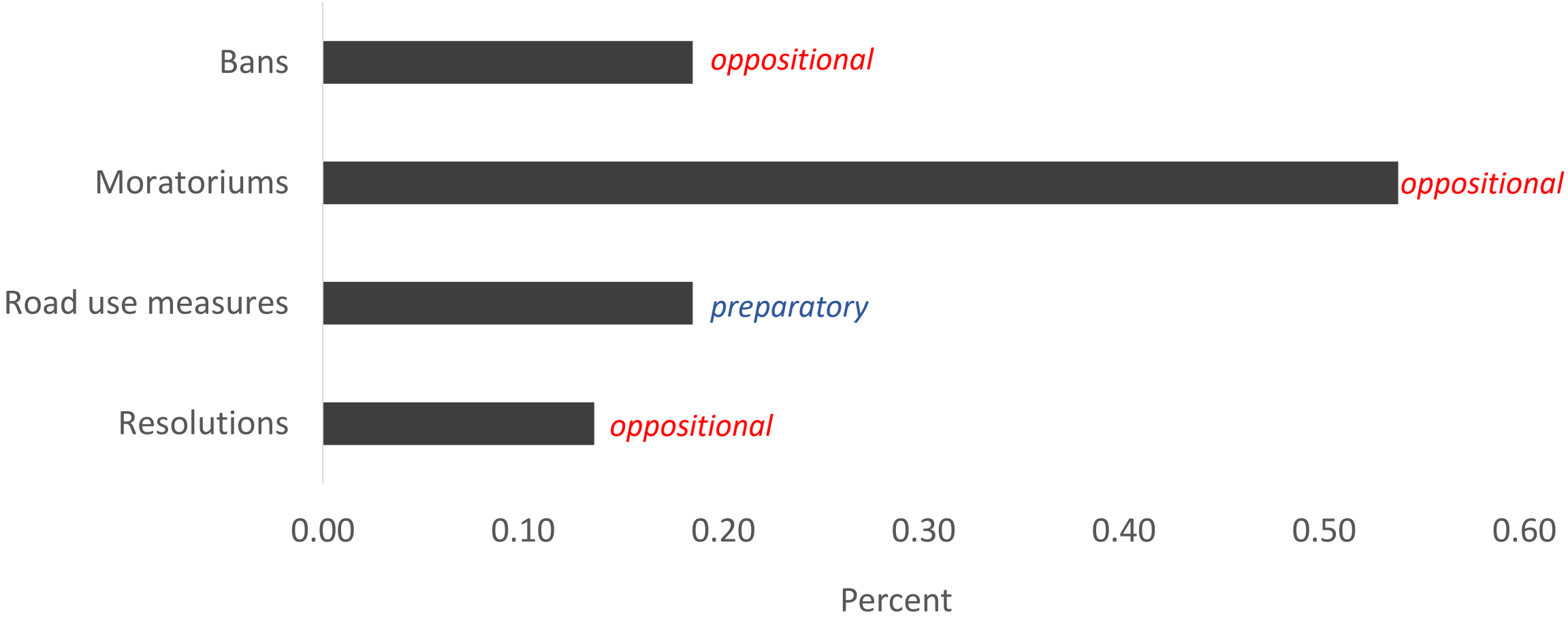
Policy actions by type



TOWN OF DANBY LOCAL LAW #3 OF 2011

AMENDMENTS TO TOWN OF DANBY ZONING ORDINANCE

A LOCAL LAW AMENDING AND CLARIFYING THE TOWN OF DANBY, TOMPKINS COUNTY, NEW YORK, ZONING ORDINANCE TO PROHIBIT GAS AND PETROLEUM MINING AND RELATED ACTIVITIES

BE IT ENACTED BY THE TOWN BOARD OF THE TOWN OF DANBY AS FOLLOWS

SECTION 1: TITLE AND APPLICABILITY – The Town of Danby hereby adopts this local law, to be known as the Town of Danby Local Law Number__ of 2011 (the "Local Law)."

SECTION 2: PURPOSE – The purpose of this Local Law is to clarify, update, and amend the Town of Danby Zoning Ordinance by, among other things: clarifying allowed uses relative to light industrial uses and operations; clarifying allowed uses relative to gas and oil mining and hydraulic (and other) fracturing; and to ensure that Town of Danby zoning laws comport with the Town of Danby Comprehensive Plan.

SECTION 3: DEFINITIONS – The following definitional terms are added to Appendix I, entitled "Definitions," of the Town of Danby Zoning Ordinance, and these terms shall have the meanings shown:

LOCAL LAW # 3 , 2011

A LOCAL LAW
IMPOSING A MORATORIUM
ON HEAVY INDUSTRY WITHIN
THE TOWN OF ANDES
COUNTY OF DELAWARE

WHEREAS, the Town of Andes has received requests from its citizens concerning the need to address and possibly regulate heavy industry in the Town: and

WHEREAS, the Town Board has discussed several recommendations for proposed actions, surveys and statutory changes to accomplishment such regulation within the Town; and

WHEREAS, the Town of Andes is also considering local laws to preserve roadways in the Town, as well as other related statutes that may effect the quality of life for all Town residents, and these local laws, if implemented, would have a significant impact on the overall development and regulation of land and road use within the Town;

NOW THEREFORE, BE IT ENACTED by the Town Board of the Town of Andes as follows:

Section 1. PURPOSE

The current local laws of the Town of Andes as currently written may be inadequate to address certain uses of property within the Town. The anticipation of possible heavy

Town of Dansville

Local Law No. 1 of the year 2012

A local law entitled "Town of Dansville Road Preservation Law"

Be it enacted by the Town Board of the Town of Dansville as follows:

Section 1. Title.

This local law may be cited as the "Town of Dansville Road Preservation Law".

Section 2. Authority for this Local Law.

The Town Board of the Town of Dansville enacts this local law under the authority granted by Section 10 of the New York State Municipal Home Rule Law, New York State Constitution Article IX § 2(c)6, Town Law, subsection 1(ii)(a)(6), subdivision 2 of section 23-0303 of the Environmental Conservation Law, Highway Law Section 140, Highway Law section 320, Tow Law section 130, and Vehicle and Traffic law section 1660.

Section 3. Purpose.

The purpose of this local law is to maintain the safety and general welfare of Town residents ar other using Town highways by regulating high impact commercial activities that have the potential to adversely impact roads and property. The intent is to protect the Town roads and property from damage from endeavors that typically require high frequency use of heavy equipment with heavy loads.

Town of Middlefield
PO Box 961
Cooperstown, NY 13326

RESOLUTION #9 OF 2010

WHEREAS, there has been great debate in the Town of Middlefield, and Otsego County regarding the practice of hydrofracking and horizontal drilling for natural gas in Otsego County, and

WHEREAS, it is the goal of drilling companies that "fracking fluid" never enter ground water, but known cases are in existence in Northern Pennsylvania where wells have been contaminated, and

WHEREAS, even though manufacturers have a "proprietary" right to non-disclosure of the composition of the "fracking fluid" used in this process, analysts have found at least 63 different compounds in "fracking fluid" and of these, about three quarters have one or more toxic chemicals known as neurotoxins which affect the activity of the brain and nervous system, and

WHEREAS, we have concern that our Town infrastructure, including our roads, are not to a standard to accommodate the traffic and related activities that will occur from gas drilling in or near our Town, and

Content attribute scores for anti-fracking policy types				
	Observability	Trialability	Complexity [scaled backwards]	Diffusion potential score
Resolution	Low (1)	High (3)	Low [3]	7
Road	Low (1)	Medium (2)	Medium (2)	4
Moratorium	High (3)	High (3)	Medium (2)	8
Ban	High (3)	Low (1)	High [1]	6

Content Attribute Hypothesis A: Rapidity of adoption of policy type X will be positively correlated with X's diffusion potential score.

Weighted content attribute scores for anti-fracking policy types				
	Observability (Multiply T+C by 0.5 if low)	Trialability (x2)	Complexity [scaled backwards]	Weighted diffusion potential score
Resolution	Low (1)	High (3)	Low [3]	4.5
Road	Low (1)	Medium (2)	Medium (2)	3
Moratorium	High (3)	High (3)	Medium (2)	8
Ban	High (3)	Low (1)	High [1]	3

Content Attribute Hypothesis B: Rapidity of adoption of policy type X will be positively correlated with X's **weighted** diffusion potential score.

Compatibility hypotheses

- *Industry Compatibility Hypothesis:* Municipalities with more experience with the oil and gas industry will be less likely to adopt oppositional policies.

- *Economic Compatibility Hypothesis:* Municipalities with greater need for economic development will be more likely to adopt preparatory policies and less likely to adopt oppositional policies.

- *Progressivism Compatibility Hypothesis:* Municipalities with a more progressive citizenry will be more likely to adopt oppositional policies.

Observability hypotheses

- *Neighbor High Observability (HO) Hypothesis*: A municipality is more likely to adopt an HO policy than an low-observability (LO) one when a greater proportion of its neighbors adopt the same HO policy.

- *Neighbor Low Observability Hypothesis:* Internal pressures are likely to have a larger impact on a municipality's choice to adopt an LO policy than neighbors' adoption of the same LO policy.

- *Neighbor High Trialability Hypothesis*: A municipality is more likely to adopt a high-trialability policy than a low-trialability one when a greater proportion of its neighbors adopt the same type of high-trialability policy. This effect is contingent upon observability.

Data collection

- 2013-2016: Acquisition of local HVHF policies, sourced from . . .
  - Food and Water Watch, Frac Tracker, Joint Landowners Coalition of New York, Keuka Lake Citizens Against Hydrofracking, NYSLLD
  - FOIL requests to obtain full texts and determine/verify date of passage
  - Acquisition and analysis of public meeting minutes to ensure that policy action was motivated by HVHF
  - 368 policies passed by 238 municipalities

- Other data from . .
  - County election boards, U.S. Census, NYS Comptroller, NYS Department of Environmental Conservation, USDA NASS (and others)

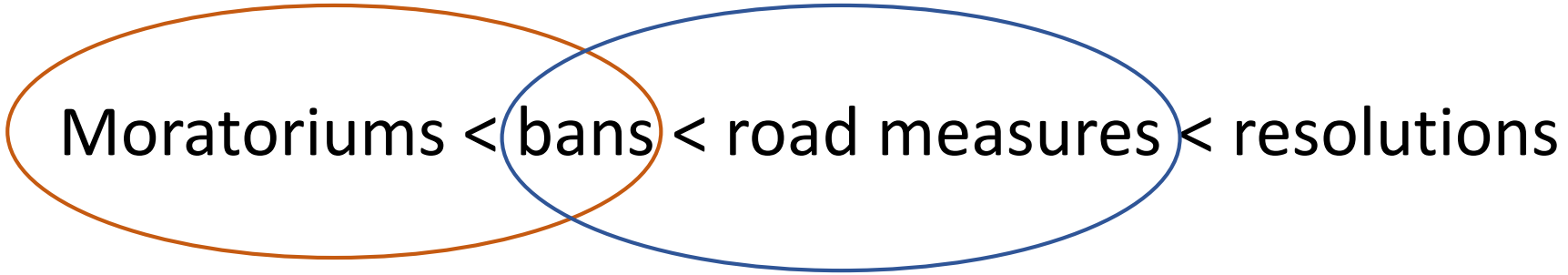
Methods

- T-tests: Average time between adoptions of X policy
- Difference of proportions tests: Ratio of X policies adopted to innovation diffusion period
- Multinomial logit (First Adoption): A municipality's first action on fracking (including abstention)
- Multinomial logit (Overall): A municipality's adoption of one or more of X policy (including a category for adoption of multiple types, and abstention)

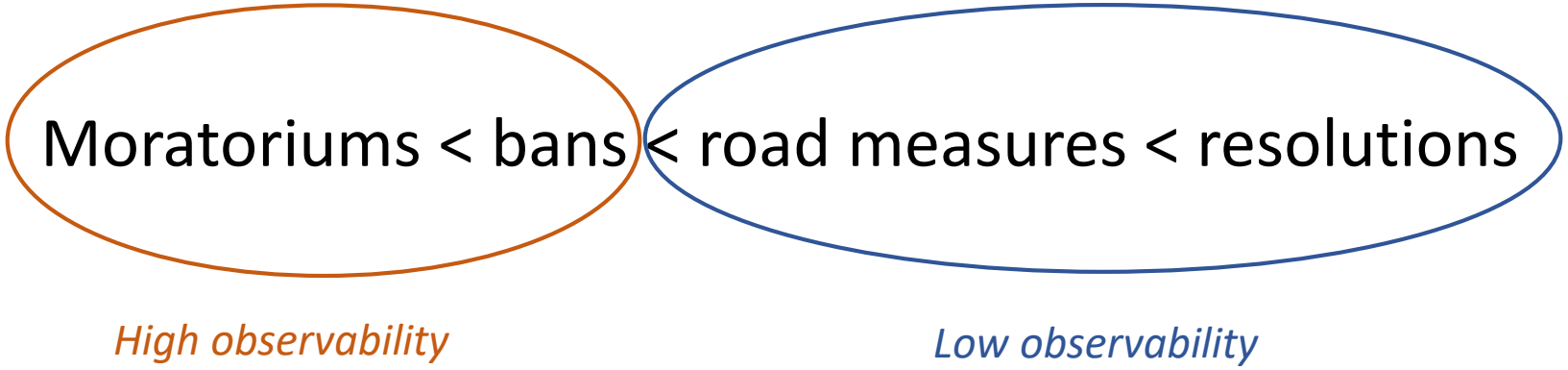
Content Attribute Hypothesis Tests				
	Resolution	Road	Moratorium	Ban
Mean time between adoptions (mos.)	1.66	0.87	0.39	0.63
N (adoptions)	33	62	140	61
Diffusion period (months)	53	53	54	38
Adoptions : diffusion rate (AD)	0.62	1.17	1.59	1.60
	Pairwise t-tests: Differences of means			
	Resolution	2.00*	3.44**	2.64**
	Road		2.45**	1.03
	Moratorium			-1.33†
	Pairwise tests of difference: AD rates			
	Resolution	-5.26**	-12.65**	-9.55**
	Road		-7.96**	-5.79**
	Moratorium			-0.78

Notes: **One-tailed t-tests of null hypothesis that mean time between adoption events is equal; unequal variances assumed. † $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.**

Content attribute results



where more rapid diffusion (less time) < less rapid diffusion (more time)



Observability matters!

Content attribute results

- Trialability and especially complexity do not as effectively explain diffusion:

High trialability Low trialability

Expected: Moratoriums, resolutions < bans, road measures
Actual: Moratoriums < bans < road measures < resolutions

High complexity Medium complexity Low complexity

Expected: resolutions < moratoriums < bans, road measures
Actual: Moratoriums < bans < road measures < resolutions

Compatibility results

- *Industry Compatibility Hypothesis* is supported.
  - Great levels of past drilling in a municipality reduces the likelihood of moratorium adoption by 0.4-0.5% (90^{th} to 10^{th} percentile).

- *Economic Compatibility Hypothesis* is minimally supported.
  - When no action is the baseline, indicators of economic need do not have the expected impacts.
  - Varied baseline: Municipalities with higher unemployment (10^{th} to 90^{th}) were 0.1-1.5% percent more likely to adopt a road measure than a moratorium and 0.4% more likely to adopt a road measure than a ban.

- *Progressivism Compatibility Hypothesis* is supported.
  - More liberal municipalities are 2-4% more likely to adopt a moratorium, 1% more likely to adopt a ban, and 0.4% more likely to adopt a resolution.
  - Being home to a university or college also makes a jurisdiction 1% more likely to adopt a resolution.

First Adoption: Multinomial logit regression predicting first fracking policy				
	Resolution	Road	Moratorium	Ban
Income	-0.82 (0.79)	0.78 (1.01)	-0.48 (0.70)	0.27 (1.04)
Landowner coalition	-0.28 (0.73)	1.19 (0.51)*	-0.80 (0.40)*	0.50 (0.59)
Municipal revenue	-0.14 (0.16)	-0.18 (0.27)	-0.37 (0.12)**	-0.05 (0.30)
Oil and gas drilling	0.00 (0.01)	0.00 (0.01)	-0.05 (0.02)*	-0.02 (0.02)
Population density	-0.03 (0.20)	-0.25 (0.14)†	-0.34 (0.09)**	-0.12 (0.14)
Shales	0.82 (1.17)	1.55 (1.11)	1.61 (0.58)**	2.78 (1.48)†
Unemployment	-9.22 (9.43)	6.23 (4.09)	-5.46 (3.51)	-8.85 (7.94)
Democrat	6.09 (2.98)*	2.63 (2.11)	5.26 (1.74)**	11.12 (2.23)**
Education	0.10 (0.05)†	-0.03 (0.04)	0.04 (0.03)	0.03 (0.05)
Universities	1.54 (0.59)**	-0.44 (1.02)	-0.16 (0.56)	0.82 (0.64)
Village	-3.06 (1.16)**	-1.52 (0.66)*	-2.00 (0.43)**	-2.83 (1.07)**
Distance to Pennsylvania	-0.01 (0.00)*	-0.01 (0.00)†	0.00 (0.00)†	0.00 (0.00)
Neighbor ban	3.79 (2.98)	0.54 (3.83)	-3.82 (2.22)†	-1.38 (2.79)
Neighbor moratorium	2.54 (1.73)	2.76 (1.85)	5.73 (0.65)**	5.31 (1.19)**
Neighbor road	4.33 (3.55)	4.53 (1.90)*	1.74 (1.88)	3.35 (3.18)
Neighbor resolution	5.70 (4.88)	-0.02 (6.37)	12.50 (3.35)**	9.45 (4.27)*
Wald $chi^2(64)$ 365.53***				
Pseudo R^2 0.29				

Overall: Multinomial logit regression predicting overall suite of fracking policies				
	One or more resolutions	One or more road measures	One or more moratoriums	One or more bans
Income	-0.07 (0.64)	0.39 (0.99)	-0.76 (0.77)	0.54 (0.115)
Landowner coalition	-0.44 (0.66)	1.72 (0.64)**	-0.77 (0.43)†	0.35 (0.69)
Municipal revenue	-0.34 (0.24)	-0.17 (0.27)	-0.44 (0.13)**	0.00 (0.36)
Oil/gas drilling	-0.00 (0.01)	0.00 (0.00)	-0.05 (0.02)*	-0.05 (0.07)
Population density	0.06 (0.24)	-0.22 (0.18)	-0.30 (0.09)**	-0.06 (0.15)
Shales	0.89 (1.26)	1.47 (1.16)	1.32 (0.57)*	2.49 (1.60)
Unemployment	-5.07 (13.85)	3.89 (4.17)	-7.10 (3.73)†	-4.26 (9.36)
Democrat	2.77 (4.36)	0.06 (2.41)	3.52 (1.73)*	11.69 (2.53)**
Education	0.07 (0.06)	-0.00 (0.04)	0.04 (0.03)	0.03 (0.06)
Universities	0.65 (1.17)	-0.24 (1.12)	0.35 (0.53)	0.68 (0.70)
Village	-2.14 (1.17)†	-2.00 (0.85)*	-2.46 (0.53)**	-2.65 (1.05)*
Distance to Pennsylvania	-0.01 (0.01)†	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Neighbor ban	3.17 (5.84)	-5.40 (5.57)	-2.81 (2.37)	-1.75 (3.15)
Neighbor moratorium	-2.78 (2.79)	-3.51 (4.17)	5.75 (0.67)**	6.17 (1.31)
Neighbor road	6.21 (7.45)	6.66 (1.98)**	1.10 (2.04)	7.85 (4.88)
Neighbor resolution	2.95 (3.16)	9.96 (6.95)	10.57 (3.70)**	0.41 (4.91)
Wald chi^2 (80) 2538.98***				
Pseudo R^2 0.30				

Neighbor effect results

High observability	Moratorium	Ban
Low observability	Resolution	Road

- *Neighbor High Observability (HO) Hypothesis* is partially supported.
  - A larger proportion of neighbors passing moratorium makes a jurisdiction 7% more likely to pass a moratorium rather than a resolution or road measure.
  - More neighbors passing a ban does not make a jurisdiction more likely to pass a ban relative to the low-observability measures.

- *Neighbor Low Observability Hypothesis* is supported.
  - No neighbor effects explain resolution adoption.
  - Internal factors (liberalism and university/college site) explain oppositional measure adoption; landowner coalition activity explains preparatory measure adoption.
  - While neighbor road use adoption significantly influences a jurisdiction's likelihood of road measure adoption, the effect is smaller/roughly equivalent to coalition impact.

Neighbor effect results

High observability	Moratorium	Ban
Low observability	Resolution	Road

- *Neighbor High Trialability Hypothesis* sees more support (S) than contradiction (C).
- Expected: Neighbor adoption of moratoriums will make a jurisdiction more likely to adopt a moratorium than a ban or road measure. Neighbor adoption of resolutions should not affect a jurisdiction's adoption of resolutions because observability is limiting.
- No neighbor effects predict moratorium adoption over a ban (C).
- A municipality with greater neighbor adoption of moratoriums is 7% more likely to adopt a moratorium rather than a road measure (S).
- No neighbor effects significantly predict a jurisdiction adopting a resolution over a road measure (S).
- A greater number of neighbors adopting resolutions does not predict greater resolution uptake relative to a ban (S).

High trialability	Moratorium	Resolution
Medium trialability	Road	
Low trialability	Ban	

Key take-aways

- Observability best explains interjurisdictional diffusion rate. Trialability may have some role.
- Uptake is more likely when a policy is compatible with a jurisdiction's industrial profile and partisan politics; results are weaker for economic compatibility.
- High-observability moratoriums exert isomorphic neighbor effects.
- Internal factors have an equal or greater role in adoption of low-observability measures than neighbor effects.
- There may be configural relationships worth exploring more.

Challenges, issues, and future work

- We do not have enough attribute permutations to make much headway on configural dynamics.
- We plan to operationalize neighbor effects as geographic contiguity, not only same-county status (latter is current approach).
- Longitudinal analysis is possible; not clear if necessary/desirable for a 5-year period.
- Rating policy complexity was particularly difficult given wide variability.

Questions?