Registered Report: Legislative Support for Environmental Policy Innovation: An Experimental Test for Diffusion through a Cross-State Policy Network

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Research Objectives

- Measure a cross-state policy network at the individual (legislator) level.
- Develop hypotheses regarding the spread of policy support through the network.
- Experimentally test for policy support diffusion through the network.

Motivation

State-level, Contiguity-based Diffusion Network
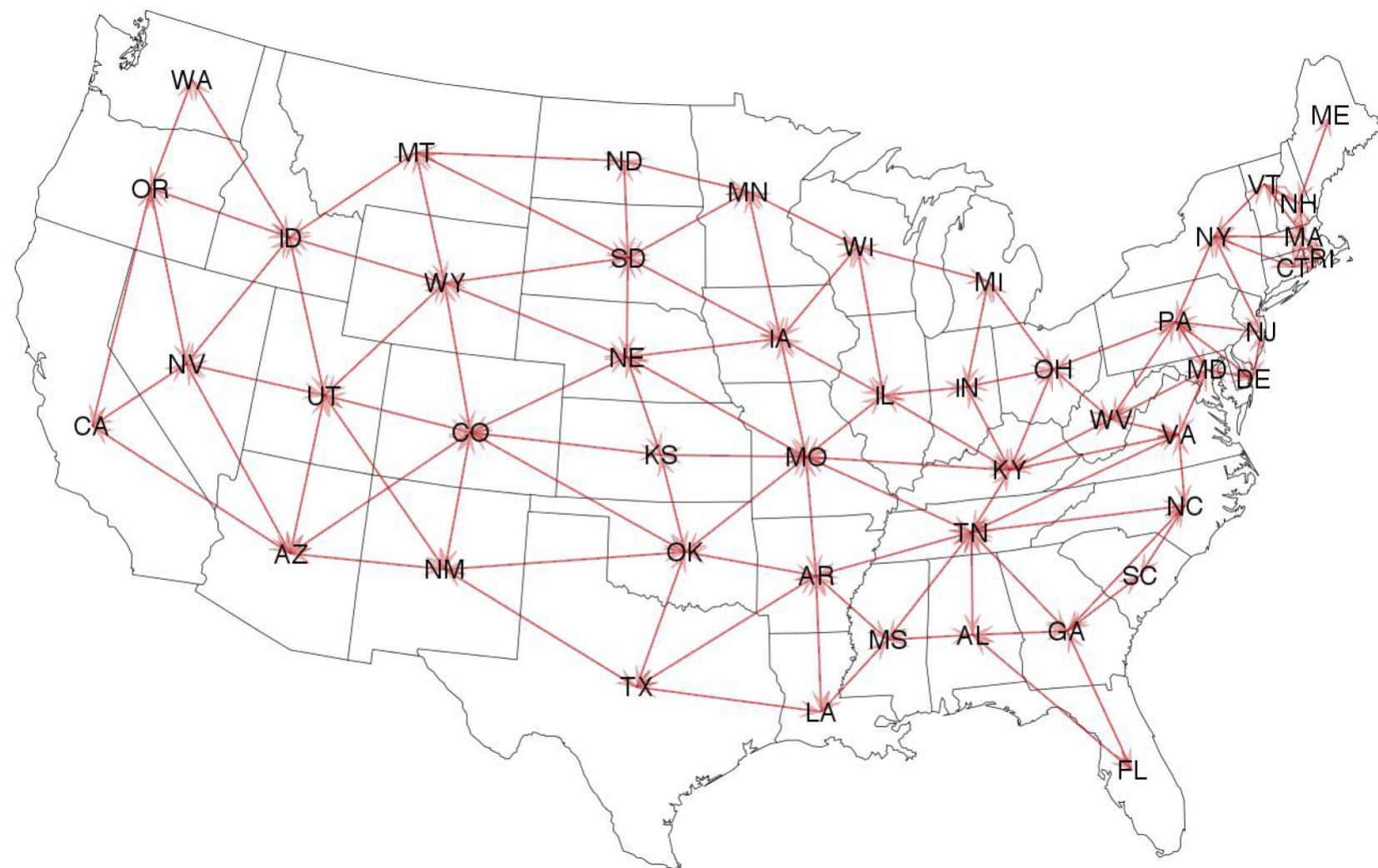
- Research on state policy diffusion is voluminous, and goes back at least 60yrs.
- Most work treats the state as the unit of analysis.
- Also, in most research, the diffusion ties are represented by geographic contiguity.
- We test for individual-level diffusion between policymakers, using a substantive policy network.

National Caucus of Environmental Legislators

Example letter organized by NCEL

- NCEL organizes policy statements co-signed by U.S. state legislators.
- We collect 15 letters signed between 2010 and 2020.
- We use letter co-signing to define ties between legislators.

"I try never to miss NCEL as it is one of the most important conferences I attend every year. It is very helpful for me to hear what legislators are doing in other states, and to learn about issues that might help my state. Every year, I come home with new ideas for legislation and an increased urgency to protect our environment." - Rep. Robert Wittenberg, Michigan
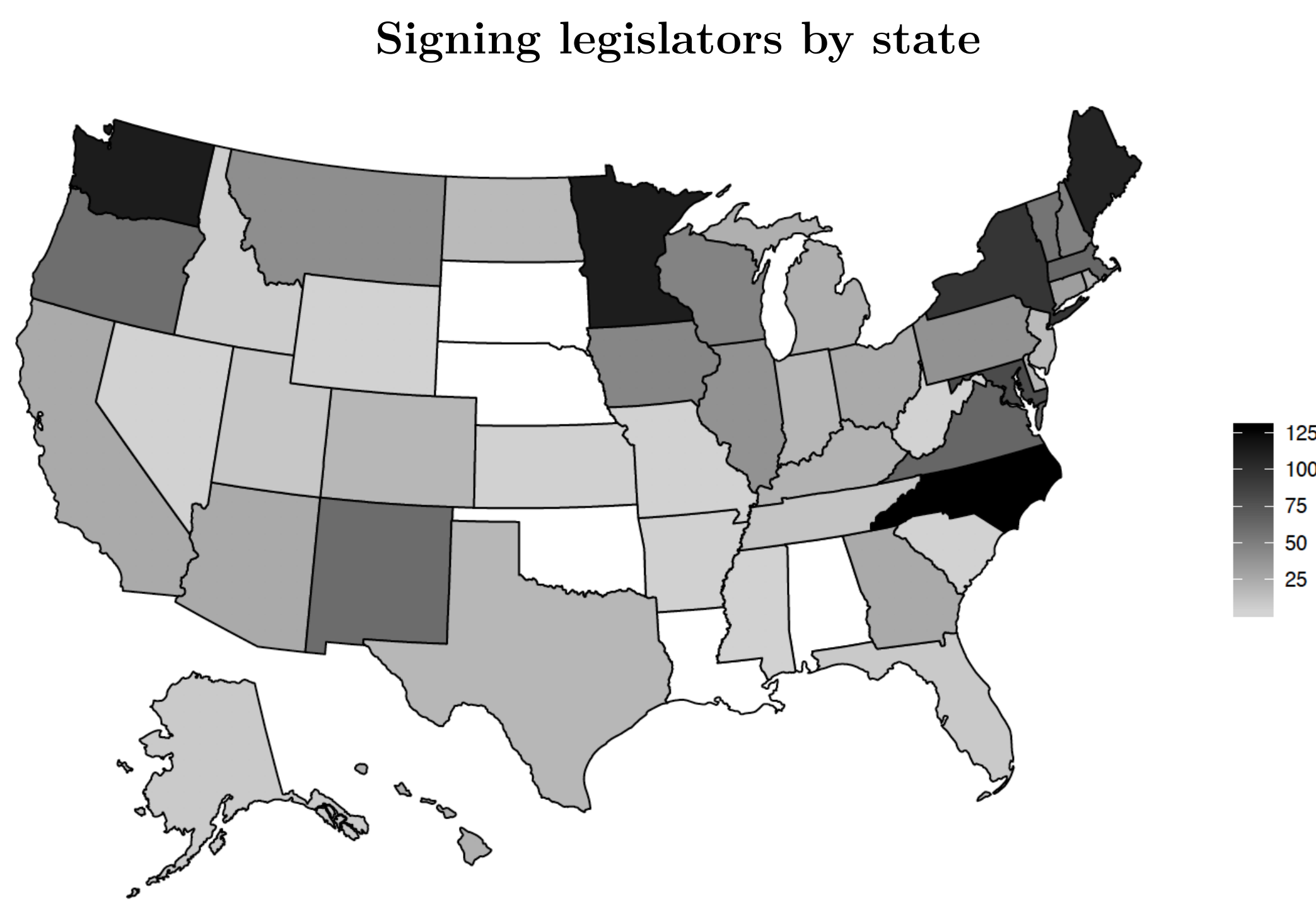
NCEL Letter signing & co-signing

Signing legislators by state

TABLE 1. Categorization of Letters by Party

| Letter Name	Year	Democrats	Republicans
Clean Energy Jobs Legislation	2010	289	8
Industrial Pollution Standards	2012	24	1
Bisphenol-A	2012	15	0
Prioritize Climate Change	2013	136	2
Language in Chemical Safety Improvement Act	2013	25	0
Protect America's Public Lands	2014	90	0
Coal Ash and Water Toxics and Public Safety	2014	74	0
Clean Power Plan	2014	137	1
Offshore Drilling	2015	46	1
Fast Track Trade Authority	2015	68	1
Ozone Standard	2015	30	0
Designations under the Antiquities Act	2017	223	4
Proposed Offshore Drilling Program	2018	159	4
Pollinators Provisions in the House draft Farm Bill	2018	89	0
Rollback of Coal Ash Rule	2020	141	5

TABLE 2. Top 20 Letter-Signing Legislators

| Letters	Name	Party	State
13	Harrison, Mary Price	D	NC
12	Provost, Denise	D	MA
11	Kowalko, John Jr.	D	DE
11	Kory, L. Kaye	D	VA
10	MacDonald, Margaret	D	MT
10	Mathern, Tim	D	ND
10	Lupardo, Donna	D	NY
9	Marzian, Mary	D	KY
9	Fisher, Susan C.	D	NC
9	Englebright, Steven	D	NY
9	Fitzgibbon, Joe	D	WA
8	Lesser, Matthew	D	CT
8	Carr, Alfred Jr.	D	MD
8	Devin, Michael Gilbert	D	ME
8	Hansen, Rick	D	MN
8	Lifton, Barbara	D	NY
8	Antonio, Nickie J.	D	OH
8	Dembrow, Michael E.	D	OR
8	Hope, Patrick A	D	VA
8	Hebl, Gary	D	WI

NCEL database overview

- 761 unique legislators.
- Vast majority of legislators signing are Democrats.
- The plurality of legislators sign only one letter.
- Some legislators sign nearly every letter.

Letters signed by legislators
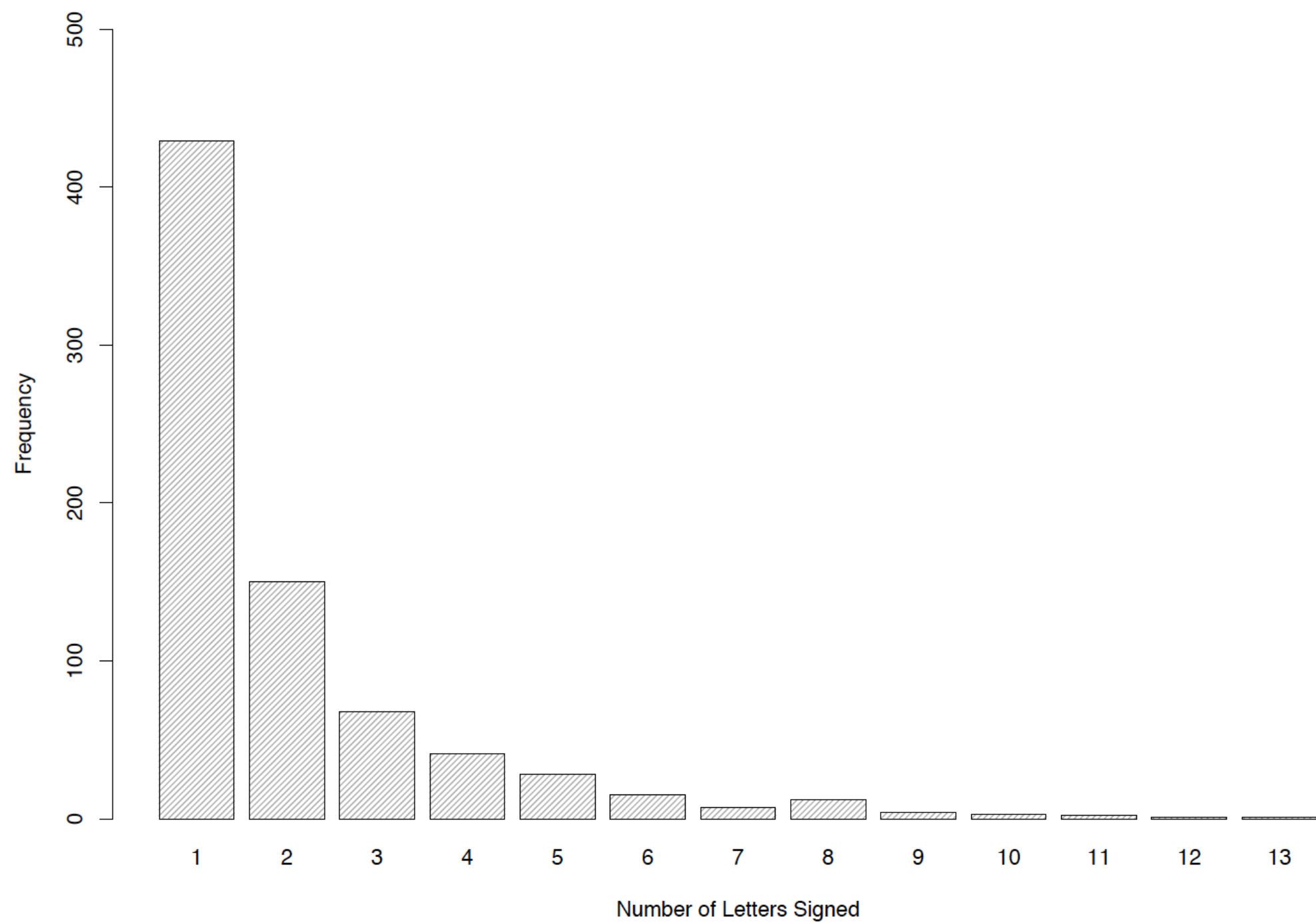
Measuring ties between legislators

Bipartite letter/legislator network
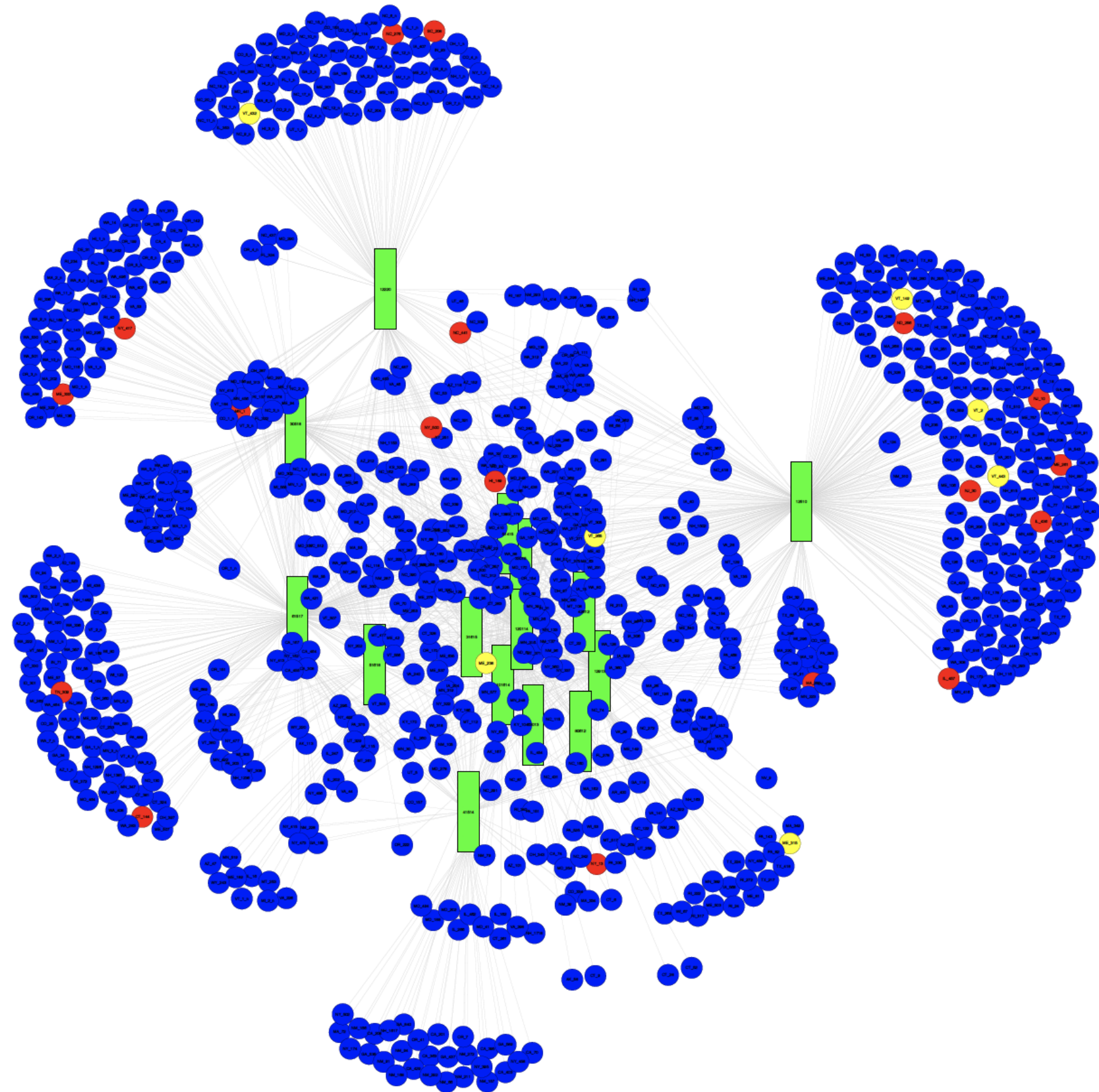
Circles represent legislators, rectangles letters.

Network Backbone Extraction: We observe legislator-letter ties. We use backbone extraction (Domagalski et al. 2021) to find ties between legislators.

- Co-signing frequency determined by two legislators' signing frequencies.
- In backbone extraction, co-signing frequency is compared to a null model based on legislators' and letters' baseline tie rates.
- Significantly frequent co-signing is used to identify "backbone" ties.
- We use backbone ties as policy diffusion ties between legislators.

TABLE 3. Summary Results: Backbone of Letter Signing Network

Backbone Model	Alpha	No. of Legislators	No. of +ve Ties	No. of Cross State Only +ve Ties
Hypergeometric	0.1	580	3092	2740
Hypergeometric	0.05	554	1555	1388
Hypergeometric	0.025	537	1379.	1249
FDSM	0.1	571	1808	1667
FDSM	0.05	547	1197	1126
FDSM	0.025	538	1096	1048

Experimental Design

TABLE 4. Summary Results: Number of legislators who have at least 1, 2, 3, 4 and 5 ties in the cross-state network

Backbone Model	Alpha	At least 1	At least 2	At least 3	At least 4	At least 5
Hypergeometric	0.1	570	449	286	266	253
Hypergeometric	0.05	538	402	207	171	150
Hypergeometric	0.025	519	358	170	142	124
FDSM	0.1	560	433	244	203	157
FDSM	0.05	538	362	153	95	55
FDSM	0.025	532	335	118	62	37

Email request template

Dear Representative/Senator [last name],

I am writing in my capacity as a member of The State Environmental Legislation Project (SELP) team. SELP is a research project based at [authors' institution]. In this project, we are tracking support for different environmental policies within state legislatures across the country. We were hoping that you would provide us with your opinion on a recently-proposed policy. Note, your individual answer will not be disclosed in any public documents made available through SELP. The policy summary, copied from the National Conference of State Legislatures website, is provided below.

[if legislator is in the treatment group] This policy has been proposed/adopted in [state name], and was sponsored by [legislator name].

[bill summary from the National Conference of State Legislatures]

If this policy were proposed in your state, would you provide support in terms of either cosponsorship or voting for its passage? A response to this email would be greatly appreciated.

We thank you for your consideration.

All the best,

Identifying suitable legislators as subjects

We build our list of experimental subjects by following this process for each legislator.

❶ Randomly select one of the legislator's cross-state neighbors.
❷ Search the National Conference of State Legislatures web database for environment bills that (a) have been sponsored or cosponsored by the selected cross-state neighbor, and (b) have not been introduced in a comparable format in the subject's state.
❸ If we find an example bill in Step Two, we copy the NCSL's summary of the respective bill, to be included in the subject's experimental message.
❹ If we do not find an example bill in Step Two, we continue steps 1 and 2 with the other cross-state neighbors.
❺ If we fail to satisfy the conditions of Step Two for all cross-state neighbors, the legislator is excluded from the experiment.

Legislators who make it through the screening process are assigned to either treatment or control, and the message is completed accordingly.

Hypothesis: Legislators in the treatment group will be more likely to indicate support for the example policy.

Outcomes and Analysis

- Total follow up time will be one month, with a reminder after two weeks sent to those who have not responded.
- Each response email will be coded as positive, negative, or neutral, in terms of support for the respective policy.
- We plan to include three types of analysis in the paper.
  ❶ Summary/description of the responses.
  ❷ Bivariate χ^2 test of overall effect of treatment.
  ❸ Regression analysis of response adjusting for legislator and state features.

References:
Domagalski, Rachel, Zachary P. Neal, and Bruce Sagan. "Backbone: An R package for extracting the backbone of bipartite projections." *Plos one* 16, no. 1 (2021): e0244363.

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