



Do economic conditions influence environmental policy? Evidence from the US Senate[☆]



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HIGHLIGHTS

- Panel-data study of how economic conditions influence environmental policy.
- Increases in the unemployment rate lead to reduced support for environment.
- Effect is largest for Republicans.

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ABSTRACT

This paper investigates whether economic conditions influence environmental policy by examining how policymakers voting on environmental legislation respond to changes in their state's unemployment rate. The outcome of interest is a US Senator's League of Conservation Voters score, which reflects how often a senator voted for the environmentally-favorable outcome on bills related to the environment in a given year. I find evidence that a higher unemployment rate is associated with reduced support for environmentally-favorable policies and that the estimated response is largest for Republicans. Counterfactual estimates indicate that if each state had experienced its lowest observed unemployment rate throughout the sample, then the proportion of votes taking the environmentally-favorable outcome would have increased from 36% to 41%.

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1. Introduction

Economists have demonstrated a substantial interest in the relationship between economic conditions and environmental policy. This interest has heightened in recent years as the “Great Recession” has coincided with reduced support for prominent environmental policies, such as a cap-and-trade program to address climate change.

A number of studies have evaluated the relationship between economic conditions and environmental policy. Kahn and Kotchen (2011) use data from California to show that an increase in a county's unemployment rate is associated with reduced public

support for policies intended to mitigate climate change. In another California-based study, Kahn and Matsusaka (1997) find that per capita income is positively associated with support for direct legislation intended to protect the environment. Using time-series data from the US Congress, Tanger et al. (2011) find that per capita income and pro-environment voting are positively related.¹ Additionally, empirical evaluations of the Environmental Kuznets Curve hypothesis, which is partially based on the idea that developed countries invoke more stringent environmental regulations as they accumulate wealth, provide an indirect test of the effect of economic conditions on environmental policy (e.g., Deacon and Norman, 2006; Grossman and Krueger, 1995). Overall, this literature has produced mixed evidence (see Kijima et al. (2010), for a recent

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¹ While their results are suggestive of a relationship between economic conditions and environmental policy, some caution is warranted because the analysis is based on only 39 observations consisting of national averages.

survey). Studies have been hampered by difficulties in measuring environmental quality, and findings have differed across choices of measurement.

In this paper, I shed new light on whether economic conditions influence environmental policy by examining how state unemployment rates affect voting on environmental policy in the US Senate. This paper contributes to the literature in several novel ways: (1) it examines the behavior of policymakers themselves (as opposed to public opinion), (2) the analysis is based on panel data, which limits the potential of omitted variable bias, and (3) it provides evidence at the national level as opposed to a more local jurisdiction.

2. Materials and methods

The outcome of interest in this paper is the voting of senators on policies related to the environment.² As a measure of this behavior, I use a congressperson's score in the *National Environmental Scorecard*. The scorecard, which is published annually by the League of Conservation Voters (LCV), reports a score for each senator that ranges from 0 to 100 and reflects the percentage of the time that the senator took the pro-environment position on major votes related to the environment.

Data on LCV scores from 1976 to 2008 were obtained from Professor Timothy Groseclose, who maintains a web site that provides data on interest group scores (Groseclose, 2011). These data include information on a senator's LCV score, the year of the score, the chamber of Congress, and the party of the senator. For use as a control variable in certain specifications, I also obtained data on ADA scores. ADA scores are published by the American Democratic Association and are a standard measure of a senator's liberalism. In all parts of the analysis I use "adjusted" LCV and ADA scores that allow for values to be credibly compared across time (Groseclose et al., 1999).

Data on state unemployment rates were collected from the Bureau of Labor Statistics and linked to the interest score data by state and year. State-level unemployment rate data are only available dating back to 1976, which accordingly constitutes the first year of the dataset compiled for the present study. The final dataset is a panel consisting of 296 total senators who served at some point between 1976 and 2008. There are 3246 total observations.³ Summary statistics are reported in Table 1.

3. Empirical framework

I begin estimation of the effect of the unemployment rate on LCV scores using a senator fixed-effects estimation approach. The fixed-effect approach controls for all time-invariant differences between senators as well as overall time trends. For example, covariates that are approximately stable during a senator's tenure, such as the income, education, or political leanings of a state's constituency should not be sources of substantial bias in estimates as they will be absorbed by the senator fixed effects.⁴ In particular, I estimate a fixed-effects regression of the following form:

$$LCV_{it} = \beta \text{unemployment rate}_{it} + \alpha_i + \omega_{pt} + \varepsilon_{it}, \quad (1)$$

² I do not evaluate members of the House of Representatives, because they are elected by district and district-level unemployment data are not available. Senators are elected by whole states and would therefore be expected to be responsive to the state's unemployment.

³ I drop all senators from minor parties and all observations for which a senator's ADA score is missing. This drop eliminates only 49 of 3295 initial observations.

⁴ Fixed-effects estimates are typically preferred to the control function approach that has generally been employed in studies of economic conditions and environmental policy. Meyer (1995) provides a general discussion on the strengths and weaknesses of different approaches to identification of causal estimates.

Table 1
Summary statistics.

Sample	Variable	Mean	St. Dev.	Min.	Max.	Obs.
All	LCV score	47.56	23.16	6.17	96.54	3246
	Unemployment rate	5.82	1.97	2.30	17.40	
	ADA score	38.05	30.27	-15.29	112.54	
Republican	LCV score	31.89	17.19	6.17	96.47	1588
	Unemployment rate	5.70	1.82	2.30	13.20	
	ADA score	12.93	17.30	-15.29	91.19	
Democrat	LCV score	62.56	17.50	7.51	96.54	1658
	Unemployment rate	5.93	2.10	2.30	17.40	
	ADA score	62.12	17.97	-2.66	112.54	

Notes: The unit of observation is a senator and a year. There are 296 senators in the data. The time period covered by the data is 1976–2008.

where α_i represents a senator-specific fixed effect,⁵ ω_{pt} represents party-by-year fixed effects that control for time effects that are experienced uniformly by all senators within a party, and ε_{it} is a normally distributed error term. The coefficient β indicates the change in a senator's LCV score associated with a one percentage point increase in the state unemployment rate. To adjust for potential correlation in the error terms, I cluster standard errors by senator.

I estimate three other variations of this base specification. First, I estimate a specification that controls for a senator's ADA score. Specifications that control for ADA help isolate whether there is a unique response toward environmental voting, as opposed to a response driven by a general movement toward more or less liberal voting. Next, I estimate a specification that allows the effect of the unemployment rate to vary by the political party of the senator. Last, I estimate a specification that combines both approaches.

In a second set of estimates, I estimate specifications that mirror those described above, with the exception that they produce estimates that allow the unemployment rate to influence LCV scores through the election of new senators, in addition to through changes in the behavior of incumbent senators. In econometric terms, this is accomplished primarily by (1) aggregating the data such that each observation reports variable means for a state and a year (2) including state effects, as opposed to senator effects. Because specifications based on these changes do not control for the specific senator who is in office, the estimates account for responses that occur both through changes in incumbency and through shifts in the behavior of those staying in office.⁶

As a final note on the empirical design, it is worth emphasizing that I use state-level unemployment data throughout the analysis. In addition to providing the best measure of the economic conditions facing a senator's constituency, the use of state unemployment rates, as opposed to the national rates, enables the inclusion of time controls in the analysis, which is one of the strengths of the empirical design.

4. Results and discussion

Estimation results for the Senate are reported in Table 2. Columns 1 through 4 report estimates that include senator fixed effects. Estimates can thus be interpreted as the effect of a one

⁵ Senators who switched parties are treated as two different senators. A different fixed effect is included for the tenure with each party.

⁶ Additionally, in these specifications, I classify states as either Democrat-leaning or Republican-leaning, based on which party was more likely to hold their seats in the Senate during the sample, and generate the unemployment-rate-by-party interaction terms and year-by-party effects based on these classifications.

Table 2
The effect of state unemployment rates on LCV scores.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unemp. rate	−0.484 [*] (0.252)	−0.645 ^{***} (0.238)			−0.277 (0.501)	−0.890 ^{**} (0.361)		
Unemp. rate × Republican			−0.831 [*] (0.439)	−0.862 ^{**} (0.429)				
Unemp. rate × Democrat			−0.293 (0.294)	−0.524 [*] (0.276)				
Unemp. rate × Rep. leaning							−0.829 (0.555)	−1.182 ^{**} (0.570)
Unemp. rate × Dem. leaning							0.049 (0.707)	−0.717 (0.452)
ADA score		0.302 ^{***} (0.025)		0.301 ^{***} (0.025)		0.545 ^{***} (0.026)		0.544 ^{***} (0.026)
Senator fixed effects	Yes	Yes	Yes	Yes				
State fixed effects					Yes	Yes	Yes	Yes
Year-by-party effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.098	0.166	0.099	0.166	0.075	0.531	0.076	0.532
Observations	3246	3246	3246	3246	1650	1650	1650	1650

Notes: The dependent variable is LCV score. Standard errors are reported in parentheses and are clustered by senator in columns 1–4 and state in columns 5–8.

^{*} Significant at 10%.

^{**} Significant at 5%.

^{***} Significant at 1%.

percentage point increase in the state unemployment rate on the LCV score of an incumbent senator. Column 1, which reports results from the base specification that assumes a uniform response across parties and that does not control for a senator's ADA score, indicates that an increase in the unemployment rate leads to reduced support for environmentally-favorable policies. A one point increase in the unemployment rate leads to a statistically significant 0.48 point decline in the LCV score of the average senator.

Column 2 reports results from a specification that continues to assume a uniform response across parties, but that controls for a senator's ADA score. The coefficient on ADA score is positive and statistically significant, indicating that a more liberal senator is more likely to support the environment. Relative to column 1, the effect of the unemployment rate on a senator's LCV score increases in magnitude, to −0.64, and the coefficient remains statistically significant, indicating that the voting response is targeted at environmental issues, and not driven by general changes in a senator's willingness to take liberal voting positions.

Results of a specification that allows the effect of the unemployment rate to vary by party are reported in column 3. The point estimate indicates that a 1% point increase in the unemployment rate is associated with a 0.83 point decline in the LCV score of an incumbent Republican senator and a 0.29 point decline in the LCV score of an incumbent Democratic senator, with only the former estimate being statistically significant. While the estimated responses of the two parties are not statistically different from each other, the difference in the point estimates suggests that increases in the unemployment rate may increase polarization on environmental issues. In column 4, I report results that control for a senator's ADA score. The response of Republicans remains comparable to the previous specification and the response of Democrats increases in magnitude and becomes statistically significant, which further suggests a unique response toward environmental issues.

In columns 5 through 8, I report estimates based on the aggregated data. These results allow for the unemployment rate to influence LCV scores both through changes in incumbent behavior and through the election of challengers. These estimates are generally similar to the results reported in columns 1 through 4. While magnitudes are somewhat different and some results are no longer statistically significant, point estimates indicate that increases in the unemployment rate lead to decreases in LCV scores in the Senate. The magnitude is greatest in Republican-leaning states. Overall, there is little evidence that the election of challengers plays a

dramatic role in how the LCV scores of a state's senators respond to fluctuations in the unemployment rate.

In summary, across columns 1 through 8, the estimates provide evidence that when the unemployment rate increases, the Senate becomes less likely to support environmentally-favorable policies, and that this response is particularly evident for Republican senators and Republican-leaning states.

To help quantify the influence of the estimated responses on actual policy outcomes, I turn to counterfactual estimates of the share of the votes considered by the LCV that would have taken a pro-environment outcome if each state had always experienced its minimum unemployment rate observed during the sample. To calculate these counterfactuals, information on the bills considered by the LCV in each year and the environmentally-favorable voting position on these bills were obtained from LCV.org. This information is only available dating back to 1981. These bills were then linked to roll call outcomes using data from www.govtrack.us.

I estimate the additional pro-environment votes that would have occurred in the Senate in a given year, t , if unemployment rates were at state minimums using the following equation:

$$\text{Additional pro-environment votes}_t = \sum_i [\min(u_i) - u_{it}] \times \beta_p, \quad (2)$$

where i indexes all senators in office in the given year, $\min(u_i)$ represents the minimum unemployment rate observed in the state the senator is serving, u_{it} is the actual unemployment rate observed in the senator's state in the given year, and β_p is the estimated change in the probability that a senator from the senator's party makes a pro-environment vote when the unemployment rate increases by one point. β_p comes from column 3 of Table 2, and equals −0.83 for Republicans and −0.29 for Democrats.⁷ After calculating the additional pro-environment votes, I then calculate how many bills would have taken the pro-environment outcome under the counterfactual situation.⁸

Results are presented in Table 3 and are shown by decade and for the sample as a whole. Overall, the share of votes that

⁷ I use the responses estimated based on the senator-level data, as these responses are estimated with greater precision than the state-level data, and there is little evidence that the election of challengers is an avenue by which LCV scores respond to changes in the unemployment rate.

⁸ I first re-calculate the number of yeas and nays, taking account of which position was the pro-environment outcome. Next, I record whether the bill would have passed, taking account of whether a simple majority or cloture was required, and then relate this again to which position was the pro-environment outcome.

Table 3
Counterfactual voting outcomes.

	Observed (%)	Counterfactual (%)
1981–1989	33	47
1990–1999	34	37
2000–2008	39	41
Total	36	41

Notes: This table reports the share of votes considered by the LCV that had a pro-environment outcome, and counterfactual estimates of the share of votes that would have had a pro-environment outcome if each state had always experienced its minimum unemployment rate. Counterfactuals are based on the responses estimated in column 3 of Table 2.

would have passed the Senate increases from 36% to 41% under the lowest unemployment rates. The difference between the observed outcomes and the counterfactuals is greatest during the 1980s when unemployment rates were relatively elevated.

5. Conclusion

Economists have demonstrated a substantial interest in the interplay between economic conditions and the environment. In this paper, I provide the first study that uses panel data to examine

how economic conditions influence the environment-related decisions of policymakers. I find that when the unemployment rate increases, senators become less likely to vote for environmentally-favorable policies and that the response is largest for Republicans.

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