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Using Donations to the Green Party to Measure Community Environmentalism

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Abstract

This paper presents empirical evidence that measures of community environmentalism based on donations to the Green Party are predictive of the demand for green products and policies at the zip code and county levels in the United States. The primary measure of community environmentalism in the existing literature is the share of Green Party registered voters, which is publicly available for California only. Measures based on donations to the Green Party are similar in spirit to shares of Green Party registered voters, but the data are publicly available for all areas in the United States.

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1. Introduction

A literature in environmental economics has shown that community environmentalism (i.e., environmental preference) is an important determinant of the demand for green products and environmental policies in the community (e.g., Kahn 2007; Kahn and Vaughn 2009; Kahn and Morris 2009; Simcoe and Toffel 2012).[1] This literature, for example, finds that greener communities buy more hybrid vehicles, have more green buildings, and are more likely to vote for environmental policies. The primary measure of community environmentalism in the literature is the share of Green Party registered voters. This is a valid measure of an area's environmental preference because individuals join the Green Party largely to express their green beliefs, not to obtain any tangible benefits (Kahn and Morris 2009). However, shares of Green Party registered voters are publicly available for communities in California only. For this reason, this literature has focused largely on communities in California.

When examining the demand for green products outside California, studies tend to either use imperfect measures of community environmentalism or simply ignore community environmentalism. In their study of green travel behavior, for example, Kahn and Morris (2009) use the League of Conservation Voters' (LCV) scorecard on each congressional representative's environmental voting record as a measure of community environmentalism. This measure has two limitations: it is applicable at the congressional district level only, and a representative's voting is likely to be influenced by factors unrelated to environmentalism. In their study of the diffusion of green buildings in the United States, Kok et al. (2011) consider a metropolitan area's percentage vote for Ronald Reagan or for George H. W. Bush. Percentage vote for either president is a measure of political ideology rather than a measure of environmental ideology. Kahn and Vaughn (2009, 18) study the geography of green buildings outside California without considering community environmentalism because they "have been unable to find a good measure of zip code environmentalism at the national level." In their study of the determinants of green building adoption in various US metropolitan areas, Fuerst et al. (2014) ignore community environmentalism as a determinant, perhaps for lack of a proper measure.

In this paper, we propose measures of community environmentalism that can be easily constructed for all zip codes and for larger geographic areas in the United States. Our measures are based on individuals' donations to the Green Party.[2] Similar to Green Party membership, donations to the Green Party are also largely expressions of green beliefs because the Green Party has little political power and cannot offer much tangible benefits. Different from Green Party membership, donations to the Green Party are public data that are available from the Federal Election Commission (FEC) for all areas of the United States. We present evidence that our measures can predict the number of green buildings at the zip code and county levels in the United States. As robustness checks, we also show that our measures are predictive of zip code

[1] Costa and Kahn (2013) study individuals' environmental preference and their behavior by using proprietary data on voters' party affiliation and donations to environmental organizations. For some questions (e.g., why are there more green buildings in area A than in area B), it is necessary to measure an area's environmentalism.

[2] In their study of consumers' reactions to the 2010 BP oil spill, Barrage et al. (2014) use an index to measure a zip code's environmentalism, which is the sum of the standardized values of four variables: the share of hybrid and electric vehicles, per capita Sierra Club membership at the state level, the number of LEED-registered buildings per capita, and the average per capita contribution to Green Party committees. This index conflates environmental preference (i.e., Sierra Club membership and donations to Green Party committees) with behavior (e.g., hybrid vehicles and green buildings). In this paper, we use donations to Green Party committees to predict hybrid vehicles and green buildings. Contemporaneous with this study, Wang et al. (2016) use donations to Green Party committees to predict the intensity of consumers' reactions to the 2010 BP oil spill.

level voting behavior for an environmental policy in California and county-level shares of hybrid vehicles in the United States.

2. Measures and Data

Our first measure of community environmentalism is the share of individuals in an area who contributed at least $200 to any Green Party political committees from 2003 through 2012. The data collected by FEC cover only contributors whose donations are at least $200. Our second measure is the average per capita contribution to Green Party political committees in an area. We also construct an environmentalism index that is the sum of the standardized values (the z-scores) of the two variables.

Table 1 shows the summary statistics of the main variables in this paper. The share of contributors variable and the per capita contribution variable are both quite small, averaging 0.01 per thousand and $0.0038, respectively, at the level of zip code tabulation area created by the Census Bureau, which is based on but can be different from the US Post Service zip code area. Zip codes in this paper refer to the zip code tabulation areas because the control variables (e.g., income and demographics) are at this level. The small values are not surprising because Green Party membership, even in California, was also very small, averaging 0.9 percent (Kahn 2007). The correlation coefficient between the share of contributors variable and Green party membership in California is 0.46 at the county level and 0.08 at the zip code level, and both are statistically significant at the 1 percent level. The correlation coefficient between the per capita contribution variable and Green Party membership is 0.10 at the county level and 0.01 at the zip code, and neither is statistically significant. The Green Party membership data come from the Berkeley Institute of Government Studies website.

Our primary measure of green buildings in an area is the number of commercial Leadership in Energy and Environmental Design (LEED) buildings in the area that have been certified by the US Green Building Council. We define a building as commercial if its owner is a for-profit organization. The LEED buildings data from 2000 through 2014 come from the council's website. Kahn and Vaughn (2009) find that community environmentalism has a statistically significant effect on the number of commercial LEED buildings at the zip code level in California, but outside California they could not consider the role of environmentalism. An average zip code and an average county have 0.25 and 2.53 certified commercial LEED buildings, respectively. We also consider commercial buildings with the Energy Star label. The Energy Star buildings data, covering 2003 through 2012, come from the official Energy Star website. An average zip code has 0.38 commercial Energy Star buildings, which are only slightly larger than the number of commercial LEED buildings. In our analysis, we do not add the two types of green buildings together because their evaluation criteria are quite different.

Following Holian and Khan (2015), our example of environmental policy is California's Proposition 23 in 2010, the purpose of which was to suspend AB 32 (i.e., the Global Warming Solutions Act of 2006) until California's unemployment rate falls to 5.5 percent or below for four consecutive quarters. The voting data come from the Berkeley Institute of Government Studies website.[3] The share of no votes for Proposition 23 was 61 percent in the average zip code.

[3] The voting data for Prop 23 are at the census block level and are available for 388,599 out of the 710,145 census blocks in California. We aggregate the block level data into the zip code level.

Table 1. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Contributors per thousand (zip code level)	32,505	0.01	0.19	0.00	28.25
Contributors per thousand (zip code level in CA)	1,710	0.01	0.08	0	1.73
Contributors per thousand (county level)	3,221	0.00	0.02	0.00	0.66
Average per capita donation ($) (zip code level)	32,505	0.00	0.14	0.00	15.54
Average per capita donation ($) (zip code level in CA)	1,710	0.01	0.35	0	14.29
Average per capita donation ($) (county level)	3,221	0.00	0.02	0.00	0.79
Environmentalism index (zip code level)	32,505	0.00	1.87	-0.06	263.14
Environmentalism index (zip code level in CA)	1,710	0.10	2.75	-0.06	108.73
Environmentalism index (county level)	3221	0.00	1.68	-0.22	40.76
LEED buildings (zip code level)	32,505	0.25	1.44	0.00	62
LEED buildings (county level)	3221	2.53	14.76	0.00	289
Energy Star buildings (zip code level)	32,505	0.38	1.62	0.00	52
No votes for Proposition 23 (zip code level)	1,710	0.58	0.14	0	1
Hybrid vehicle (county level)	257	0.00	0.00	0.00	0.02
Income: [$25,000, $45,000] (zip code level)	32,505	0.23	0.07	0.00	0.90
Income: [$45,000, 100,000] (zip code level)	32,505	0.36	0.12	0.00	1
Income: ≥ $100,000 (zip code level)	32,505	0.17	0.14	0.00	1
White (zip code level)	32,505	0.83	0.21	0.00	1
Age: [20, 40) (zip code level)	32,505	0.23	0.07	0.00	0.90
Age: ≥ 40 (zip code level)	32,505	0.51	0.10	0.00	1
Ln(Population) (zip code level)	32,505	7.97	1.77	0.69	11.64

Note: No votes for Proposition 23, share of Green Party Registration, hybrid vehicle, income, race, and age variables are all expressed as shares between 0 and 1.

We purchased the July 2009 share of hybrid vehicles data from the R. L. Polk Company. Because of cost considerations, we purchased the data only for counties with at least 50 retail gasoline stations and at least 5 BP-branded stations (based on gasoline data from Oil Price Information Service, a consulting firm). These large counties are located in 27 states and the District of Columbia, all east of the Rocky Mountains.

We control for income distribution and demographics (i.e., population, race, and age) in the estimation. These data come from the 2010 Census and American Community Survey.

3. Models and Result

For LEED or Energy Star buildings, we estimate a zero-inflated negative binomial (ZINB) count model with the STATA command zinb, because 90 (85) percent of the zip codes have zero LEED (Energy Star) buildings and the standard deviations of both buildings are much larger than the means. This model has two parts: a negative binomial count model that uses the full set of explanatory variables to predict the number of buildings, and a logit model that uses population and a constant to predict excess zeros. The maximum likelihood method is used to estimate the ZINB model. The parameter estimates for the logit model part are strongly significant but are not reported here. The Vuong test indicates that the ZINB model is preferred to the negative binomial model alone. The dispersion parameter is significantly positive, indicating that the negative binomial model is preferred to the Poisson model.

Table 2. Zip Code–Level Regression Results

	Model 1 LEED	Model 2 LEED	Model 3 LEED	Model 4 Energy Star	Model 5 Energy Star	Model 6 Energy Star	Model 7 Prop 23	Model 8 Prop 23	Model 9 Prop 23
Contributors per thousand	0.822			0.240***			0.325***		
	(0.638)			(0.043)			(0.083)		
Average per capita donation		0.869**			0.049			0.005***	
		(0.378)			(0.364)			(0.002)	
Environmentalism index			0.087**			0.024*			0.001*
			(0.041)			(0.014)			(0.001)
Income: [$25,000, $45,000]	-1.655	-1.644	-1.640	0.564	0.519	0.554	0.026	0.047	0.046
	(1.097)	(1.093)	(1.093)	(1.154)	(1.149)	(1.153)	(0.103)	(0.105)	(0.105)
Income: [$45,000, $100,000]	-1.862***	-1.853***	-1.850***	-0.780*	-0.789*	-0.780*	-0.522***	-0.531***	-0.531***
	(0.436)	(0.435)	(0.435)	(0.413)	(0.411)	(0.413)	(0.050)	(0.051)	(0.051)
Income: ≥ $100,000	3.119***	3.128***	3.124***	3.062***	3.045***	3.056***	0.009	0.022	0.022
	(0.398)	(0.397)	(0.397)	(0.424)	(0.422)	(0.424)	(0.044)	(0.045)	(0.045)
White	-0.665***	-0.671***	-0.669***	12.113***	12.116***	12.107***	-0.266***	-0.268***	-0.268***
	(0.181)	(0.180)	(0.180)	(0.663)	(0.661)	(0.661)	(0.018)	(0.018)	(0.018)
Age: [20, 40)	12.899***	12.925***	12.889***	6.658***	6.650***	6.652***	1.197***	1.243***	1.242***
	(0.666)	(0.659)	(0.660)	(1.007)	(1.003)	(1.005)	(0.063)	(0.063)	(0.063)
Age: ≥ 40	5.505***	5.511***	5.493***	-0.266*	-0.261	-0.265*	0.818***	0.849***	0.848***
	(1.001)	(0.999)	(0.999)	(0.160)	(0.159)	(0.160)	(0.057)	(0.057)	(0.057)
Ln(Population)	0.406***	0.405***	0.404***	0.634***	0.631***	0.633***	0.001	-0.000	-0.000
	(0.072)	(0.072)	(0.072)	(0.068)	(0.068)	(0.068)	(0.004)	(0.004)	(0.004)
Constant	-10.069***	-10.062***	-10.039***	-13.169***	-13.119***	-13.145***	0.235***	0.218***	0.218***
	(1.350)	(1.347)	(1.346)	(1.375)	(1.367)	(1.372)	(0.071)	(0.071)	(0.071)
Observations	32,505	32,505	32,505	32,505	32,505	32,505	1,710	1,710	1,710
R-squared							0.457	0.442	0.443

Notes: The dependent variable is the number of certified commercial LEED buildings for models 1, 2, and 3, the number of commercial Energy Star buildings for models 4, 5, and 6, and the share of no votes for Proposition 23 for models 7, 8, and 9. Robust standard errors are in parentheses. Omitted categories are income< $25000, age 0–20, and nonwhite. *** p<0.01, ** p<0.05, * p<0.1.

Models 1 to 3 in Table 2 report the zip code level results for LEED buildings. The per capita contribution measure in model 2 and the environmentalism index in model 3 have positive coefficients that are statistically significant at the 5 percent level, but the share of contributors measure in model 1 has a positive but statistically insignificant coefficient. The model 2 results indicate that a one standard deviation increase in the average per capita contribution would lead to an increase of about 1.1 (= exp (0.869 ∗ 0.14)) LEED buildings in a zip code, and the model 3 results indicate that a one standard deviation increase in the environmental index would lead to an increase of about 1.2 (= exp (0.087 ∗ 1.87)) LEED buildings in a zip code. The estimates for the control variables are similar to Khan and Vaughn's (2009) results at the national level: zip codes with higher income have more green buildings, and zip codes with a larger share of whites have fewer green buildings.[4]

Models 4 to 6 in Table 2 report the zip code level results for Energy Star buildings. The coefficient for the number of contributors measure in model 4 is positive and statistically significant at the 1 percent level, and the coefficient for the environmentalism index variable in model 6 is positive but only statistically significant at the 10 percent level. The coefficient for the per capita contribution measure in model 5 is positive but statistically insignificant. The results in model 4 indicate that a one standard deviation increase in the number of contributors per thousand would lead to an increase of about 1.05 (= exp(0.240*0.19)) Energy Star buildings in a zip code, and the results in model 6 indicate that a one standard deviation increase in the environmental index would lead to an increase of about 1.05 (= exp(0.024*1.87)) Energy Star buildings in a zip code. The estimates for the control variables are somewhat different from the results for LEED buildings. For example, zip codes with a larger share of whites tend to have more Energy Star buildings.

Models 7 to 9 in Table 2 report the ordinary least square (OLS) estimates for the share of no votes at the zip code level for California's Proposition 23. The coefficients for the contributors per thousand measure and for the per capita donation measure are both positive and statistically significant at 1 percent level, and the coefficient for the environmentalism index is positive and statistically significant at 10 percent level. The model 7 results indicate that a one standard deviation increase in the number of contributors per thousand measure would lead to an increase of about 2.60 (= 0.325*0.08*100) percentage points for the share of no votes for Proposition 23 in a zip code. The model 8 results indicate that a one standard deviation increase in the per capita measure would lead to an increase of about 0.18 (= 0.005*0.35*100) percentage points for the share of no votes in a zip code. We estimate the model at the county level as well, and the coefficients for all three measures are positive and statistically significant. Results are available upon requests.

In Table 3, we report some county level results. Models 1 to 3 in Table 3 report the OLS results for shares of hybrid vehicles. All three measures of environmentalism have positive coefficients that are statistically significant at the 1 percent level. The model 1 results indicate that a one standard deviation increase in the number of contributors per thousand variable would lead to an increase of about 0.16 (= 0.080*0.02*100) percentage points in the share of hybrid vehicles in the county. The model 2 results indicate that a one standard deviation increase in the average per capita donation variable would lead to an increase of about 0.164 (= 0.082*0.02*100)

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[4] Kahn and Vaugh (2009, p.18) find that "based on the national estimates, zip codes with larger shares of Asians and blacks are more likely to have more LEED buildings, whereas in California LEED buildings seem to have clustered in predominantly white zip codes."

percentage points in the share of hybrid vehicles in the county. The model 3 results indicate that a one standard deviation increase in the environmental index would lead to an increase of about 0.05 (=1.68*0.0003*100) percentage points in the share of hybrid vehicles in the county.

Table 3. County-Level Regression Results

	Model 1 Hybrid	Model 2 Hybrid	Model 3 Hybrid	Model 4 LEED	Model 5 LEED	Model 6 LEED
Contributors per thousand	0.080***			4.340**		
	(0.024)			(1.932)		
Average per capita donation		0.082***			1.482**	
		(0.029)			(0.626)	
Environmentalism index			0.0003***			0.032***
			(0.00008)			(0.012)
Income: [$25,000, $49,999]	0.013*	0.010	0.012*	9.229***	9.075***	9.094***
	(0.007)	(0.006)	(0.006)	(2.238)	(2.254)	(2.245)
Income: [$50,000, $99,999]	-0.005	-0.005	-0.005	4.365***	4.306***	4.302***
	(0.007)	(0.007)	(0.007)	(1.363)	(1.350)	(1.348)
Income: ≥ $100,000	0.024***	0.022***	0.023***	7.883***	7.915***	7.879***
	(0.005)	(0.004)	(0.005)	(1.039)	(1.025)	(1.030)
White	-0.000	0.000	-0.000	0.074	0.061	0.066
	(0.001)	(0.001)	(0.001)	(0.353)	(0.360)	(0.356)
Age: [20, 40)	0.040***	0.041***	0.040***	15.840***	16.260***	16.012***
	(0.007)	(0.007)	(0.007)	(1.719)	(1.728)	(1.725)
Age: ≥ 40	0.025***	0.025***	0.024***	7.942***	8.233***	8.053***
	(0.007)	(0.007)	(0.007)	(1.399)	(1.436)	(1.436)
Ln(Population)				1.198***	1.199***	1.199***
				(0.045)	(0.045)	(0.045)
Constant	-0.025***	-0.024***	-0.024***	-26.649***	-26.846***	-26.695***
	(0.006)	(0.006)	(0.006)	(1.733)	(1.708)	(1.701)
Observations	257	257	257	3,221	3,221	3,221
R^2	0.665	0.662	0.669			

Notes: The dependent variable for models 1, 2 and 3 is the share of hybrid vehicles in a county. Models 1, 2, and 3 are estimated by OLS and weighted by county-level population. The dependent variable for models 4, 5 and 6 is the number of certified commercial LEED buildings in a county. The logit inflate model parameter estimates have been suppressed for brevity. Omitted categories are income< $25000, age 0–20, and nonwhite. Standard errors in parentheses are clustered by states. *** p<0.01, ** p<0.05, * p<0.1

Models 4 to 6 in Table 3 estimate the ZINB model for LEED buildings at the county level. All three measures of environmentalism have positive and statistically significant coefficients. The model 4 results indicate that a one standard deviation increase in the number of contributors per thousand variable would lead to an increase of about 1.09 $(= \exp(4.34 * 0.02))$ LEED buildings in the county. The model 5 results indicate that a one standard deviation increase in the average per capita contribution variable would lead to an increase of about 1.03 $(= \exp(1.482 * 0.02))$ LEED buildings in the county. The model 5 results indicate that a one standard deviation increase in the environmental index would lead to an increase of about 1.06 ($= \exp(0.032 * 1.68)$) LEED buildings in the county.

4. Conclusion

Community environmentalism is an important determinant of the demand for green products and environmental policies, but the application of this insight in the literature has been limited by the lack of an appropriate measure of community environmentalism that can be easily constructed for areas outside California. In this paper, we present empirical evidence that individuals' donations to Green Party political committees can be used to construct valid measures of community environmentalism for all areas of the United States. We hope that these new measures of community environmentalism will allow more studies to consider the important role of community environmentalism in determining the demand for green products and policies.

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