Do Governmental and Private Conservation Funds Crowd Out Open Space Spending?

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THE UNIVERSITY OF RHODE ISLAND

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USDA

ABSTRACT

There are many different vehicles that can be used to conserve land within towns. For example, towns can spend money on conservation through open space related expenditures in their budget, residents can vote on a referendum to fund conservation with bonds, private land trusts can purchase land development rights, and governmental grants can be used to fund conservation. The attraction or repulsion of funding sources for land conservation have only been investigated in some of these vehicles, however. Our paper investigates the relationship between conservation funding sources that have not been examined before.

Previous literature has focused on how government grants might "crowd out" private funding sources and local revenue efforts (e.g. Heutel 2014 and Cascio et al. 2013) and how federally funded conservation lands can alter private conservation activity (e.g. Albers et al. 2006, Albers et al. 2008, and Parker and Thurman 2011). Some of these studies argue that in order for a public agent to optimize the net benefits related to land conservation, they need to understand how their decisions affect other conservation agents. We extend the literature on the relationship between multiple conservation agents by investigating how governmental and private land trust conservation activity affects municipal conservation activity.

MOTIVATION

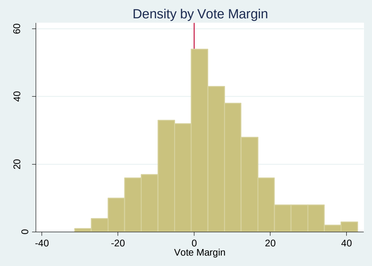
Previous literature that investigates the attraction or repulsion of open space conservation from multiple agents tend to do so from a cross-sectional standpoint (e.g. Albers et al. 2006 and Parker and Thurman 2011). This is a valuable exercise because the identification of conservation lands of different types/funding sources together or apart in a spatial context holds important implications for the ecosystem and public preferences depending on the importance of agglomeration. However, we decide to investigate spatial spillovers from a conservation perspective using a regression discontinuity framework that gets at a more causal relationship.

DATA

Data was collected from the following sources:

- Massachusetts State conservation investment per town from 1998-2011 from the Conservation Almanac
- Town level referendum conservation expenditure in Massachusetts from 1996-2015 from the LandVote Database
- Massachusetts town level demographic data from the 2010 Census
- Massachusetts land cover data for 2001 and 2011 from the National Land Cover Database

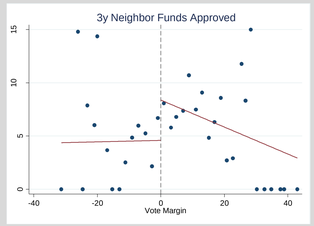
Regression Discontinuity Framework

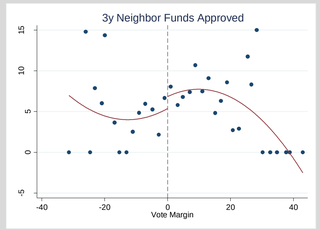


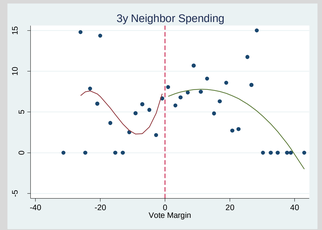
	Towns that ever fail a referendum	Towns that ever pass a referendum	Difference (t stat)	Towns that ever fail within 5%	Towns that ever pass within 5%	Difference (t stat)
# of Referenda	119	202		81	141	
# of Towns	98	172		72	122	
Median Income	82,727.57 (2,060.855)	81,627.78 (1,807.073)	1,099.789 (0.3877)	81,136.51 (2,401.657)	83,110.81 (2,225.332)	-1,974.302 (-0.5714)
% Bachelor Degree	43.30713 (1.332461)	46.29511 (1.114941)	-2.98798 (-1.6818)	42.80042 (1.630525)	47.28367 (1.333888)	-4.483255 (-2.0846)
% Under 18	22.33445 (.3694336)	21.51931 (.3613894)	.8151468 (1.4828)	22.37901 (.4300291)	21.43901 (.4632664)	.9400053 (1.3565)
% Over 65	14.48067 (.3399927)	16.5 (.4451447)	-2.019328 (-3.1741)	14.70494 (.4445309)	16.9383 (.5721807)	-2.23336 (-2.7001)
% White	91.66471 (.6917305)	91.31683 (.5481137)	.3478742 (0.3909)	91.49877 (.9161269)	91.62553 (.6045927)	-.1267665 (-.1267665)
% Black	2.106723 (.2945784)	2.064851 (.2320307)	.0418712 (0.1109)	2.240741 (.4128521)	1.891489 (.1786601)	.3492514 (0.8921)
Total Pop	21,531.25 (5,227.288)	17,136.21 (1,276.762)	4,395.039 (1.0128)	25,043.11 (7,614.52)	15,764.99 (1,458.246)	9,278.118 (1.5273)
Available Acres	11,501.94 (758.3271)	11,905.19 (580.7622)	-403.2559 (-0.4224)	11,042.19 (908.1862)	11,604.21 (653.3627)	-562.0178 (-0.5095)

The regression discontinuity framework takes advantage of an arbitrary cutoff point that determines treatment among observations by assuming observations close to that cutoff are very similar in observable and unobservable characteristics. If this assumption holds, it is possible to estimate the Average Treatment Effect by comparing the observations on either side of the threshold. In our case, there are a few observables that this assumption does not hold for and further research will need to be done to investigate this issue.

Regression Discontinuity Results







VARIABLES	(1) 3y Neighbor Funds	(2) 3y Neighbor Funds	(3) 3y Neighbor Funds
Pass	4.165*** (1.333)	3.889*** (1.295)	4.586*** (1.314)
Margin	-0.0879* (0.0481)	-0.0631 (0.0482)	-0.0813 (0.0503)
Observations	299	299	299
Adjusted R-squared	0.028	0.098	0.133
Demographics	No	Yes	Yes
Year FE	No	No	Yes

VARIABLES	(1) 3y Neighbor Funds	(2) 3y Neighbor Funds	(3) 3y Neighbor Funds
Pass	3.130** (1.450)	3.256** (1.416)	3.591** (1.430)
Margin	-0.0275 (0.0587)	-0.0282 (0.0576)	-0.0307 (0.0580)
Margin^2	-0.00316* (0.00177)	-0.00194 (0.00176)	-0.00320* (0.00185)
Observations	299	299	299
Adjusted R-squared	0.035	0.099	0.139
Demographics	No	Yes	Yes
Year FE	No	No	Yes

VARIABLES	(1) 3y Neighbor Funds	(2) 3y Neighbor Funds	(3) 3y Neighbor Funds
Pass	1.931 (1.613)	2.364 (1.590)	2.124 (1.607)
Margin	0.0821 (0.0879)	0.0512 (0.0866)	0.0995 (0.0879)
Margin^2	-0.000887 (0.00223)	-0.000373 (0.00218)	-0.000809 (0.00220)
Margin^3	-0.000161* (9.63e-05)	-0.000117 (9.52e-05)	-0.000196* (0.000100)
Observations	299	299	299
Adjusted R-squared	0.041	0.100	0.148
Demographics	No	Yes	Yes
Year FE	No	No	Yes

CROSS-SECTIONAL ANALYSIS

VARIABLES	(1) Conservation Funds Approved	(2) Conservation Funds Approved
Neighbor Conservation Funds Approved	0.269*** (0.0865)	0.274*** (0.0867)
Acres Available 2011 (log)	1.843*** (0.539)	1.718*** (0.585)
Median Income 2010 (log)	5.16e-05 (3.59e-05)	5.37e-05 (3.60e-05)
% Bachelor Degree 2010	0.137*** (0.0427)	0.133*** (0.0430)
% Under 18 2010	-0.288* (0.153)	-0.283* (0.154)
% Over 65 2010	0.171 (0.105)	0.171 (0.105)
% White 2010	-0.0643 (0.0835)	-0.0638 (0.0841)
% Black 2010	-0.131 (0.175)	-0.132 (0.176)
Population Density 2010 (log)	1.471*** (0.412)	1.508*** (0.416)
Observations	349	349
R-squared	0.274	0.278
Year FE	No	Yes

The dependent variable in the regressions to the left are the log of town level conservation funds approved between 1996-2015 and the independent variable of interest is the logged average of conservation funds approved in neighboring towns during the same time period. Cross-sectional analysis of spillover effects of neighboring town conservation reveals that neighboring conservation referendum funds approved positively affects focal town referendum funds approved. This finding is robust to the inclusion of demographic variables and year fixed effects.

CONCLUSION

We use a regression discontinuity framework to examine if there is a causal relationship between spatial conservation decisions between multiple agents. In contrast to standard cross-sectional analysis which suggests that there are positive conservation spillover effects between neighboring towns, examining conservation activity of towns that barely pass a referendum and those that don't using a flexible third order polynomial of the vote margin reveals that there does not appear to be a positive spillover effect of conservation spending. This finding in the cross-sectional analysis may be driven by the difference in unobservables between towns that pass referendums and those that do not.

ACKNOWLEDGEMENTS

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