Does open space conservation increase neighboring development?

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Introduction

- Open space is an important tool to mitigate sprawl, protect habitats, etc

- Open space could increase the value of private land (Cheshire and Sheppard (1995), Irwin (2002), Geoghegan (2002))

- Which could lead to increased development
  - Irwin and Bockstael (2004) open space increases the hazard rate of agricultural conversion to residential use
  - Wu and Plantinga (2003) the effect of open space on total area of developed land is ambiguous

- Could have a different effect depending on land-use
  - Lewis, Provencher, Butsic (2009) open space actually decreases further residential development

Research Questions

- What is the effect of open space on the rate and pattern of nearby development?
- Does this differ by land-use?
  - Unambiguous effect of open space on agricultural land
  - Ambiguous effect on further residential development
- Complementarity vs. Substitutability of open space and private land
  - How does open space affect the demand for private land?
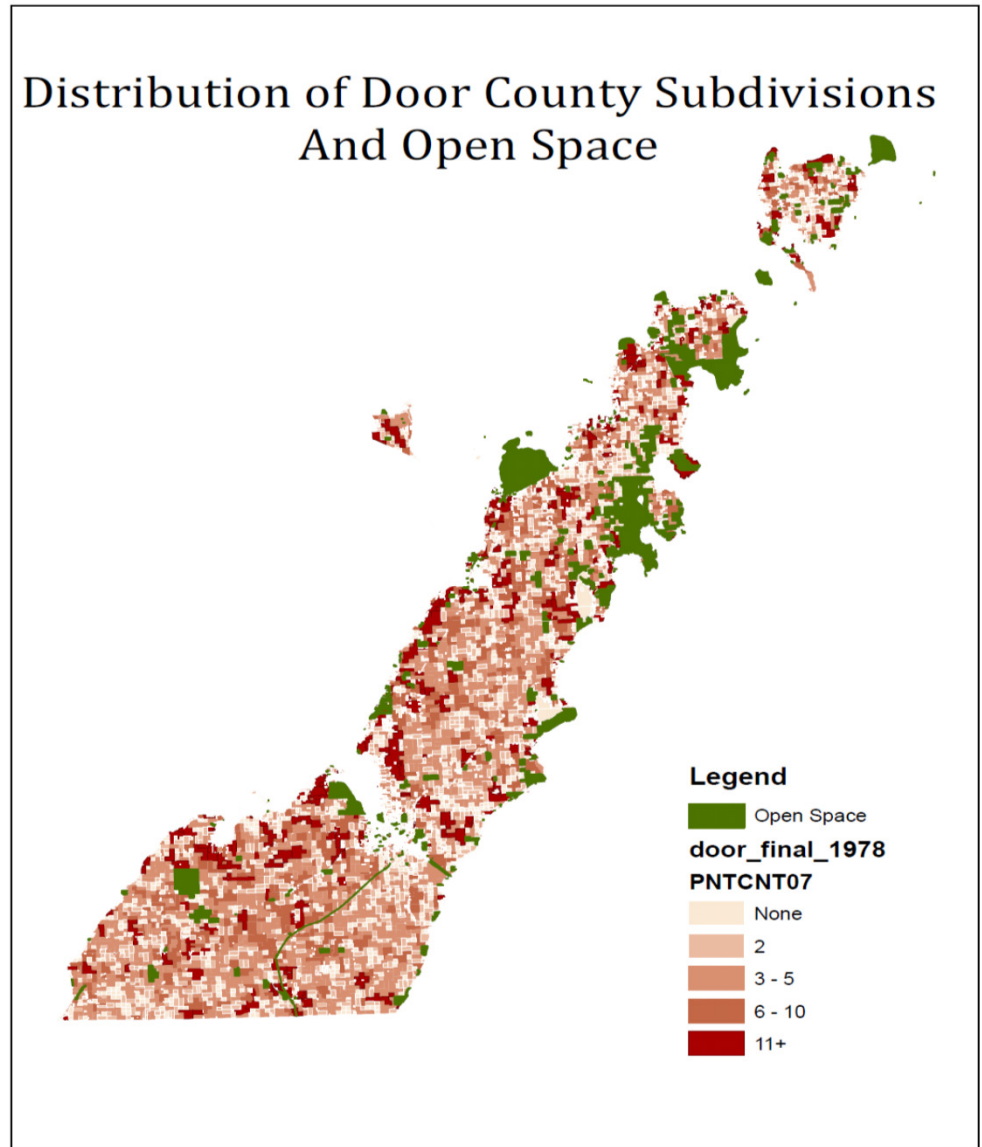
Contributions

1. Unique spatial-temporal dataset
2. Propose identification strategy
   - Endogeneity of open space location

   "In recent years, our land protection efforts have been focused on the protection of specific sites throughout the county that have been identified for their ecological importance and scenic beauty. These "Special Places", as we refer to them, showcase the best of Door County's diverse and inspiring natural landscapes" (Door County Land Trust)

   - Fixed effects to control for time-invariant parcel-specific characteristics
3. Separately estimate agricultural and residential parcels

Data

Door County, WI

- 10,033 legally subdividable parcels in 1978 and 6,237 in 2005

- 11,386 subdivisions (~8%)

- Average 1.73 additional parcels created upon subdivision

- 1,273 parcels of conserved open space

- Land use in 1992

Distribution of Door County Subdivisions And Open Space

Legend
Open Space
door_final_1978
PNTCNT07
None
2
3 - 5
6 - 10
11+

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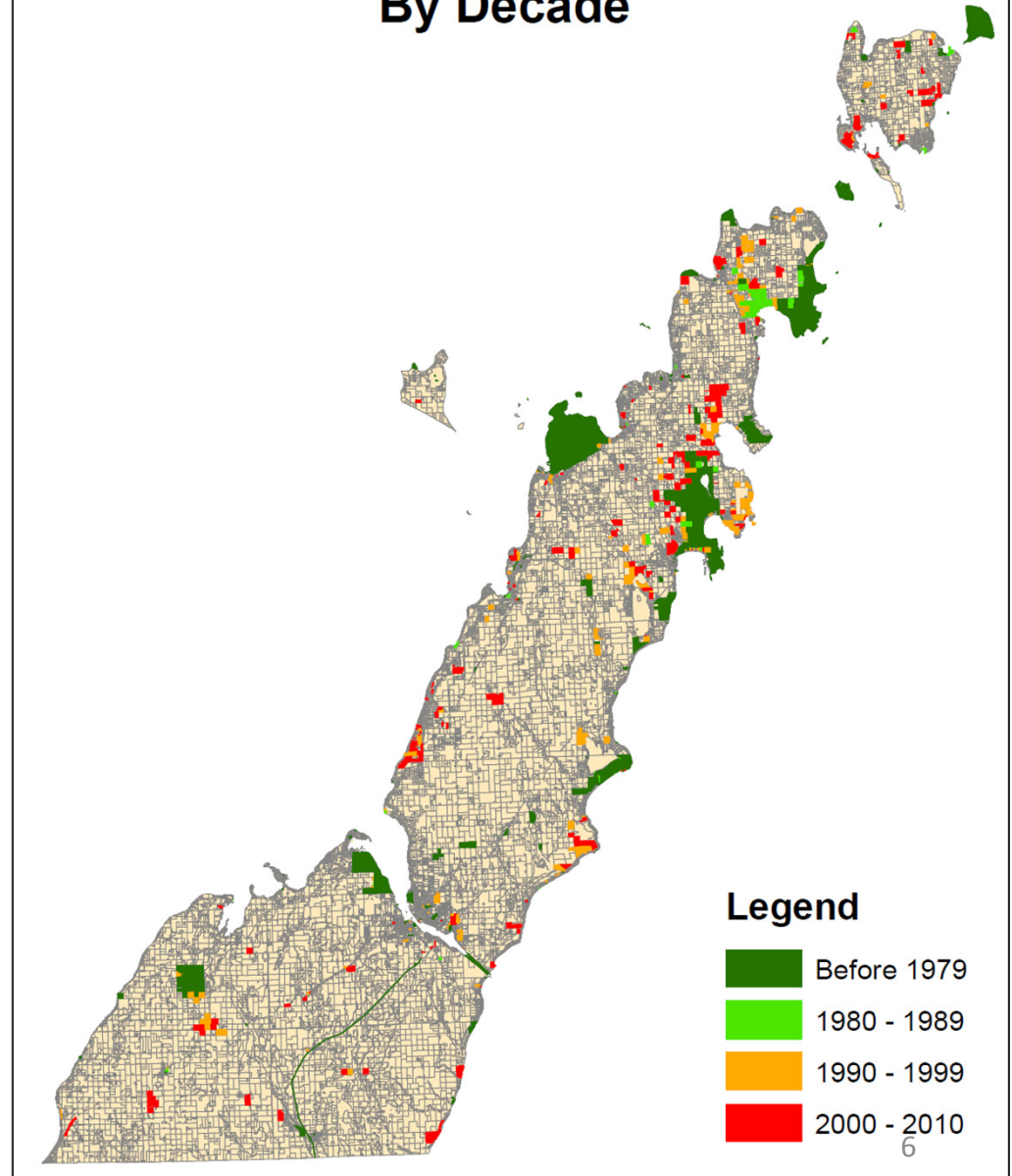- 1,273 parcels of conserved open space

- Land use in 1992

Distribution of Open Space Conservation By Decade

Legend

- Before 1979
- 1980 - 1989
- 1990 - 1999
- 2000 - 2010

Estimation

- Specify random utility model
- Estimate a binary discrete choice model (subdivide or not)
- Fixed-effects logit model

Results

Table 1: Odds Ratios for Various Logit Models for Agricultural and Residential Lands with Time Dummies

	Odds Ratios (95% Confidence Intervals)					
	Agricultural			Residential		
Effect of ...	Logit	FE Logit	CRE	Logit	FE Logit	CRE
half mile decrease in distance to open space	1.015 (0.998, 1.032)	0.919 (0.822, 1.016)	0.970 (0.922, 1.018)	0.861 (0.818, 0.903)	0.563 (0.345, 0.781)	0.832 (0.713, 0.951)

Note: FE Logit is a fixed effects logit model estimated using conditional maximum likelihood to avoid the incidental parameters problem (Greene, 2008). CRE is a correlated random effects model estimated by the Chamberlain-Mundlak method of adding time-averages of the variables to the model to control for the parcel-specific component of the error term.

- Open space has no effect on the odds of agricultural conversion to residential use.

- Open space lower odds of subdividing residential parcels by 14% in the model without fixed effects and 44% in the model with fixed effects
  - Open space is systematically located in areas more likely to subdivide
  - Complementarity between open space and private residential parcels

Future Research

- Control for time-varying unobservables that may be correlated with open space (such as other community amenities)
  - Bivariate Probit

$$y_{it1} = \mathbb{I}[z_{it1}\gamma_{a1} + \alpha_{a1}y_{it2} + \varphi_{a1} + \bar{z}_i\xi_{a1} + a_{i1} + \varepsilon_{it1} \geq 0]$$

$$y_{it2} = \mathbb{I}[z_{it}\gamma_2 + \varphi_2 + \bar{z}_i\xi_2 + \upsilon_{it2} \geq 0]$$

y_{1it} = subdivide 0/1

z_{it} = strictly exogenous variables, including a full set of period dummies

y_{it2} = endogenous variable - the probability that a neighbor (not including yourself) subdivides

c_{i1} = unobserved heterogeneity

$Corr(\varepsilon_{it1}, \upsilon_{it2}) = \rho$