Does open space increase development?

Katherine Zipp[1], David Lewis[2], Bill Provencher[1]

1. Department of Agricultural and Applied Economics, University of Wisconsin – Madison

2. Department of Economics, University of Puget Sound

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Contact: kzipp@wisc.edu

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 (Wu and Plantinga (2003) and Irwin and Bockstael (2004)
- Could have a different effect depending on the land use (Lewis, Provencher, Butsic (2009)

Research Questions

- What is the effect of open space on the rate and pattern of nearby development?
- Does this differ by land use?
- Does this differ by type of open space?
- Are open space and private land complements or substitutes?

Contributions

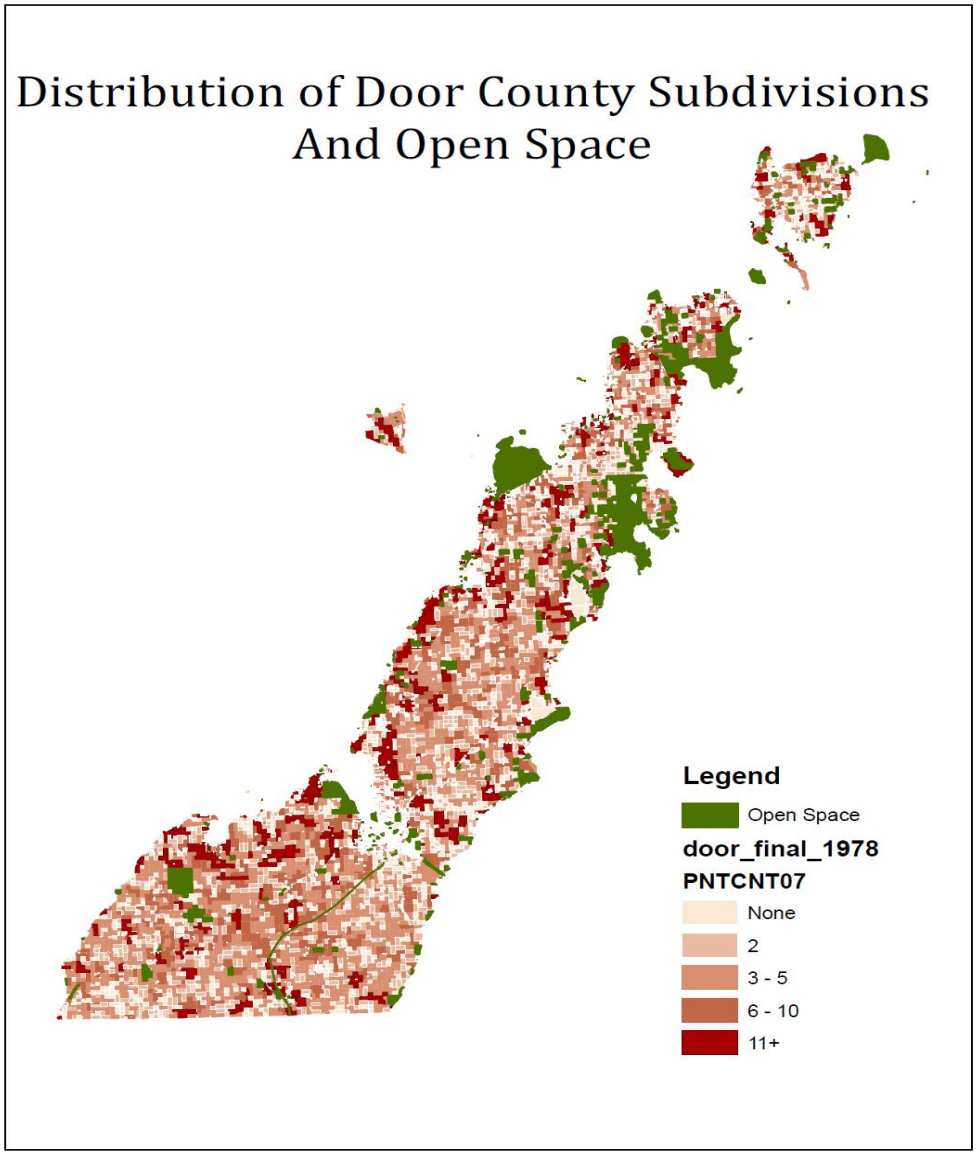
- Propose an identification strategy to identify effects of open space on the probability of development
- Differentiate the effects by land use
- Introduce a unique dataset capturing 30 years of parcelization and dynamic open space characteristics

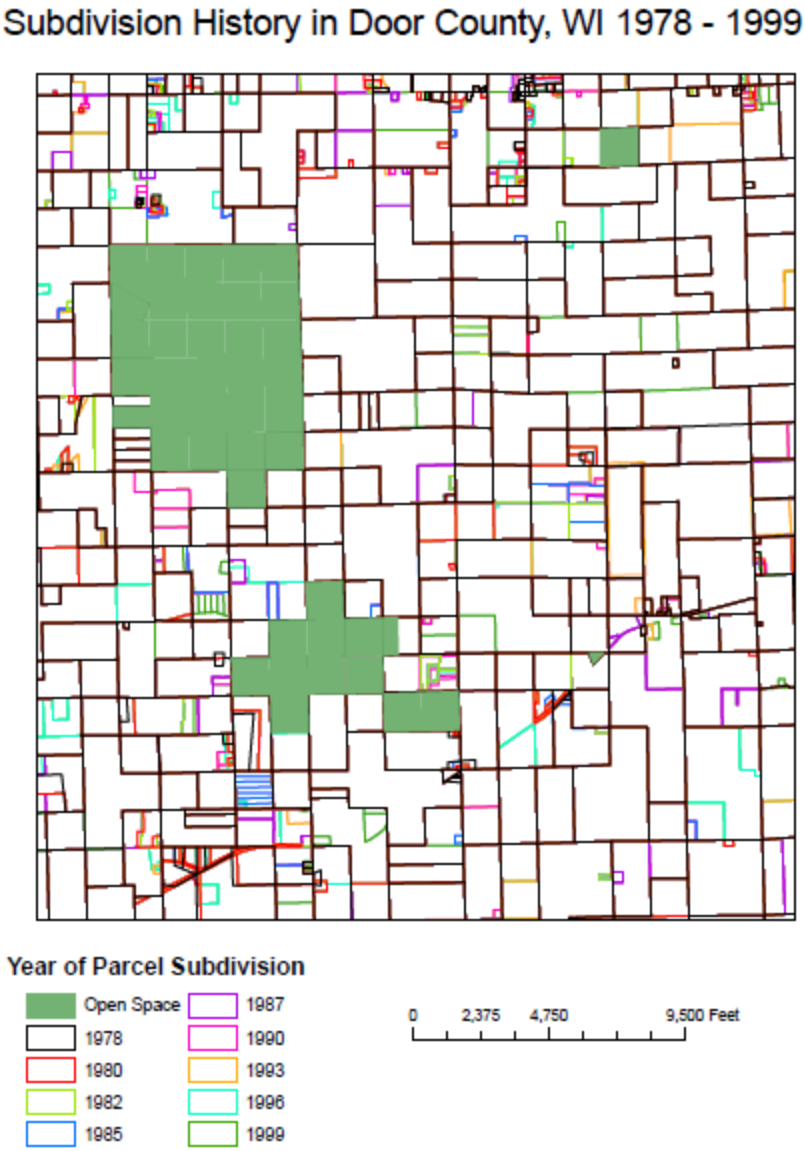
Data

- 1978-2009 in 3 year intervals Door County, WI

Table 1: Variables used in estimation

Variable	Description	Mean	Std. Dev.	Min	Max
Time-varying Characteristics					
area_ft2	Area of parcel (ft^2)	692,328.90	1,450,972.00	9,994.00	38,100,000.00
open_dist	Distance to open space (ft)	4,551.70	4,055.86	0.00	26,830.89
open_dummy1	$\begin{cases} = 1 & \text{if parcel within 100 ft of open space} \\ = 0 & \text{otherwise} \end{cases}$	0.03	0.16	0.00	1.00
minlot	Minimum lot size (zoning) (ft^2)	90,444.33	192,964.50	4,500.00	1,524,600.00
Time-invariant Characteristics					
near_dist	min(distance to bay (ft), distance to lake (ft))	6,354.51	9,016.57	1.18	68,923.19
bay_dummy	$\begin{cases} = 1 & \text{if parcel is closer to the bay} \\ = 0 & \text{if parcel is closer to the lake} \end{cases}$	0.57	0.49	0.00	1.00
gb_dist	Distance to City of Green Bay (ft)	74.86	24.25	20.00	130.00
pflood_3	Percent of parcel with frequent flooding	0.10	0.22	0.00	1.00
pslope_3	Percent of parcel with a slope of 15-25	0.02	0.10	0.00	1.00
Soil	Percent of parcel rated limited for ...				
pbsmnt_3	Dwellings with basements	0.67	0.37	0.00	1.00
nobsm_3	Dwellings without basements	0.50	0.39	0.00	1.00
psepti_3	Septic tanks	0.94	0.19	0.00	1.00
ppaths_3	Paths and trails	0.24	0.34	0.00	1.00


Distribution of Door County Subdivisions
And Open Space
Legend
Open Space
door_final_1978
PNTCNT07
None
2
3 - 5
6 - 10
11+


Subdivision History in Door County, WI 1978 - 1999
Year of Parcel Subdivision
Open Space
1978
1980
1982
1985
1987
1990
1993
1996
1999
0
2,375
4,750
9,500 Feet

Methodology

- Use the panel structure of the data to control for time-invariant omitted variables (like scenery) and spatial autocorrelation
- Specify random utility model
- Estimate a reduced-form equation
  - Linear probability model
  - Linear probability model with fixed effects
  - Logit model
  - Logit model with fixed effects

Results

	Logit		FE Logit		Linear Probability		FE Linear Probability	
	Coefficient (std error)	P>|z|	Coefficient (std error)	P>|z|	Coefficient (std error)	P>|z|	Coefficient (std error)	P>|z|
area_100000	0.0271 (-0.000609)	0	0.131 (0.0158)	0	0.00389 (0.0000683)	0	0.01417 (0.00286)	0
open_100000	-1.486 (0.278)	0	-38.765 (2.348)	0	-0.169 (0.0253)	0	-2.107479 (0.125)	0
open_dummy1	-0.442 (0.0768)	0	-0.0948 (0.266)	0.721	-0.0487 (0.00599)	0	0.00717 (0.0179522)	0.69
minlot	-4.51E-08 (5.60E-08)	0.421	6.61E-07 (1.53E-07)	0	-2.46E-08 (6.22E-09)	0	7.79E-08 (1.95E-08)	0
near_dist	2.17E-06 (1.44E-06)	0.132			5.16E-08 (1.40E-07)	0.713		
bay_dummy	0.0271 (0.0250)	0.279			0.00258 (0.00218)	0.237		
gb_dist	-0.00692 (0.000548)	0			-0.000573 (0.0000464)	0		
pbsmnt_3	-0.242 (0.0344)	0			-0.0223 (0.00290)	0		
pslope_3	-0.399 (0.135)	0.003			-0.0240 (0.00983)	0.014		
pflood_3	0.416 (0.0511)	0			0.0336 (0.00469)	0		
_cons	-1.820 (0.0594)	0			0.131 (0.00524)	0		

Conclusions and Further Research

- Controlling for the endogeneity of open space affects regression results
- The effect of open space varies by land use
- Simulation?
  - Need to be able to estimate the probability of subdividing (try correlated random effects)