



Are Farmland Preservation Programs Easement Restrictions Capitalized into Farmland Prices?

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Land Values: A Bundle of Rights

1. Agricultural Value:

- Function of the present value of the stream of net farming returns (Ag Value)

2. Development Value:

- Function of the option to convert the parcel to non-farm uses (Speculative value or value of development rights)

Farmland Preservation Easement

- ⇒ Landowner are paid some function of the value of development rights but retains ownership of land
- ⇒ Programs place an easement on the parcel that permanently restricts commercial, industrial and residential uses for current and future owners
- ⇒ Courts have consistently upheld Conservation Easement provisions

Maryland Agricultural Land Preservation Foundation (MALPF)

- ⇒ 250,000 acres preserved by 2004
- ⇒ MALPF (PDR)
 - Purchase development rights through auction and retire
 - Minimum eligibility criteria were recently changed to include 50 contiguous acres or contiguity to another preserved farm, at least 50% prime soils.
- ⇒ TDR
 - Sell development rights to developers to use elsewhere
- ⇒ PDR
 - County-level programs similar to MALPF with different payment schemes

Standard Model for Per Acre Sales Price for Unrestricted Parcel

$$P_i = E_t \left[\int_{t=0}^{t^*} A_i(X_i, s) e^{-r(s-t)} ds + \int_{t^*}^{\infty} R_i(X_i, s) e^{-r(s-t)} ds \right]$$

$$P_i = E_t \left[\int_{t=0}^{\infty} A_i(X_i, s) e^{-r(s-t)} ds \right]$$

Participate if unrestricted land value is less than restricted land value + easement payment:

$$E \left[\int_0^{t^*} A_i(X_i, s) e^{-r(s)} ds + \int_{t^*}^{\infty} R_i(X_i, s) e^{-r(s)} ds \right] < E \left[\int_0^{\infty} A_i(X_i, s) e^{-r(s)} ds \right] + EV_i$$

Endogenous Enrollment Decision

⇒ Potential bias on enrollment effect

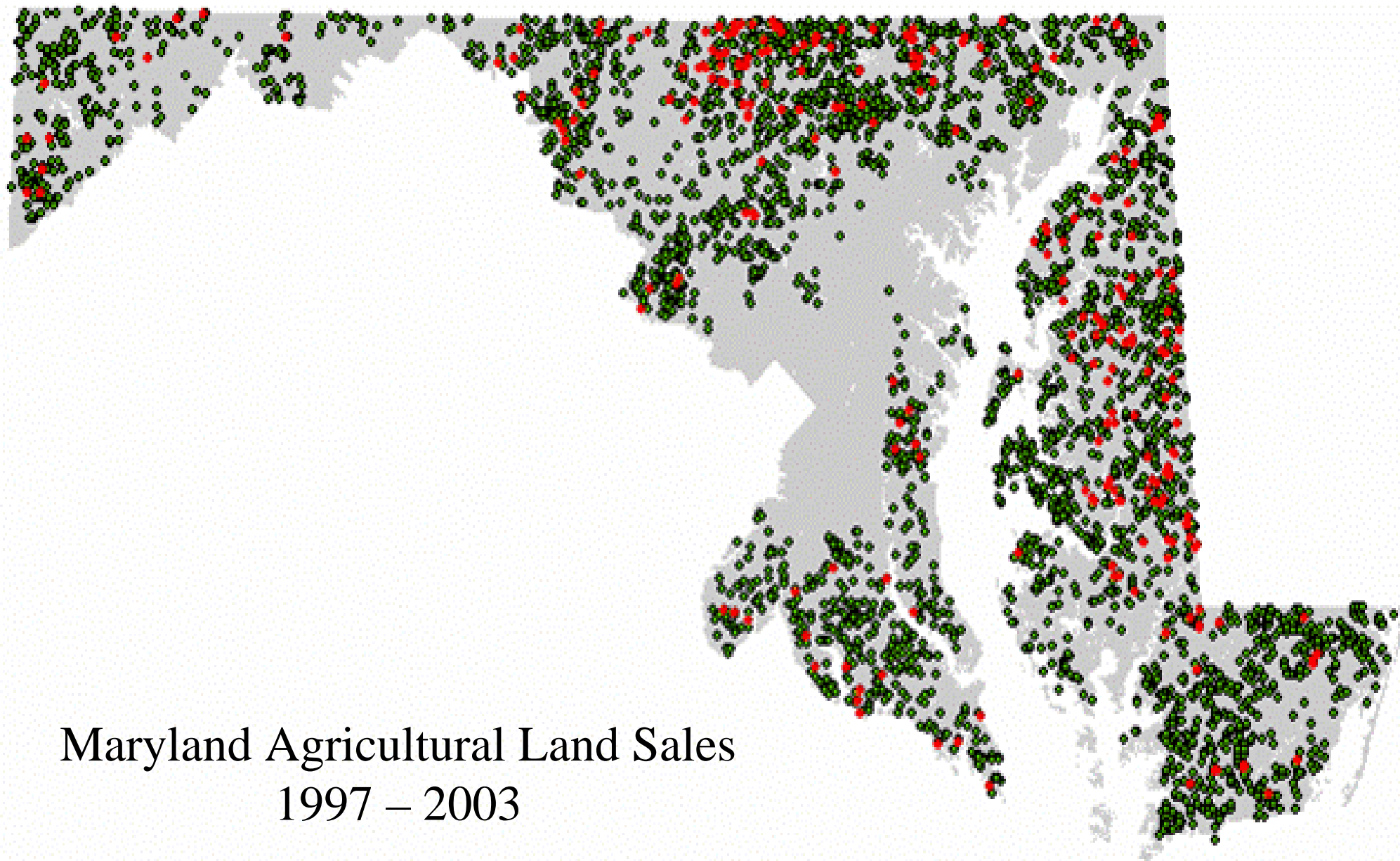
- Farmers should preserve lower-valued properties (*ceteris paribus*)
 - Lower R means higher likelihood that (A+ Price for Dvt rights) is greater
- Expect negative bias in hedonic regression

⇒ Previous Research:

- Nickerson & Lynch (2001, *AJAE*) - used Heckman model for sample selection of enrollment decision-Found little evidence that easement restrictions affect sales price
- Anderson and Weinhold (2005) – insignificant effect unless...
- Michaels (2007)- no impact on value
- Lynch, Gray and Geoghegan (2007, *RAE*) – used propensity score matching
- Significant effect of easement restriction except when controlled for proximity to nearest preserved parcel (limited # of usable controls)

Data

- ➔ County and State Preservation Offices: Parcels preserved, Easement Price, Year Preserved
- ➔ Tax Assessment Database: Sales price and dates (1997 - 2003), Geographic coordinates, Acres, Appraised Value of Structures
- ➔ Maryland Office of Planning GIS layers: Soil quality, Land use, Distances to city and other preserved parcels.



Maryland Agricultural Land Sales 1997 – 2003

Farm Sales

- Farm Sales With Easement
- Farm Sales Without Easement

(note: Waterfront and Montgomery County observations excluded from analysis)

	Full Sample	Yes	No	Unimproved Land	
Variable Names	Mean N=3,157	Mean N=256	Mean N=2,901	Mean N=1534	
price	\$5,477 (8,727)	\$3,286	\$5,671	\$4,941	Price (\$/ acre, adjusted)
agease	0.081 (0.273)			0.069	Preserved parcel (0/1)
prime soil	0.426 (0.423)	0.581	0.413	0.393	Fraction of parcel with prime quality soil type
ease1k	0.051 (0.109)	0.143	0.043	0.045	Fraction preserved within 1KM
ease5k	0.067 (0.079)	0.121	0.062	0.057	Fraction preserved within 5KM

Methodological Outline

⇒ Hedonic pricing models (OLS)- dummy for preservation status – don't correct for selection

- Three models

- No indicator of preservation in area
- With % preserved land in 1 km radius
- With % preserved land in 5 km radius

- ◆ Other control variables constant through specifications:
improved; log acres; %prime soils; % cropland; regional dummy

⇒ Propensity score matching

- Probit of probability of easement

- Same 3 indicators of preservation in area
- Similar covariates as OLS

<i>Hedonic Results: Full Sample</i>				
Model	2a NO	2b 1K	2c 5K	
Depvar	Logged Price (\$2003)			
Agease	-0.162 (-3.16)	-0.135 (-2.59)	-0.126 (-2.43)	
Ease1k		-0.30 (-2.26)		
Ease5k			-0.833 (-4.06)	
R-sq	0.425	0.426	0.428	

Per acre land prices for preserved parcels estimated to be 12-16% (\$686-\$914) lower and consistently significant.

Average easement py=\$1,720

Neighborhood Effect?

As the preserved land within 1 km (5km) increases 1 percentage point – price falls 0.3%-\$17 (0.8%-\$48)

Including the preserved land within 1 km (5 km) also reduces own-preservation effect from 16% (no preservation in area variable to 13.5% (\$771) and (12.6% (\$720))

<i>Hedonic Results: No Structure Sample</i>				
Model	2a	2b	2c	
Depvar	Logged Price (\$2003)			
Agease	-0.242 (-2.97)	-0.190 (-2.29)	-0.174 (-2.13)	
Ease1k		-0.651 (-3.16)		
Ease5k			-1.776 (-5.10)	
R-sq	0.448	0.451	0.458	

Per acre land prices for preserved parcels estimated to be 17-24% (\$889-\$1255) lower and consistently significant.

Neighborhood Effect?

As the preserved land within 1 km (5km) increases 1 percentage point – price falls 0.65% -\$34 (1.8%-\$94)

Including the preserved land within 1 km (5 km) also reduces own-preservation effect from 24% to 19%- \$993 (17% -\$889)

The Propensity Score Approach

- ⇒ Estimate propensity score $P(X)$ using probit
- ⇒ $P(X) = \text{Probability}(\text{treatment group} \mid X)$
- ⇒ X can include linear, interaction, higher-order terms
- ⇒ Balancing: means of X 's are statistically similar for treatment and control observations with similar $P(X)$ values.
- ⇒ $P(X)$'s used to construct counterfactual, through different matching methods – here, kernel method.
- ⇒ Compare outcome of interest between treatment and control.

The Comparison

- ⇒ “Average effect of treatment on the treated”:
(ATT)
- ⇒ Calculated as the *difference* between the sales price of each preserved property (the treatment group) and the average sales prices for a comparison (control) group of non-preserved properties with similar estimated probability of participation in easement program.

Average Effect of Treatment on the Treated (ATT) Models

Full-Sample (3157 observations, kernel matching)

	Treated/Controls	Difference (price)	t-stat
BASE	256 / 2817	-0.175	-4.4
EASE1k	256 / 2862	-0.144	-3.3
EASE5k	256 / 2859	-0.158	-3.5

Base model finds preserved parcels sell for **17.5% less**: \$915

With EASE1k and EASE5k, parcels with easements sell for **14.4% to 15.8% less**: \$659 to \$826

Average Effect of Treatment on the Treated (ATT) Models Parcels without Structures (1428 observations, kernel matching)

	Treated/Controls	Difference (price)	t-stat
BASE	98 / 1226	-0.236	-3.3
EASE1k	98 / 1222	-0.188	-2.6
EASE5k	98 / 1235	-0.207	-2.9

Base model finds vacant preserved parcels sell for **23.6% less**:
\$1234

With EASE1k and EASE5k, vacant parcels with easements sell for
18.8% to 20.7% less: \$983 to \$1082.

Conclusions

- ⇒ Preserved parcels with easement seem to sell for 15% - 25% less than those without restrictions.
- ⇒ Overall, evidence of price impact with OLS and with propensity score
 - Affected by degree of preservation in areas
- ⇒ But why so little - appraised values have development value at 50% - 90% of the land value not 20%?
- ⇒ Average payment = \$1,720 per acre
- ⇒ Discount smaller for parcels with structures. Can this be for amenity or hobby farm reasons?

Policy implications

- ⇒ Pay less? Should programs be paying more than the lost “value” to the farmers?
- ⇒ Not helping to keep ag land affordable
- ⇒ Ending up with privately-owned inaccessible open space – high cost to taxpayers (welfare improving?)
- ⇒ General equilibrium impact or selection issues: indirect effect of higher % of preserved parcels – smaller loss in value

Future work

- ⇒ Add in population growth since 1978 within block group (programs began late 1970's)
- ⇒ Add in generalized zoning – permitted density between areas
- ⇒ Distance to major cities – not just nearest city