Buying patterns suggest homebuyers prefer their open space to be close to home.

Big Yards or Green Space?

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In many communities, particularly those on the urban-rural fringe, most housing is located in subdivisions. Increasingly, those developments are subject to "clustering" rules in which houses must be located on a portion of the total land and the remainder is left as open space. In some communities, the zoning law mandates clustering; in others, clustering is recommended but not required.

This open space may be undisturbed forest or pastureland, or it may include recreation facilities and trails. In some communities, the open space may remain in agricultural use as grazing or cropland.

Proponents of clustering requirements argue that undeveloped areas convey value, not only to the residents of the subdivisions themselves, but also to the broader community by preserving more of the aesthetic and rural character of the community and improving environmental quality through habitat protection or water pollution reduction in the region. In communities on the urban-rural fringe, clustering residential developments may be one option in the local government's "toolkit" for maintaining an agricultural base and curbing sprawl.

Open space may provide benefits to subdivision residents, but clustering means that those residents are living in a higher-density setting compared to conventional subdivisions, with neighboring houses in closer proximity to one another. Although the external benefits from the preserved forest, recreation area, or other kind of open space may be positive, it is unclear whether those benefits offset the loss experienced by smaller lots and higher density.

That trade off is the focus of our study. We use data on subdivision house sales occurring over the period 1981–2001 in a county on the fringe of the Washington, D.C., metropolitan

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area: Calvert County, Md. We examine how households value adjacency to open space and more open space in the subdivision, as well as how readily they will trade off those amenities with their own private lot space.

We find that private acreage positively affects prices, but so does subdivision open space. Most interesting, we find that subdivision open space does substitute for private lot size, but the magnitude of the effect is small. Finally, having a lot that is adjacent to subdivision open space appears to enhance the value of a house, particularly if the open space is not too steeply sloped. However, we find no evidence of willingness to trade off one's own lot size for adjacency to the open space. We use the results of the estimated hedonic model to simulate the effects on prices of jointly increasing open space and reducing average lot size, holding the size of the subdivision constant. We find average house prices are lower with the clustering, particularly for lots not adjacent to open space.

Private acreage and subdivision open space positively affect house price. Open space does substitute for private lot size, but the magnitude of the effect is small.

DATA

Calvert County is located in southern Maryland, on the western shore of the Chesapeake Bay. It has 101 miles of shoreline, along the Chesapeake Bay and the Patuxent River to the east. The county has historically had an agricultural economy consisting of small villages and rural lands, but the past 20 years have seen considerable population growth and the county has increasingly become part of the broad Baltimore-Washington metropolitan area.

Most of the housing growth in recent years has been in low density suburban subdivisions in the residential and rural areas of the county. Figure 1 shows average lot sizes within the county during different time periods. Although the average gross lot size, calculated as total subdivision acreage divided by the number of houses, has remained relatively high and constant over time, the average lot size net of open space has declined. This provides some indication of the extent to which clustering has been increasing in the county in recent years. Gross lot size increased in the late 1990s following a major downzoning, but actual house lots continued to fall in size slightly, reflecting more open space in subdivisions.

In this study, we limit the sample to subdivisions that had at least 10 house sales over the study period of 1981–2001. This allows us to include 3,386 individual house sales within 89 subdivisions. The mean lot size is 1.5 acres and subdivisions are, on average, 134 acres, with a little over 20 percent of their land under easement as protected open space. The degree of clustering varies considerably over the sample; 16

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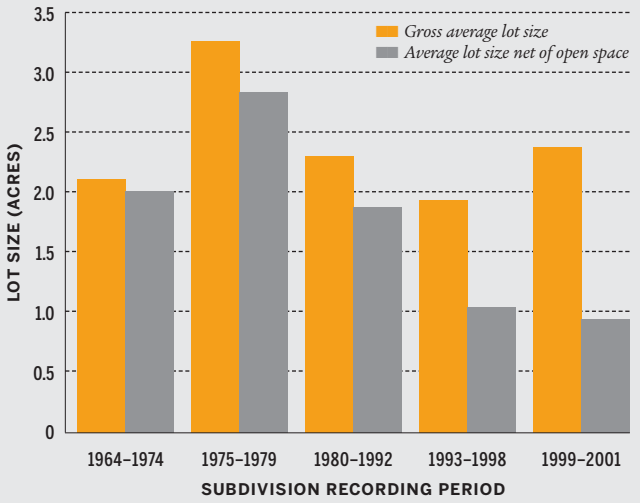
Figure 1

Average Lot Size in Subdivisions

Calvert County, Md.



of the 89 subdivisions have minimal open space (less than 1 acre) and 20 subdivisions have over 40 percent of their acreage in open space.

ECONOMETRIC MODEL AND RESULTS

We estimate an econometric model that explains the variation in housing prices in terms of lot size, structural characteristics associated with the house (e.g., age, number of bathrooms, square footage), subdivision characteristics other than open space amenities, accessibility measures, and open space attributes.

Because evidence from the literature suggests that the value of open space amenities to residents may vary by proximity or the type of open space (e.g., number of trees, usability, steepness), in our model we include three subdivision open space variables: open space acreage, a dummy for whether a house is adjacent to subdivision open space, and the percentage of subdivision open space that is in steep slopes. We also include interaction variables, which we discuss below, as well as surrounding land-use variables, including adjacency to preserved agricultural land.

RESULTS: LOT SIZE Households have a consistent preference for larger lots, ceteris paribus. We calculate the marginal willingness to pay for additional private acreage and subdivision open space at the bottom of Table 1. We find that a 10 percent increase in private lot size is associated with an approximately 0.6 percent increase in house price, ceteris paribus. This suggests that for an average-priced house in 2004 (about $300,000), an increase in lot size from 1 to 1.5 acres would increase the house's price by about $9,000. The magnitude of this estimate is robust across various specifications of the model, including one with subdivision fixed effects.

The amount of open space in the subdivision, given subdivision size, is also statistically significant and its effect on house prices is positive, but small. A 10 percent increase in subdivision open space is associated with a 0.1 percent higher average house price. The result was also robust to alternative specifications of the model. That suggests that increasing open space acreage from 20 to 30 acres would increase sales price by 0.5 percent, or $1,500 per house (evaluated at an average of $300,000), ceteris paribus.

The significant, negative interaction term between the amount of open space and own lot size suggests that residents will trade off their own lot size for the amount of open space in the subdivision. That is, the positive effect of open space on the price households will pay for housing (second variable in Table 1) is smaller the larger is one's own lot size. Likewise, the positive effect of one's own lot size on price will be smaller the larger the amount of open space in the subdivision. Adjacency to subdivision open space also has a positive effect on house prices, but the magnitude of the effect depends on how much of the open space is in steep slopes. The greater the percentage of open space that is steep, the smaller the impact that adjacency has on house prices.

Perhaps our most surprising finding is that households are unwilling to trade off their own lot size to be adjacent to open space. One explanation for this may be that proximity to open space is less valuable than having a view of forested or undeveloped areas.

RESULTS: OTHER VARIABLES Most of the other explanatory variables in the model are significant and of the expected sign. All of the variables describing house characteristics and variables measuring proximity to commuting routes are significant at the 99 percent or 95 percent level. The northern edge of the county marks the closest point in the county to the urban centers of Washington, D.C., and Baltimore; moving the average house one mile farther south reduces house price by a little more than 1 percent. Locating farther from the major highway in the county, state Route 2/4, also significantly reduces sales price. Larger and newer subdivisions tend to have slightly higher priced houses.

Some of the other amenities and surrounding land uses are important in explaining house prices while others are not. Being on the water is highly valuable: sales prices of waterfront houses (on the Patuxent River or Chesapeake Bay) are found to be 30 percent higher than prices of similar houses away from the water. However, being adjacent to parkland, privately owned preserved farmland, or the open space area of another subdivision, does not significantly affect housing prices.

CLUSTERING We can illustrate the overall effects of changes in subdivision configuration by a simple simulation. We start with a representative subdivision in our sample: 134 acres in size, with about 30 acres of open space and an average lot size of 1.5 acres. Holding total subdivision size and the number of lots constant, doubling the amount of open space to about 60 acres would require average lot size to fall to 1.1 acres. Based on the results in Table 1, we find that such an increase in clustering (from about 22 percent to 44 percent) would decrease the average house price by 1.2 percent (for a house not adjacent to open space). The loss in value from the smaller lot size dominates any increased

Table 1

What Homeowners Value

The effects of house, lot, and subdivision characteristics on sales price

Variable	Coefficient (t-stat)
Own lot size (acres, logged)	0.078*** (10.423)
Variables related to subdivision open space:	
Subdivision open space (acres, logged)	0.010** (2.279)
Percent of open space acres in steep slopes	-0.024 (-1.140)
Subdivision open space × pct. steep	-0.003 (-0.410)
Subdivision open space × own lot size	-0.007*** (-2.715)
Adjacent to own subdivision open space (dummy)	0.029** (2.181)
Adjacent to own open space × pct. steep	-0.059** (-2.327)
Adjacent to own open space × lot size	0.016 (1.512)
Other adjacency variables:	
Adjacent to another subdivision's open space area	0.010 (0.582)
Adjacent to water	0.300*** (12.805)
Adjacent to undeveloped, unpreserved land	-0.006 (0.741)
Adjacent to preserved farmland or parkland	-0.012 (0.532)
House characteristics:	
House size (square ft., logged))	0.280*** (23.042)
Age of house	-0.002*** (-5.896)
Dwelling grade	-0.090*** (-6.845)
Number of full baths	0.073*** (10.159)
Number of half baths	0.039*** (5.437)
Fireplace (dummy)	0.037*** (5.922)
Townhouse (dummy)	-0.113** (-2.435)
Accessibility variables:	
Distance to northern border (meters, logged)	-0.129*** (-4.361)
Distance to Route 2/4 (meters, logged)	-0.026** (-2.533)
Accessibility to town centers	0.000 (0.245)
Other subdivision variables:	
Subdivision size (acres, logged)	0.026*** (2.751)
Year subdivision was recorded	0.002*** (75.502)
Subdivision in farm community district	0.011 (0.473)
Subdivision in residential zone	-0.025 (1.241)
Subdivision in town center	0.037 (0.168)
Constant	4.792 (14.909)
spatial autocorrelation parameter, ρ	0.358 (41.269)
R^2	0.7795
Elasticity of sales price with respect to:	**Marginal effect evaluation at variable means (t-stat)**
Own lot size*	0.055*** (7.15)
Subdivision open space acreage	0.006* (1.75)
Adjacency to own subdivision open space	0.014* (1.68)

** Marginal effect for interior lot; for lot adjacent to open space, marginal effect is 0.070.*
NOTES: *Dependent variable is the natural log of house sale price. Coefficients on sale year and census block group dummy variables are available upon request. ***signifies significance at 99% level, **at 95%, *at 90%.*

value from more subdivision open space. The additional clustering may also increase the probability of a house being adjacent to the open space area, however, and that adds some value. For houses on lots that become adjacent to subdivision open space as a result of the increased clustering, we find the change in sale price is minimal, decreasing by only 0.3 percent.

CONCLUSIONS

Our results suggest why we may not see many clustered subdivisions on the urban-rural fringe without government regulations requiring such clustering. Households appear to value strongly their own private lots. While we do find in our analysis that households value having more open space in their subdivisions, and they value having a lot that is adjacent to subdivision open space, they do not value those amenities nearly as much as a larger lot. Thus, reducing private acreage to provide more public subdivision open space tends to lead to overall reductions in house prices, all else equal.

One of the most important questions we wanted to address in this study is whether households would be willing to trade off the size of their own lot for open space in the subdivision. Clustering subdivision development is being viewed as a way to reduce the development footprint and preserve open space in fringe communities. Our findings suggest that there is some small willingness to trade off lot size for more subdivision open space. One caveat to our findings is that they may be specific to the community that we examined — one on the urban-rural fringe with very large average lot sizes and a great deal of surrounding open space and farmland. It is possible that households in those areas value their large lots and also have adequate substitutes for subdivision open space.

Our analysis only attempts to measure the effects of subdivision open space on property values within the subdivision. The external benefits of subdivision open space, such as aesthetic values and ecological and environmental benefits, may accrue to the larger community. Those benefits will not be capitalized into subdivision property values. To the extent that they are important, they suggest additional reasons why the private market may under-provide open space and government intervention may be necessary. R

Readings

- "'Open Space' Zoning: What It Is and Why It Works," by R. Arendt. *Planning Commissioners Journal*, Vol. 5 (July/August 1992).
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