

# EXPLAINING SPRAWL

## How Much Does

Virginia McConnell, Margaret Walls, and Elizabeth Kopits

**D**o zoning requirements in the outer suburbs encourage the spread of houses on large lots, or are real estate developers simply responding to consumer demands for more room? The answer, not surprisingly, is ambiguous.

Many communities on the urban fringe are implementing a range of policies to preserve farmland and open space, cluster residential development, and promote development in areas with sufficient infrastructure, including roads, utilities, and schools. These efforts are an attempt to control overall growth and to counter a trend toward large-lot development so that the growth that does take place consumes less land.

It is important to first ask why such trends are occurring. Some experts contend that large-lot development specifically, and sprawl more generally, are simply the natural result of household preferences and market forces. Others argue that local government zoning rules in the form of minimum lot sizes are the main reason for current patterns of low-density development.

Drawing on a unique data set, we set out to address two important questions: Do zoning regulations or market forces create low-density, land-intensive development? And if zoning limits cause low-density development in at least some cases, how would development patterns be different if there had been no such rules?

We addressed these issues by analyzing economic factors that explain subdivision density in rapidly growing Calvert County, Maryland, which sits on the fringe of the Washington, DC, metropolitan area. Calvert's long-running transferable development rights (TDRs) program, which allows developers

to increase density above the base zoning limits in some areas by purchasing TDRs, was also considered in the analysis.

### How Many Houses on How Many Acres?

Developers in many high-growth suburban areas, such as Calvert County, will build a subdivision on almost any greenfield (undeveloped) land available to them. For each parcel, a developer decides how many building lots to create to maximize profits at that site, given regulatory constraints. This decision depends on variables that affect the revenues and costs of development, zoning regulations about allowable density, and, in the case of Calvert County, whether and how many TDRs can be purchased.

Revenues from development depend on the number of lots built in the subdivision, the total acreage of the subdivision, the natural amenities of the land itself (such as topography and views), land uses of the properties immediately surrounding the site, and the site's location and accessibility to employment and commercial centers. Surrounding land uses can have a strong effect on the value of development; for example, the price of a house may go up if the parcel is adjacent to parkland, or down if it is next to an industrial facility.

The costs of development will be affected by the number of lots; the total acreage of the subdivision; the shape of the parcel of land; and the costs of providing infrastructure at the site, which depend on soil characteristics and topography. Finally, zoning regulations, which establish a minimum average lot size, serve as a constraint on the overall density that a developer can achieve.

# Zoning Matter?

TDRs provide a tool for allowing zoning flexibility in designated regions. If a community wants to encourage protection of undeveloped land in some areas, landowners in these TDR “sending” areas are permitted to sell their development rights, thereby preserving their land in perpetuity. Developers in TDR “receiving” areas can buy these rights in order to build more lots than allowed under the baseline zoning restrictions. (See the box on page 18 for a more detailed description of TDRs.)

## Calvert County’s “Tract” Record

In 1967, Calvert County adopted its first comprehensive plan, in which all rural land was zoned to a maximum density of one dwelling unit per three acres. In 1975, the county updated the plan to reflect a “slow-growth” goal and changed the maximum density to one dwelling unit per five acres. Despite the five-acre minimum lot requirement, population growth and conversion of land from agricultural uses to housing developments continued at a brisk pace throughout the county. In 1978, the county adopted a TDR program in an attempt to protect many of its prime farmland areas from development. The first TDR was sold in 1981.

The program designated the receiving areas broadly; they included town centers, residential areas, and some rural areas. Rural lands considered prime farmland were designated as TDR sending areas only. All other rural regions could either receive or send TDRs. Figure 1 shows the location of lands in these different zoning classifications.

In 1999, as a result of rapid growth in the county and con-



Figure 1.  
Zoning Map of Calvert County, Maryland



## UNDERSTANDING TDRs

In the United States, and in most countries with market-based economies, to own land means to also own a bundle of rights and responsibilities that comes with that land. Although there is often debate over exactly what rights are included, property owners generally have the right to develop their properties in accordance with local zoning laws and other regulations. In residential areas, zoning usually sets a maximum number of dwelling units per acre of land.

A system of transferable development rights, or TDRs, allows ownership of the development rights to be

separated from ownership of the land. Those rights can then be bought and sold. All TDR programs in existence today operate in concert with zoning rules. If an owner of a parcel of land sells her development rights, she preserves her land from development, usually (though not always) in perpetuity. As a result, she relinquishes the right to develop the property (known as a “sending” parcel) in the way allowed by zoning.

The purchaser of the development rights may then develop a different parcel of land more intensively than is allowed by the baseline zoning that

covers that parcel. For example, the “receiving” parcel may be in an area where the baseline zoning rules allow one dwelling unit per acre, but with TDRs, four dwelling units per acre are permitted. Greater density in the receiving area results, while land is preserved in the TDR sending area.

For a good overview and program examples, see *Beyond Takings and Givings: Saving Natural Areas, Farmland, and Historic Landmarks with Transfer of Development Rights and Density Transfer Charges*, by Rick Pruetz, 2003 (Burbank, California: Arje Press).

gestion on the county’s main commuting road, all regions were “downzoned” to reduce overall development. Density permitted with TDRs, however, remained the same as before the downzoning. As a result, the pre-1999 maximum density levels in all areas still could be attained, but only with more TDR purchases.

Since the TDR program began, TDR sales have preserved more than 13,000 acres of farmland in Calvert County. Developers used TDRs in slightly less than 30 percent of the new subdivisions built between 1980 and 2001; in total, 2,130 additional housing units were created with TDRs.

### What Our Model Shows

The TDR program in Calvert, along with the zoning changes that have been implemented there over time, have led to variability in housing density in the county. This variability allows us to statistically analyze the factors that explain density. In addition, Calvert is typical of many fast-growing communities on the fringes of large metropolitan areas where most residential development consists of single-family dwellings on relatively large lots. If we can begin to understand why Calvert has developed the way it has and the relative importance of zoning versus market forces, this could provide important lessons for similar communities.

We constructed an econometric model to explain the number of building lots in a subdivision as a function of several

variables that affect revenues and costs of development. These variables included the total acreage of the subdivision, the quality of the soils, the steepness of the terrain, the location in the county, the distance to bodies of water and to the main commuting highway in the county, sewer availability, and the uses of land surrounding the subdivision. To examine the impact that zoning density limits have on the number of lots, we included the number of lots allowed in each subdivision as an explanatory variable.

We statistically tested for the possibility that zoning alone explains the number of lots built and strongly reject that this is the case. In fact, only about 8 percent of all subdivisions built between 1967 and 2001 have the maximum number of lots permitted by the zoning rules. Nonetheless, zoning is important: the number of lots allowed is a highly significant variable in explaining the number of lots that are actually built. But most of the economic variables are significant as well. The size of the subdivision land area is important, as is the steepness of the terrain. Adjacency of the subdivision to parkland or permanently preserved farmland is associated with lower densities. Availability of sewers, accessibility to the major highway in the region, and proximity to town centers all tend to increase density.

After estimating the model, we used it to predict what development would have looked like in the absence of zoning. Specifically, for those subdivisions developed to the density limit, we determined what the number of lots in each subdivi-

vision would have been, absent any zoning regulations. We found that, indeed, the development would have been denser—approximately 46 percent more lots would have been built in these constrained subdivisions—but even by suburban standards, this development would still be considered low density. Most of these subdivisions had average actual lot sizes of about five acres, whereas our predictions show that average lot sizes without zoning would have been about three to three-and-a-half acres.

In rural areas where developers were permitted to use TDRs, our predictions indicate that subdivision density is less constrained by the zoning limits. Both the predicted and actual average lot sizes in these subdivisions are approximately two acres per lot, suggesting that this new limit is just about what the market demands. Similarly, in the town centers and residential areas (facing minimum average lot sizes of one acre or less), our results show that there was not much excess demand for additional lots beyond what was allowed by zoning.

## What This All Means

Concern over urban sprawl is at least in part a concern over dispersed, low-density residential development patterns in suburban and ex-urban locations. In our work, we have looked at a developer's decision about housing density at the subdivision level and studied the relative influence of zoning rules versus market forces. Is zoning contributing to sprawl? And if so, how much denser would development be without it?

Our results show that in the urban fringe county we studied, density was most constrained in rural subdivisions facing very low-density zoning limits (requiring minimum average lot size of 5 acres). Although these subdivisions would have been almost 50 percent denser without the zoning regulations, they would still be considered relatively low-density development. And in the residential and town center areas, the zoning limits do not appear to be binding.

A number of factors affecting both the value and the cost of additional lots were found to be important in determining density outcomes. Physical site characteristics, accessibility measures, sewer availability, and surrounding land uses have a significant influence on subdivision density.

We hasten to point out that although our data may be typical of many exurban, fast-growing rural jurisdictions around large metropolitan areas, the results could be somewhat different in the case of a more urban or an older suburban area. The underlying zoning will be denser in such areas, but the demand for additional density may be greater as well. Much of the new development would be infill in already-built neigh-

borhoods on land that has higher development value. Although there would be pressures to develop at high densities, there are also likely to be countervailing pressures in these areas.

Much anecdotal evidence exists about objections to higher density on the part of existing residents who perceive high costs and reductions in neighborhood quality of life from new development, particularly high-density development. Future research on development patterns and the factors affecting density in these areas would be of great use to local planners and other government policymakers.

The land use problems plaguing many high-growth areas of the United States—declining open space, farmlands, and ecological resources—are not likely to go away in the near future. As policymakers and planners struggle to find solutions, a clearer understanding of the underlying forces driving development is needed. Our findings suggest that while planners in outlying suburban areas need to carefully consider whether their zoning regulations are exacerbating these problems, it is likely that market forces do strongly influence large average lot sizes in these locations. ■

*This article is based heavily on “Zoning, Transferable Development Rights, and the Density of Development,” by the authors, which will be published later this year in the Journal of Urban Economics. It is also available at [www.rff.org/rff/Documents/RFF-DP-05-32-rev.pdf](http://www.rff.org/rff/Documents/RFF-DP-05-32-rev.pdf).*

## Further Reading

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