

Using Markets for Land Preservation: Results of a TDR Program

VIRGINIA McCONNELL*, ELIZABETH KOPITS** &
MARGARET WALLS†

*University of Maryland-Baltimore County and Resources for the Future, Washington DC, USA,

**US EPA-National Center for Environmental Economics,

†Resources for the Future, Washington DC, USA

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ABSTRACT *This paper reviews different approaches to using transferable development rights (TDRs) as a way to preserve rural lands in the face of development pressure. One TDR program is examined in detail, that of Calvert County, Maryland, which has had an active TDR market since the mid-1980s. This program uses TDRs as a key policy tool for achieving a total amount of preserved acreage in the county, and for providing incentives for preservation in some areas and development in others. The paper examines both the early difficulties in developing participation in the program, and the events that lead eventually to an active TDR market. It assesses the workings of the market including factors that influence the demand and supply of TDRs, the movement of prices over time, and the location of preserved areas and of additional developed areas. The study found that the program is achieving many of the county's land preservation goals because of the high level of activity in the TDR market. However, most of the additional density is being channeled into rural areas with underlying low-density zoning.*

Introduction

Planners and elected officials in many parts of the United States have focused their attention in recent years on the dispersion of low-density development known as 'suburban sprawl'. Historically rural areas located in relatively close proximity to major urban areas have seen a sharp increase in the conversion of land to residential and commercial uses. Between 1950 and 2000, urbanized land areas in the US increased at an average annual rate of nearly 5%, while population over the same period grew at only a 1.7% average annual rate (Heimlich & Anderson, 2001).

Many areas under intense development pressure have historically farm-based economies. According to some estimates, as much as 30% of prime farmland lies within metropolitan statistical areas and adjacent counties (Daniels, 1997). These communities are struggling to balance additional development with a desire to

Correspondence Address: Virginia McConnell, Economics Department, University of Maryland-Baltimore County, 1000 Hilltop Circle, Baltimore, Maryland 21250, USA. Email: mcconnel@umbc.edu

maintain a traditional rural economy. They are using a host of policies to limit or channel development to preserve the rural landscape, including zoning changes, creation of special agricultural districts, tax advantages, government purchase of development rights (PDRs) and transferable development rights. This paper focuses on the use of transferable development rights (TDRs) as a tool to regulate local land markets and allocate land between development and preservation.

The TDR concept is a market-based approach to land preservation. In principle, TDRs can be used to achieve a range of local land use goals, but they are most commonly used for farmland or open space preservation. The right to develop a property at specified density or lot size is commonly granted through local zoning rules. TDRs allow those development rights to be traded in private markets and transferred to other geographical locations. Some landowners elect to give up development rights on their properties by selling them to developers who are allowed to develop in other areas at densities greater than the existing zoning limits. Development can be transferred from one region to another, allowing land to be permanently preserved from development, and all without the expenditure of public money.

Communities strive to preserve rural land for a variety of reasons, ranging from an effort to sustain a pervasive working farm economy on one end to maintaining rural character and open space on the other (American Farmland Trust, 1997; Daniels & Bowers, 1997). Whatever the stated goals, in practice, few TDR programs have been successful in meeting those goals. In fact, many programs are 'on the books' but remain inactive, i.e. few development rights have been transferred. It has been argued that TDR programs "are among the most challenging preservation techniques to design and implement" (Bowers, 1995).

The way TDR markets are designed and implemented determines how effective they are in achieving the identified land use goals. TDR policies and approaches have been reviewed in the planning and economics literature extensively (Mills, 1980; Johnston & Madison, 1997; Pruetz, 1997, 2003; Thorsnes & Simon, 1999).¹ Most economists have tended to focus on how TDRs can improve economic efficiency in the land market, while planners have concentrated on program design and the political feasibility of establishing TDR programs. The paper examines one TDR program from both of these perspectives.

The paper takes a close look at the long-standing TDR program in Calvert County in Maryland, which was designed to help preserve the rural character of the county that was under intense development pressure. Calvert's TDR program aims to keep a specified amount of land in farming and forest use across the county, while at the same time giving landowners a great deal of flexibility in how that outcome would be achieved. There was no initial down-zoning to very low density lots when the program was implemented, and virtually any land in farming or managed forestry was eligible to sell development rights.² The goal was to direct the growth away from regions containing the best prime farmlands. The use of TDRs is allowed to increase density in many areas of the county, including some rural regions. In these rural areas, landowners can choose either to sell development rights and preserve their land, or to develop their land and use development rights to increase density.

The Calvert program provides an unusually rich source of data. The authors were able to piece together information on nearly 500 individual transactions over a

23-year period from county records. Using GIS software, all preserved farms and all subdivisions where TDRs have been used to increase density were identified and mapped. In addition, the data made it possible to track the number of farm acres that have the potential to enter the TDR market but have not yet done so. The complete dataset also made it possible to summarize TDR sales and prices over time and determine the number of acres preserved through the program since its inception.

The paper focuses on two particular aspects of the program: (1) the performance of the TDR market itself, and (2) the spatial patterns of land development and preservation that have resulted in the county. Because Calvert County has one of the few active TDR markets in existence, it is worth examining the performance of that market in detail, including the volume of sales each year, the level and dispersion of prices, the amount and location of preserved properties, and the role of the county government in facilitating the market. It is also interesting to study the spatial patterns of preservation and development that have occurred in this comparatively 'free market' program. Unlike in other farmland preservation programs, agricultural lands in Calvert are not zoned to an extremely low density and some can even use TDRs for more dense development. Thus owners of rural lands face a range of land use options.

The paper begins by outlining briefly the rationale behind the different approaches for using TDR markets. The next section identifies the important features of designing TDR markets and examines the Calvert County approach to these. The following section presents a number of findings from the program to date. The final section provides concluding remarks.

Land Preservation Goals and Design of TDR Markets

The economics and planning literatures provide many justifications for why government should intervene in land markets to improve social outcomes. Many argue that negative environmental effects associated with low-density dispersed development such as pollution and aesthetic considerations are not taken into account in private decisions about land use. In addition, open space areas, ecological habitats and farm and forest lands often confer public benefits to the larger community (Kline & Wichelns, 1996; Thorsnes & Simon, 1999; Heimlich & Anderson, 2001; Hellerstein *et al.*, 2002).

Many experts argue that to preserve an effective working farm economy, there must be a large land area that is almost exclusively in farming (Daniels, 1997). One regulatory approach to keeping desired areas in farming is to zone those areas to very low-density building—requiring at least 25 acres for each dwelling unit (Daniels, 1997). Montgomery County in Maryland used this approach in combination with a TDR program as a way to promote higher density in some areas, and to provide at least some private market compensation to farmers for giving up development rights. However, many communities are unwilling or unable to dramatically down-zone such large areas (Arendt, 1997). One alternative to a large-scale down-zoning is the TDR program developed in Calvert County. Farmers in areas targeted for preservation are allowed to sell development rights if they want to maintain the agricultural land use in perpetuity; their lands thus become so-called

'sending areas'. Developers can buy those development rights and build more densely in areas of the county targeted for development, so-called 'receiving areas'. The county did not down-zone, but instead used the TDR market to provide incentives to channel development away from prime agricultural areas.

There are both advantages and disadvantages to this type of TDR program. It offers flexibility to landowners, and is thus likely to be more politically acceptable than a program that involves large-scale down-zoning.³ This was an important factor in Calvert County, where down-zoning was not considered a viable option. However, this type of TDR program changes only the relative profitability of uses in different locations—it cannot prevent development in any particular area. There still may be some development that takes place in the agricultural areas.⁴

Another key aspect of TDR program design is the location of the TDR receiving areas, i.e. the locations where TDRs can be used to increase density. Many communities would like to channel TDR use to locations with existing infrastructure and development but this is often easier said than done. If baseline zoning in those locations is acceptable to developers, or if existing residents refuse to accept additional density, it may be difficult to generate demand for TDRs in such a program.⁵ TDRs essentially place a tax on new development, since building houses to a greater density requires the purchase of development rights, yet the tax is optional as developers can choose to stay at or below baseline zoning and not buy the rights to additional density.

The issue of demand is critical. In order for a TDR program to be active, there must be a consistent demand for TDRs. In fact, the lack of demand is perhaps the biggest problem in many existing TDR programs. Low demand means low prices, little market activity, and little land preservation. Pizor (1986) points out "the linchpin in TDR is whether the increased densities provided by the development rights are in demand" (p. 209).

The Calvert County program initially attempted to identify specific receiving areas, but it quickly became clear that higher density in each of those designated areas would be strongly opposed by local groups. The county then elected to define receiving areas broadly to include residential areas as well as large areas of the rural non-prime farmland region.

Just as in the case of the sending areas, there are both advantages and disadvantages to this approach. The advantages are that it allows developers opportunities to find those regions where there is the strongest market demand for additional density, thereby ensuring TDR demand and the associated land preservation. Density in these developed areas will be higher than it would otherwise be, and lot sizes will be smaller. The disadvantage is that while the program may preserve farmland and increase density, it does allow higher density development across broad areas, including those with low baseline zoning density. However, it should be noted that TDR programs that allow receiving areas only in densely zoned urban areas also do not prevent development in the rural areas. There are many cases where TDR programs are on the books, but are not being used; therefore, land is not being preserved, and development may be rapidly occurring in the rural areas at low densities.

What is likely in a program like Calvert's in which there are regions where parcels may become *either* a sending or receiving area for TDRs, is fragmented development

due to preserved parcels located next to a high-density TDR receiving parcels. It may be possible to mitigate such effects by using a TDR program in conjunction with a PDR program which can target certain key properties for preservation that lie adjacent to other already-preserved properties.

Another way that the Calvert program has attempted to limit overall development, while maintaining an active TDR market and the associated land preservation, is to periodically down-zone, or reduce the baseline density in all regions. This has created both more demand for TDRs in areas where they can be used, due to a higher demand for density, and more landowners willing to supply TDRs in sending areas because of the lower value of their land in development. These aspects of the Calvert County program are evaluated in detail below.

Overview of the Calvert County TDR Program

Background on Calvert County

Calvert County is located in southern Maryland on the western shore of the Chesapeake Bay. The county is a 215 square mile peninsula formed by the Bay and by the Patuxent River estuary. It is an historically rural area that because of its proximity to Washington DC (its northern border lies approximately 35 miles from the city) and Annapolis, Maryland has experienced a great deal of development pressure over the past 20 years. Although total county population is only about 85,000, Calvert was the fastest growing county in Maryland between 1990 and 2000, with a population increase of over 45%, well above the state average increase of 10.8%; however, average population density remains comparatively low: 347 people per square mile. As development has expanded, there has been roughly a 20% loss in farmland and a 15% loss in forestland since 1980.⁶

Calvert's farm sector has been based on small farms producing tobacco, soybeans and corn. Small-scale fruit and vegetable production and livestock are also important enterprises on some farms.⁷ Average annual returns on cropland have remained relatively stable at about \$40 per acre. Although Calvert can no longer be considered a primarily farm-based economy, small-scale farm production is still a key element of the county's landscape.

Calvert's TDR Program Design

Appropriately addressing design issues, such as the rules for participation and the location of the sending and receiving areas, is critical for achieving the land-use goals of any TDR program, and for establishing an effective market. Other key elements for program design include rules about the number of units transferred between areas, and the role of the government in providing information and stability to the market. Additional detail on Calvert County's approach to these design choices is provided here.

Designation of sending areas. As explained above, Calvert opted not to accompany the adoption of the TDR program with a down-zoning of targeted preservation

areas. All rural land was designated as potential TDR sending area sites. This included Farm Community Districts (FCD), Resource Preservation Districts (RPD), and Rural Communities (RC). As Table 1 shows, average minimum baseline zoning remained at 5 acres per lot in all three of these rural regions when the program began in 1978. FCD and RPD are shown with lined areas in Figure 1. These were areas with the best agricultural soils and those that were deemed important to preserve for farming and environmental reasons.⁸ The RC (white areas in Figure 1) can become either sending areas or receiving areas.⁹ This means that property owners in these zones have the option of selling TDRs and preserving their farmland, developing their properties or buying TDRs and developing their properties beyond the baseline zoning limits.

Sending area participation rules. One of the most important aspects of the Calvert County program is that an entire parcel is permanently preserved when a single TDR is sold off the property. Once one TDR has been sold, the land cannot be subdivided and developed. This is in contrast to other TDR programs, such as Montgomery County, Maryland's, in which a landowner can sell some development rights, but still retain the right to subdivide at low-density levels with the remaining rights. For example, in Montgomery County, a 100-acre parcel would have 20 development rights, only four of which can be used for building on the property after the down-zoning. Hence, 16 rights could be sold for development elsewhere and four retained for building at the site. The same 100-acre parcel in Calvert would also have 20 development rights but the landowner must make an all or nothing decision. The property could be subdivided into at most 20 lots, or if the landowner sells even one TDR, no development would be allowed. In either the Calvert or the Montgomery cases, large lot development permitted by baseline zoning can still occur in the areas targeted for preservation.

Any property in Calvert shown to be large enough to undertake farming activities (minimum 50 acres) and to be in active agricultural or forestry¹⁰ use is eligible to

Table 1. Maximum density allowed by zoning in Calvert County TDR Program

Zoning classification	1978–98		1999–2003	
	Base density	Density allowed with TDRs	Base density	Density allowed with TDRs
Rural				
FC District	1 unit/5 acres	1 unit/5 acres	1 unit/10 acres	1 unit/5 acres
RP District	1 unit/5 acres	1 unit/5 acres	1 unit/10 acres	1 unit/5 acres
Rural Communities	1 unit/5 acres	1 unit/2 acres	1 unit/10 acres	1 units/2 acres*
Residential				
R-1	1 unit/acre	4 units/acre	1 unit/2 acres**	4 units/acre**
R-2	14 units/acre	14 units/acre	–	–
Town Centers***	4 units/acre	14 units/acre	2 units/acre	14 units/acre

*Density can go as high as 1 unit/acre within 1 mile of a TC.

**All residential areas have the same zoning after 1999.

***The Town Center zoning classification came into effect in 1983.

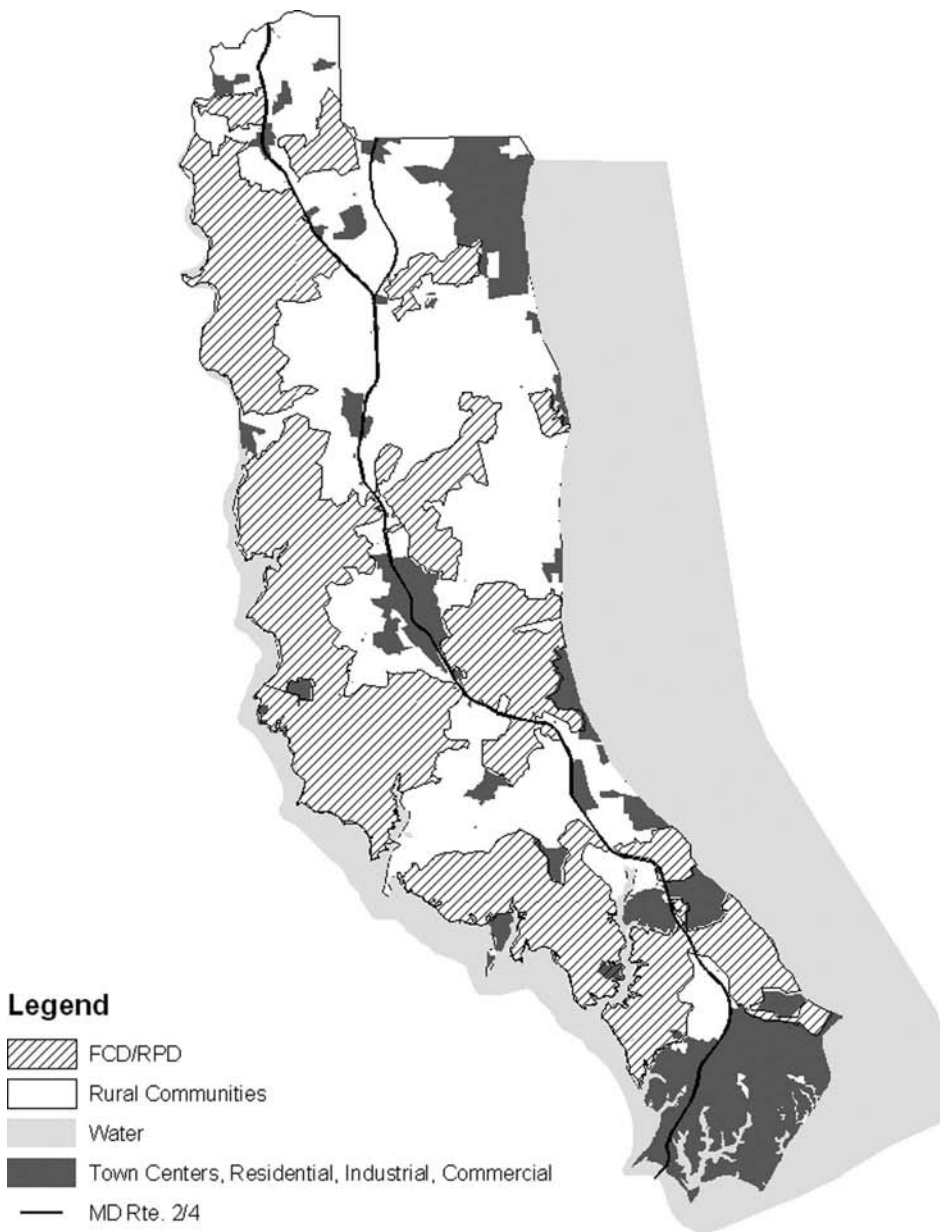


Figure 1. Zoning map, Calvert County, Maryland.

offer development rights for sale. The property owner must first submit an application to the county to form an Agricultural Preservation District (APD). By establishing an APD, the property owner agrees to keep the land in agricultural or forest use for at least five years, over which time the owner is exempt from county property taxes.¹¹ After this time, the owner may remove the property from APD

status. However, while in APD status the landowner is eligible to certify and sell TDRs from the property at any time. Approximately one development right is granted for each APD acre.¹² The land is not in permanent easement status as an APD but only after the first TDR is sold.

Designation of receiving areas. Receiving areas were broadly designated at the outset of the program and, as shown in Figure 1, include the rural RC regions (white areas on the map) and the smaller residential and Town Center areas (dark grey areas on the map). The additional density allowed with TDRs in each of these regions is described below. By drawing the receiving areas broadly in the beginning, the county has not had to negotiate the density of additional receiving areas with existing residents. Some TDR programs, such as Montgomery County's, have found the process of identifying new receiving areas to be controversial and resource intensive (see Cohen & Preuss, 2002).

As noted earlier, allowing land in the RC to become either sending or receiving areas is a controversial aspect of the Calvert program. Smart growth advocates prefer to see additional development occur only in existing residential areas (Danielsen *et al.*, 1999). Agricultural preservation advocates frequently find this program design undesirable because of the possible fragmentation of agricultural parcels that could result from TDR market transactions.

Transfer of building units between sending and receiving areas. How housing units can be transferred from sending to receiving areas is determined by three factors: the baseline zoning, the maximum density permitted with use of TDRs and the TDR transfer ratio. Most of the sending sites have a baseline density of one house on 5 acres, and the county allocates approximately one TDR for each undeveloped acre on a sending site. Additional units built with TDRs in receiving areas require the purchase of five TDRs per housing unit.

Table 1 shows the different zoning designations for Calvert County both in the initial years of the program and after a revision in 1999. The three rural classifications are subject to more restrictive (lower density) zoning than the residential areas and Town Centers. Although FCD and RPD have the same zoning level as the RC, they are differentiated by the fact that, until 1999, TDRs could not be used to increase density; they were sending areas only.

The second and fourth columns of Table 1 show the maximum density permitted with use of TDRs. As the Table shows, prior to 1999, a developer could use TDRs in R-1 to build up to four houses per acre even though the baseline zoning only allowed one house per acre. In the RC, density was allowed to increase from one unit per 5 acres to one unit per 2 acres with TDRs. The ratio of the maximum density allowed with the use of TDRs to the baseline density is sometimes referred to as the 'density bonus'.

The final program parameter that must be determined is the TDR transfer ratio. The transfer ratio is specified as the amount of development that can be transferred from a sending site divided by the amount of development that can be built on the sending site; it thus helps determine the relative value to the landowner from preserving his land versus developing it. Prior to 1999, Calvert County had a one-to-one transfer ratio; for every 5 acres of land owned, a landowner could build one

house or sell five development rights which could be used to build one house elsewhere.¹³

Changing program parameters, such as the transfer ratio and the density bonus, can change the incentives in the program. However, basic market conditions, e.g. land values, the demand for additional density and farming economics, will also matter a great deal in decisions landowners and developers make about density. If baseline density limits in receiving areas are equal to or greater than the market demand for density, increasing density bonuses in TDR programs will have little or no effect on the realized density. This point will be discussed in more detail below.

In 1999, new evidence about the actual growth rate in population and housing in Calvert County during the decade of the 1990s and forecasts of future growth required the county to rethink its overall land-use plan. The baseline zoning in virtually all areas was reduced by 50%.¹⁴ The last two columns of Table 1 show the adjusted baseline zoning and the additional allowed density with TDRs in receiving areas for each zoning category.¹⁵ With the down-zoning, the transfer ratio in the sending sites changed to a 2-to-1 ratio: that is, on a 10-acre lot, 10 TDRs, or two housing units, could be sold from a sending property to be used in a receiving area, but only one house could be built on the 10 acres at the sending site. In both the Rural Communities and Residential receiving areas, larger density bonuses allowed developers to use TDRs to 'buy back' to density levels set by the previous zoning. These changes are likely to increase both the demand and supply for TDRs, and therefore will increase the number of TDRs purchased and the amount of land that is preserved. As a result, the development that does occur is likely to be more concentrated in the receiving areas than before the down-zoning. The effects of the down-zoning are discussed further in the results below.

Informational constraints, government participation. The way transactions in the market are facilitated, and how and where they take place can be important aspects of the success of a TDR program. How buyers and sellers find each other and the information available about transactions and prices can be important for participation in the program. Some programs allow TDR markets to work entirely through real estate agents (Montgomery County, Maryland), while at least one program has facilitated the market by holding TDR auctions (Chesterfield Township, New Jersey).

In Calvert County, buyers and sellers could obtain information in the early years of the program only through the County Planning office. Sellers were often not aware of the prices and details of other transactions. Eventually, the county government became more involved in the market in several ways. First, it provided information for market participants by providing a quarterly newsletter with details about transactions, prices and preserved properties. Second, the county government began to participate directly in the TDR market by buying and retiring TDRs. The so-called 'Purchase and Retire' (PAR) program began in 1993, when the government wanted to increase the amount of land preservation in the county. The county announces, at the beginning of the year, the price at which it will purchase development rights, thus providing further information and stability to the private TDR market.¹⁶ Many farmers have been willing to commit all of their land to

easement by selling just a few TDRs. There is an evidence that market prices will gradually rise, giving landowners confidence that selling their TDRs over time is a reasonable investment.

Combining Calvert County's flexible TDR market with a direct Purchase of Development Rights program (such as the county PAR program) offers the opportunity for greater amounts of land preservation at lower cost to local governments. In addition, a PDR program allows the county government to target particular parcels that may not otherwise be preserved.

Results of the Calvert Program

Acres preserved in the TDR program. Figure 2 shows the cumulative acres of land in APDs in the county and the cumulative acreage in permanent easement status. As of July 2002, over 19 600 acres were in APD status. From those acres, 12 664 TDRs have been sold, resulting in the protection of nearly 13 000 acres. This means that approximately 13% of all agricultural and forested land, and nearly 10% of the entire county land area, has been permanently preserved under the county's TDR program. The county's goal is to preserve a total of 40 000 acres of farmland, or about one-third of the entire county land area, through all state and local land preservation programs by the year 2020.¹⁷

Annual number of TDRs sold. Figure 3 shows the number of TDRs sold since the program's inception, including both sales to private buyers and sales to the county government through the PAR (Purchase and retire) and LAR (Leverage and retire, see footnote 18) programs. There were few sales in the early years of the program, and then large fluctuations in sales through the latter part of the 1980s.¹⁸ The large number of sales in 1987 was most likely due to anticipation of a moratorium on new development that was imposed in 1988 because school capacity was at its maximum in certain parts of the county.¹⁹

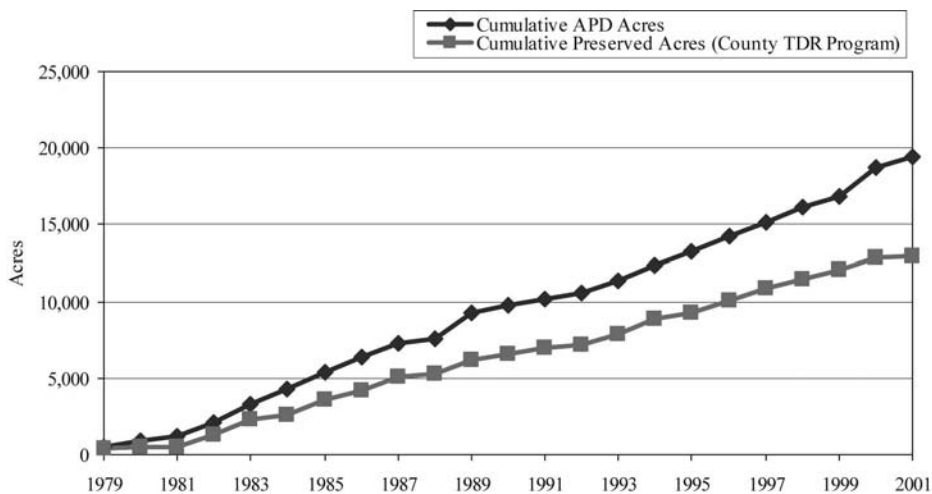


Figure 2. Cumulative APD and preserved acreage, Calvert County TDR Program.

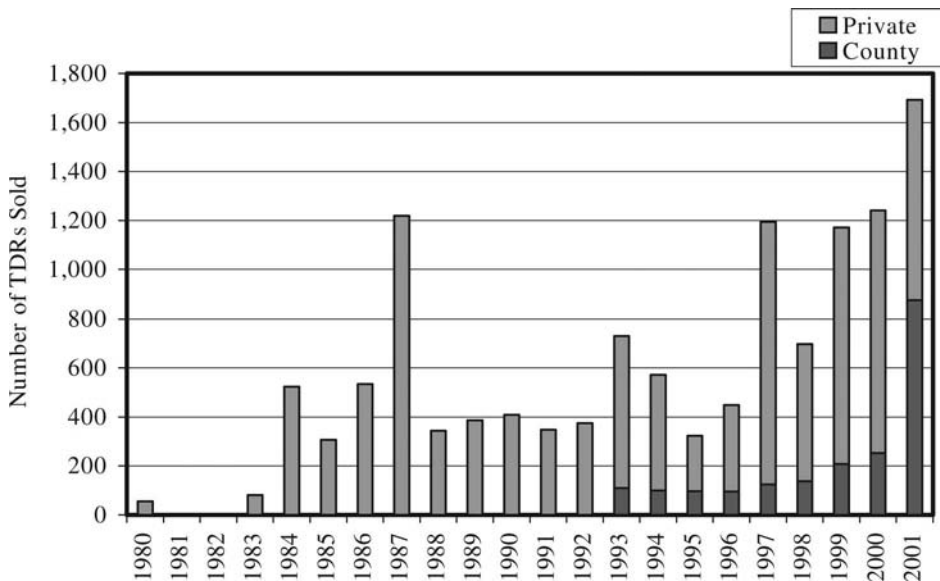


Figure 3. Number of TDRs sold by year, Calvert County TDR program.

Private market participants engaged in more transactions and purchased more TDRs in each year than did the county.²⁰ Since the county's goal is to preserve as much prime agricultural land as possible with the money it has available and since an entire property is preserved when a single TDR is sold, the county typically buys fewer TDRs in each transaction than do private developers. Through the PAR and LAR programs, the government has permanently preserved 3371 acres since 1993, accounting for roughly one-quarter of all preserved acreage in the county programs.²¹

TDR prices. Figure 4 shows the trend in the average TDR sales price for all transactions from 1983 to 2001.²² From 1983 to 2001, the average real price rose by 6.3% per year, but most of the increase occurred in the first decade of the program. Between 1983 and 1993, the average real price more than doubled, rising from \$1211 (in 1999 dollars) to \$2578. However, between 1993 and 2001 real prices remained relatively constant. The average real TDR price in 2001 was \$2582, virtually the same as it was in 1993.

At the same time, the variance in prices declined considerably. In 1999, for example, the minimum and maximum TDR prices were \$2200 and \$2800, respectively, and 50% of all transactions in that year occurred at prices between \$2400 and \$2600. In 1990, the range was much greater: 50% of all transactions occurred at prices between \$1209 and \$2780 (in 1999 dollars).

The increased price stability occurred at the same time that the county government became a direct participant in the TDR market. The county purchase price has remained relatively constant over time, rising by small amounts at periodic intervals from \$2350 per TDR in 1993 to \$2700 in 2002.²³ The information provided to the

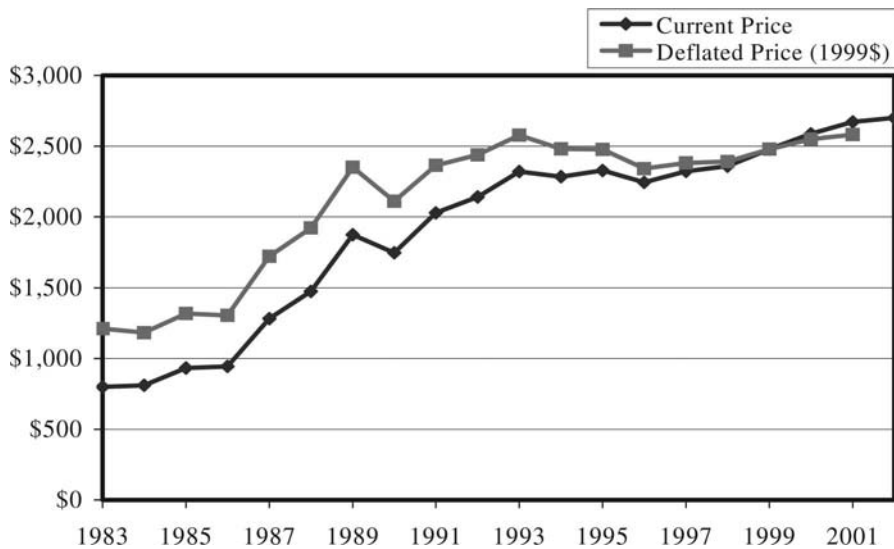


Figure 4. Average annual TDR prices, Calvert County TDR program.

market by the announced county purchases probably helped to maintain a pattern of gradually rising prices over time and relative price stability. This provides more certainty to both buyers and sellers about market prices, and therefore more willingness to participate.

Figure 5 shows prices of individual TDR transactions in chronological order. The few transactions in the early years of the program support the notion that the costs of negotiating transactions were high. In addition, developers may have had some leverage over prices paid to farmers. The low prices observed in the early to mid-1980s are consistent with low-valued farms entering the program first, with their owners being paid just the amount that would keep the land in farming. In fact, virtually all farms preserved through 1983 are in the south and central parts of the county, where land values are the lowest.

The large variance in prices in the early years also lends support to the argument that transactions costs were high. In a competitive market, TDR sales prices should be the same across transactions, otherwise, brokers would be likely to enter the market and arbitrage would take place. High costs of finding buyers and sellers could account for why such arbitrage did not occur. The county's PDR program and its quarterly newsletter appear to have helped to stabilize prices. It is notable that no secondary markets or much in the way of brokerage services have developed around the Calvert TDR market. Although the volume of transactions is relatively small, Figure 5 shows that there could have been clear gains from third party brokering to both buyers and sellers.²⁴

Geographical patterns of preservation and development. As discussed above, although the county has broad areas targeted for preservation and development, Calvert's program allows flexibility to landowners in most of the rural areas. Since market

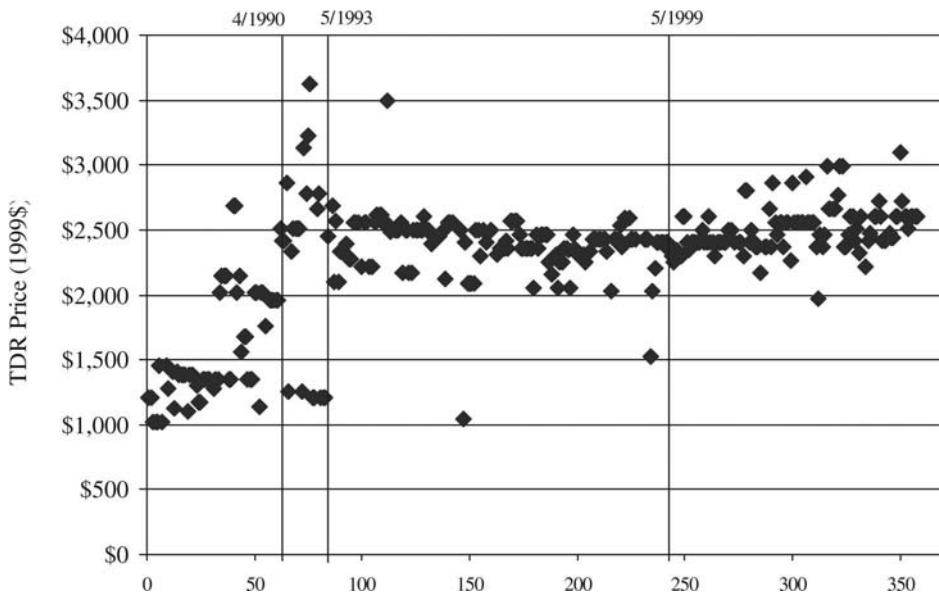


Figure 5. Chronological TDR sale prices (1999\$) (Private transactions only).

prices for land reflect potential returns to both uses, the market is allowed to sort out which individual parcels should be developed and which preserved. Therefore it is useful to look at the spatial patterns of land development and preservation that take place in this setting. Using GIS software, all APDs, preserved properties and subdivisions recorded between 1980 and 2001 were located. Figure 6 shows the properties overlaid on the zoning map of Figure 1. The medium grey areas show permanently preserved acreage through the TDR program, and the land that is in APD status but has had no sales of TDRs is in very light grey.²⁵ Subdivisions that used TDRs for additional development, i.e. the receiving areas, are shown in black.

There are several observations that can be drawn from Figure 6. First, most properties that have entered the APD program lie within the FCD and RPD regions, the areas targeted for preservation. Although some of the light grey areas are within the Rural Communities (white areas), 79% of all preserved acreage (medium grey) and 73% of remaining APD acreage (very light grey) lie in FCD and RPD zones.²⁶

Second, up to 1999, the receiving areas could be in Residential zones, Town Centers, and Rural Communities, but the map shows that they were almost exclusively in Rural Communities. We note this is not because residential areas are completely built out. Although the map does not show non-TDR development, there was some new development in the residential areas and Town Centers, but existing zoning limits of one unit per acre appear to satisfy the demand there.²⁷

Without a counter-factual, i.e. what development patterns would have been in the absence of a TDR program or with a TDR program that limited receiving areas to residential and Town Center zones, it is difficult to evaluate the outcomes of the program. The county's stated goal is 40 000 acres of preserved land and it has targeted prime farmland in the RPD and FCD; in terms of these goals, it is doing a

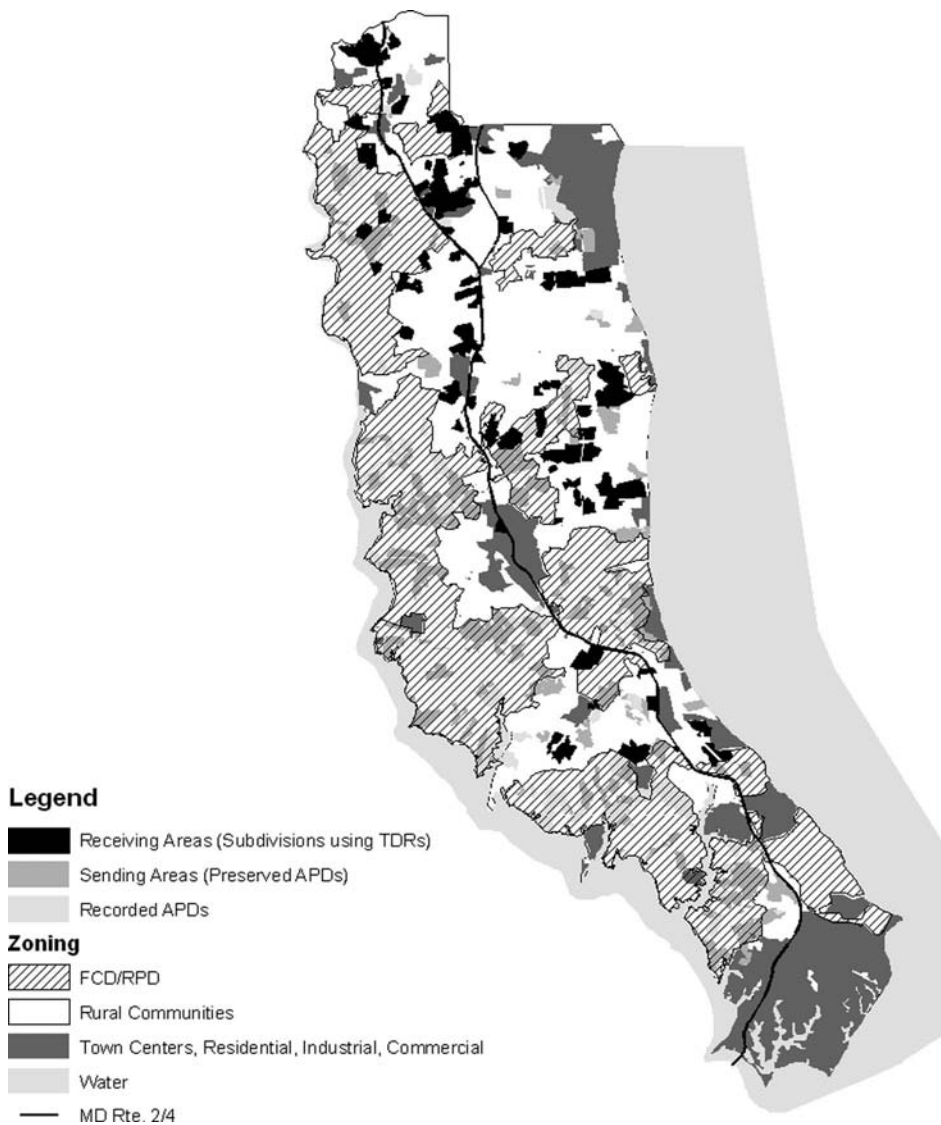


Figure 6. Sending and receiving areas, Calvert County TDR Program, 1980–2001.

good job. The TDR program has not channeled development exclusively to residential zones, but it is difficult to know whether any TDR program in Calvert could have accomplished this objective. What can be said is that the development that is occurring is at a higher density on average than it would have been otherwise, due to the TDR program.

Third, the location of receiving areas offers further evidence that TDRs have been used to increase development where markets value it most. Most of the black areas of Figure 6 (TDR subdivisions) are in the northern part of the county and near the

major north-south highway that runs through the middle of the county. These areas provide greater access to Washington, DC, Annapolis and Baltimore. The TDR market provides some additional incentive for TDRs to be used in the north where housing prices are higher. Since all TDRs in a given time period command roughly the same price, the extra cost of using TDRs to put an additional house in a receiving area is a lower percentage of these higher-valued houses in the north, than of those in the middle and southern sections of the county.²⁸

Fourth, a substantial fraction of the farms that have sold TDRs are in the central and southern part of the county rather than the north. These are farms that, all else equal, have less value in development so it is no surprise that they are the properties that have been preserved. It can be argued that some of these farms may not have been developed anyway, at least over the 1978–2001 period. This means that the TDR program may have led to more building than would have occurred with zoning alone (Levinson, 1997). If all of the more than 2000 new houses built with TDRs over the period 1980 to 2000 were net additions to the housing stock, this could have increased the amount of housing by as much as 10%.²⁹ On the other extreme, decisions by developers about how many houses to build may be affected more by the economics of the housing market than by zoning constraints in individual areas. In that case, the TDR market will serve to simply redirect the location and density of development, not to change the actual number of houses built. In addition, county purchases of TDRs (through the PAR and LAR programs) reduce the number of homes built because the county retires those development rights.

Finally, it is important to note that the TDR program has not prohibited development in the FCD and RPD areas. There has been some building in these areas at densities up to the pre-1999 baseline density of one house per 5 acres. As expected, this has resulted in some development occurring in prime farmland regions and even adjacent to preserved areas. However, as discussed above, even more development may have occurred in FCD and RPD in the absence of the TDR program, particularly in the northern parts of the county most subject to development pressures.

Changes in zoning and TDR program parameters. Since the inception of the TDR program, the county government has made few changes to zoning designations. Before that time, a great deal of county time and resources were devoted to zoning hearings and applications for zoning exceptions. Once the TDR program was put in place, it became clear to potential developers that the only avenue for obtaining zoning variances was through the use of TDRs. Calvert's experience seems to support the Mills (1989) argument that combining zoning with TDR markets can reduce the amount of effort and expense on the part of both private parties and local governments that is devoted to changing zoning designations.³⁰ Other TDR programs, such as Montgomery County's, in which receiving areas and receiving area densities must be negotiated over time, spend considerable time and resources in this process.

Calvert County has changed regulations to achieve preservation objectives in a couple of cases, most notably with the 1999 down-zoning. As explained above and shown in Table 1, the county reduced allowed density in all areas by 50%. The motivation for this change was to reduce the overall amount of building in the county. The TDR market helped make the down-zoning politically acceptable since

the previously allowed densities were still achievable (even in the FCD and RPD) through the purchase of TDRs.

Down-zoning should affect both the demand and supply of TDRs. Owners of agricultural land compare the development value they give up by entering the TDR program to the value of the land in rural uses plus the value of selling TDRs. The down-zoning lowered the development value of rural lands and thus made it more likely that they would elect to sell TDRs. On the demand side, the reduction in the baseline zoning of residential land, together with the increased density bonuses, increased the developers' demand for TDRs. As can be seen in Table 2, clearly the percentage of new subdivisions using TDRs rose in all areas after 1999.

With both the supply of and demand for TDRs increasing, it would be expected there would be more trading in the TDR market after 1999. As shown in Figure 2, there was a significant increase in APD acreage in 2000, meaning that many farmers registered their properties as APDs, thus taking the first step toward the possible sale of TDRs.³¹ TDR sales, themselves, were high in both 1999 and in 2000, and even higher in 2001 (see Figure 3). Sales of TDRs might have been even higher still in 2001, had it not been for a moratorium imposed on new building because of inadequate school capacity.³²

Conclusions

The data from Calvert County, Maryland's 23 years of experience with transferable development rights provides a unique opportunity to examine the performance of a real-world TDR market. Although historically a predominantly agricultural community, this ex-urban county has been under intense development pressures for the past few decades. The county's preservation efforts stem more from a determination to maintain some small-scale farming in the prime farmland regions and to preserve rural character, rather than to retain a large, primarily farm-based economy. To this end, Calvert uses TDRs to complement the state's other land preservation tools to help achieve its overall goal of permanently preserving 40 000 acres of land, or approximately one-third of the county land area. The TDR program has preserved about 13 000 acres to date, or one-third of the goal (mostly in

Table 2. Percentage of new subdivisions using TDRs in Calvert County, by recording year and zoning category

Zoning	New subdivisions using TDRs (%)	
	Subdivision Recording Year	
	1992–98	1999–2001
Residential/Town Centers	8.0%	57.1%
Rural Communities (RC)	48.1%	63.6%
Farm Community Districts (FCD)/ Resource Preservation Districts (RPD)	7.7%	64.3%
Countywide	28.6%	62.8%

the areas of prime farmland), with other state and local programs preserving another 13 000, leaving one-third of the goal remaining to be met.

The limited set of restrictions imposed on the Calvert County TDR market is unusual. Although broad areas of prime farmland have been identified to be sending areas only, receiving areas were broadly defined to include both residential and rural areas. In fact, the program provides an example of the government making conditions amenable to a smoothly functioning TDR market. In the early years of the program, high costs of locating a buyer or seller resulted in few trades and substantial price variation. Government purchases of development rights at announced prices, and the provision of information through a quarterly newsletter has helped to promote price stability. With uncertainty over the value of TDRs reduced, trading activity has increased substantially. Enough demand exists for increased density in some areas of the county to make using TDRs worthwhile, enough interest in farming exists to ensure an adequate supply, and relative price stability appears to have reassured market participants.

Because the county did not down-zone large areas and allowed landowners and developers voluntary participation in the TDR program, it is interesting to examine the spatial pattern of land use that resulted. Additional development through the use of TDRs has taken place in the northern part of the county and along an important north-south highway. Most preserved lands lie in the southern and central part of the county.

Most important, TDRs are being used almost exclusively in a zoning classification called 'Rural Communities' rather than in the residential zoning classifications, revealing a lack of demand for relatively dense residential development in the county. This result highlights what may be one of the greatest problems for TDR programs around the country. If receiving areas are targeted in regions with high-density baseline zoning, there may not be demand for additional density. Preferences for housing type and density must be accounted for in policies to guide the location and intensity of new development. A TDR program that fails to create any TDR demand will not result in any transactions and, therefore, will fail to preserve land. The issue in US land markets is that local zoning rules confer rights to develop to individual landowners. Development cannot be prevented except through easements, but the intensity of development can be modified by TDRs when market conditions for buying and selling additional density are right.

Calvert County seems to be achieving its stated preservation goals with the help of the TDR market. Contributors to the high level of market activity include such factors as flexibility in the program's design and the relatively low-density baseline zoning in some receiving area regions, as well as the government's participation in purchasing TDRs and in providing information to buyers and sellers. The TDR program has not prevented scattered growth because it does allow the use of TDRs in the rural areas, but it is resulting in more land preserved and denser development than would have been the case without the program. The TDR program does this by essentially taxing new building or new residents to the region. Alternative policies to preserve land, such as PDRs, would tax existing residents of the county or the state, depending on the public revenue source and program jurisdiction. Comparing the fiscal impact and effectiveness of TDRs with other preservation policies is a fruitful area for further research.

The Calvert County TDR program provides an interesting case study, and provides useful insights about TDR design. Whether a TDR program like Calvert's is appropriate in other jurisdictions depends, of course, on the preservation goals and housing market forces of the particular community.

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Notes

- 1 The TDR concept was first proposed by Lloyd (1961) and suggested for open space preservation in the 1970s by Chavooshian *et al.* (1973).
- 2 Farmed or forested areas had to be at least 50 acres in size or adjacent to an already preserved area.
- 3 For a discussion of the importance of political acceptability, see Machemer & Kaplowitz (2002).
- 4 It is even true that there will be some development even in regions that down-zone to very low densities, such as the one house on 25 acres in Montgomery County. Montgomery County has had some of its preserved land subdivided into large lot parcels.
- 5 For an example of the latter case where existing residents are opposed to higher density, see the description of the Montgomery County program by Cohen & Preuss (2002).
- 6 These numbers are from Debbie Weller of the Maryland Department of Planning.
- 7 See <http://www.nass.usda.gov/md/calverti.pdf>.
- 8 Most of these areas designated for protection were part of the Designated Agricultural Areas (DAAs) which had the best soils for agriculture in the county.
- 9 Prior to 1999, parcels in FCD and RPD could only become sending areas. Residential land and Town Centers may only be receiving areas.
- 10 Properties can show that they are active in farming or forestry by registering a farm or forest management plan at the time they apply to be an APD.
- 11 If a property has agricultural use, it is allowed a low land value assessment and consequently is subject to low rates of property taxation. Hence, the county tax exemption for properties gaining APD status is not large. For example, a 100-acre property in agricultural use in Calvert County having a market value of \$3000 an acre would pay only \$446 in county property taxes a year; this would also be the tax savings from entering the APD program.
- 12 Some adjustments are made for existing residences and if the property retains any grandfathered lots from the 1975 downzoning. (Rural parcels deeded before 1975 are permitted to build a few more lots than allowed under baseline zoning, as compensation for the 1975 3-acre to 5-acre lot downzoning. These additional lots are often referred to as grandfathered lots). See McConnell *et al.* (2003) for more detail.
- 13 Many programs have transfer ratios greater than one. For example, in Montgomery County, the transfer ratio is 5:1; only one house can be built on a 25-acre sending area parcel, but the sale of development rights would allow up to five houses to be built on a receiving area site. See Pruetz (2003) for more on the concept. The transfer ratio concept is difficult to define for Calvert after 1999 since landowners in the FCD/RPD areas have been eligible to be both sending and receiving areas.

- 14 Since the collection of data for this project, Calvert County implemented another county-wide down-zoning in 2003, in an attempt to again control overall growth in the county.
- 15 R-1 and R-2 have had essentially the same zoning since 1999 except that townhouses and multifamily homes are allowed in R-2 areas and not in R-1.
- 16 In 2001, the county began a 'Leverage and Retire' Program (LAR) in which landowners who sell their development rights to the county receive tax-free interest payments over a 15-year period and are paid the principal at the end of the 15 years. This program allows the county to retire more acreage with a smaller up-front expenditure; it buys zero-coupon bonds to finance the stream of payments (see Calvert County Agricultural Land Preservation Program Newsletter, 2 April 2001, 4(1)). See American Farmland Trust (1999) for more on so-called 'installment purchase agreements' like the LAR program.
- 17 There are other preservation programs operating in the county as well, including five state programs: the Maryland Agricultural Land Preservation Program (MALPF), Rural Legacy Program (RLP), Maryland Environmental Trust (MET), Program Open Space (POS), and the most recently established Program GreenPrint. Over 13 000 additional acres have been preserved through these programs to date. There are also private land trusts that buy and sell TDRs.
- 18 Annual TDR sales and acres preserved in each year are not the same. This is because when a property enters the TDR program and sells even one TDR, the entire property is permanently preserved. The remaining TDRs may then be sold over time as the owner chooses.
- 19 In 1988, the county adopted an Adequate Public Facilities (APF) ordinance that requires that school and road capacities be reviewed before development projects are approved. The capacities must satisfy specifically defined public facility capacity standards. If the standards are not met, development is curtailed or delayed until school and/or road capacity is added. The APF moratorium was applied in 1989 in Calvert and again in 2000. The ordinance stopped development in parts of the county during the 1990s and the entire county was closed to any new development as of November 2001.
- 20 For example, developers in 2001 bought an average of 23 TDRs in each transaction, while the county bought only 12.
- 21 This is the acreage preserved from first sales, since the first TDR sold puts an entire parcel in easement status. The county also buys TDRs from some landowners whose properties are already preserved, including those whose first sales were to private developers. That acreage is not included in the 3371 acres here.
- 22 The GDP deflator is used to calculate inflation-adjusted prices.
- 23 Occasionally, for certain sales, the price will vary slightly from the Board of County Commissioners' (BOCC) stated price. In addition, prices paid in the LAR program, which started in 2001, sometimes have a 10% bonus as an additional inducement for landowners to enroll; in five sales in 2001, for example, prices ranged from \$2730 to \$2990.
- 24 Currently, with about 700 TDRs sold in the private market each year at a price of roughly \$3000 each, and a 5% return on brokerage services, total returns to brokering would be about \$100 000 a year.
- 25 As in Figure 1, Town Centers, residential areas and commercial/industrial areas are shown in dark grey.
- 26 The average price paid for land in the FCD and RPD regions for development was \$4000/acre over the 1998–2002 period, while land in Rural Communities had much higher prices of approximately \$8500/acre. Using Census of Agriculture numbers for farm sales values for Calvert County (see <http://www.nass.usda.gov/md/calverti.pdf>) and a 5% real interest rate, farm values averaged about \$4800/acre. This kind of calculation illustrates why Rural Community farms were less likely to be preserved than FCD and RPD properties. Even with \$2500/acre from the sale of TDRs, the average farmer in a Rural Community zone does not earn as much as he would have earned from selling his land for development. However, care should be taken with these numbers, since they are simply averages and there are many differences across individual properties.
- 27 When the county was down-zoned in 1999, the baseline zoning in residential areas became one house in 2 acres, and demand for TDRs did increase.
- 28 A developer wanting to build an additional house beyond what the baseline density allowed would need to purchase five TDRs. Therefore, in 2000, TDRs added approximately \$12 500 to the cost of building that additional house. The median price of a new house in a subdivision in the northern part of the county in 2000 was \$248 170, so the TDR cost was approximately 5% of the price of a new house. Subdivision houses in the southern part of the county had a median value of only \$138 000 in

- 2000, implying that TDRs would comprise a larger share of the price of a house in that region, approximately 9%.
- 29 As stated above, 12 664 TDRs have been sold in total, 10 656 to private developers (the remainder to the county). Since 5 TDRs are needed to build one house, approximately 2130 new units were built with TDRs. This is about 10% of the total of 10 128 new housing units that are known to have been built between 1990 and 2000, plus a guess of approximately 10 000 units built in the 1980s.
- 30 Mills (1989) argues that zoning differences increase rents for owners of those parcels that allow more dense development, creating incentives for landowners to spend resources to obtain zoning associated with the highest valued land uses. TDR markets can mitigate this behavior.
- 31 A similar response was felt in 1989 (see Figure 5) in response to the creation of Critical Areas in the county. As explained earlier, these are waterfront areas that were down-zoned in 1989 to one unit/20 acres. A significant amount of new acreage became APDs in that year.
- 32 Data on TDR sales starting in 2001 are complicated by the fact that in that year sales of TDRs in the LAR program began. All of the TDRs from a property show up in the authors' statistics for TDR sales in 2001, even though only a small number of them are actually purchased in that year.

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