

Tavares, Antonio

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Can the Market Be Used to Preserve Land? The Case for Transfer of Development Rights

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**Can the Market Be Used to Preserve Land?
The Case for Transfer of Development Rights**

António Tavares
School of Economics and Management
University of Minho
Braga, Portugal
Tel.: 351-253-604510
atavares@eeg.uminho.pt

Abstract

This paper discusses the use of a market-driven technique – transfer of development rights (TDR) – to preserve land from development while guaranteeing the rights of property owners. While the technique is often used in the United States, Europe has a lot more urgency in land preservation but it is still lagging in the use of market based instruments such as the transfer of development rights.

This paper explores the economic arguments favoring the use of TDR programs, discusses the difficulties in implementing these programs in Europe, where command-and-control regulation has been preferred in land preservation to market-based solutions, and presents tentative hypotheses to explain the adoption of TDR programs in local communities. Preliminary data collected for TDR programs in Florida supports some of the arguments presented and encourages researchers to extend this empirical analysis to European countries.

Introduction

Local governments in Europe and elsewhere are faced with the urgency to preserve land as environmentally sensitive areas, agriculture uses, open space and historic landmarks. Unfortunately, the expansion of the urban fringes has placed strong development pressures on land with noneconomic uses. The difference in monetary value between the land's current use and the development value is very often so large that it makes virtually impossible for landowners to resist selling. Although some might argue that this is simply the land market working in a competitive manner, it is clear that many market decisions do not constitute Pareto improvements. This is frequently the case of urban sprawl, loss of highly productive farm land and destruction of unique wildlife habitats, environmentally sensitive areas, and historic buildings.

The correction of market failures using traditional government regulation such as zoning, land acquisition, and eminent domain and condemnation procedures to preserve land with such unique characteristics has proven to be extremely expensive, prone to legal challenges, and has not lived up to the expectations in accomplishing these preservation goals.

In order to overcome the failure of traditional land use preservation techniques, many researchers and practitioners have suggested the adoption of transfer of development rights (TDR) programs as a market-based technique with potential advantages over command-and-control regulation. The literature reports several success stories in the United States (Machemer and Kaplowitz, 2002; Bredin, 2000; Voget, 1999; Johnston and Madison, 1997), but also in Europe (Micelli, 2002; Renard, 1999).

The determinants of the adoption of TDR programs have deserved little attention from urban economists, land-use planners, and political scientists. This work attempts to answer the call made by Feitelson and Lindsey (2001) to identify differences across local jurisdictions that may determine the choice to adopt TDR programs.

The paper explores the economic arguments favoring the use of TDR programs, discusses the difficulties in implementing these programs in Europe, where command-and-control regulation has been preferred in land preservation to market-based solutions (Weale, 1999; Feitelson and Lindsey, 2001), and presents tentative hypotheses to explain the adoption of TDR programs by local communities. Preliminary data collected from TDR programs in Florida support some of the arguments presented and encourage researchers to extend this empirical analysis to European countries.

The Concept of Transfer of Development Rights

Property ownership can be described as a bundle of rights, including the right to use, the right to exchange, and the right to convert. The transfer of development rights (TDR) technique assumes that the development rights of a parcel, as part of the right to convert, can be sold and used in another parcel. Although this is not as evident as other severable and tradable rights such as water, timber and mining, development rights can be transferred. The motivation for the creation of a TDR program is the preservation of environmentally sensitive areas, agricultural land, open space, and historic landmarks.

The typical TDR program involves the landowner of a preservation or sending zone (or parcel) selling the development rights (DR) to a developer who will use these rights in an area designated as development or receiving zone (or parcel)ⁱ. In general, the receiving area allows for higher density of construction than the base density established by law through density bonuses provided by local governments. This becomes the incentive for developers to buy the development rights (Lawrence, 1998). The establishment of sending and receiving areas is similar to what is done for all growth management plans and should not constitute an additional source of complexity in TDR implementation (Machemer, Kaplowitz, and Edens, 1999).

A variation of TDR programs occurs when the local government creates a TDR bank from which developers acquire rights to develop at higher densities and the government uses the money to purchase development rights in areas it wishes to protect. TDR banks can also help during economic recessions to sustain the price of certificates (Lawrence, 1998).

TDR programs can be voluntary or mandatory. Mandatory TDR programs have the advantage of forcing preservation of lands threatened by development, although they may generate stronger opposition by landowners. Voluntary programs are less effective, but may still be successful if the program design includes the appropriate incentives to the TDR market. Development rights (DR) are issued by government and distributed to landowners in the preservation areas based on one or several possible criteria (Barrows and Prenguber, 1976; Machemer et al., 1999): acreage, previous zoning, unit-for-an-equivalent-unit, measure of monetary loss (market land values, assessed value, difference between market value and restricted value, and difference between “maximum restricted value”ⁱⁱ and restricted value under TDR).

In a recent survey of four TDR programs in the United States, Johnston and Madison (1997) found that credit designation systems in TDR programs employ one or a combination of two or more of these criteria, although the land's type, location, past and present uses, and square footage of buildable space may also play a role in the allocation of DR.

The DR owned by landowners in the sending areas constitute the supply-side of the TDR market, whereas the developers wishing to invest in the receiving area form the demand-side. The following section presents an economic analysis of TDR, contrasting TDR programs with traditional preservation tools, namely zoning, and discussing the conditions for the establishment of a competitive TDR market.

Economic Analysis of TDR programs

TDR is thought to be the best technique to preserve these areas, since it is a market-type transaction involving low costs for the public. It is more effective than zoning in the protection of land and landmarks, and it provides compensation to landowners that alienate the development rights (Berry and Steiker, 1975).

The economic analysis argues that TDR programs should be preferred to zoning for four reasons. First, TDR programs are market-based alternatives and, therefore, entail less administrative costs than zoning (a command-and-control type of regulation). Once they are in place, TDR programs require little to no monitoring, since transactions take place without government interference. The main administrative costs appear at the onset of the program, because it will be necessary to assure proper supply and demand of TDR.

In addition to low preservation costs, TDR programs are likely to produce long lasting preservation effects, which make them more reliable instruments in accomplishing these goals than traditional zoning. In fact, all TDR deeds should be publicly recorded to assure preservation goals (Danner, 1997) and, simultaneously, provide information to investors, landowners, developers, builders, and the general public to reduce uncertainty costs in market transactions.

Second, as we argued previously, rezoning decisions frequently involve large rent-seeking costs, whereas TDR overcomes the market failure and "...increases the net benefits of the regulation by better allocating resources across uses" (Thorsnes and Simons, 1999). One possible way to preserve agricultural land is to zone for agricultural

use only. However, such decision would deprive landowners from the possibility of selling to developers and obtaining a reasonable return from their land (Price, 1981). Moreover, agricultural zoning indirectly hurts housing affordability, since it restricts the supply of land for development driving the price upwards. In contrast, TDR programs can redirect development to areas where infrastructure is already available or can be extended with significant economies of scale.

Open space zoning creates even larger rent-seeking costs, with environmentalists pushing for zoning and builders and developers opposing it. Taken to the extreme, the result of this conflict produces a negative-sum game, because all the rents are dissipated in the rezoning process.

One major issue of concern to the community at large is that the land use plan will be constantly changed to serve special interests (Barrows and Prenguber, 1976). TDR programs allow for the compensation of landowners, which reduces their economic incentives to engage in rent-seeking activities (Thorsnes and Simons, 1999).

Third, the certificates of development rights can be exchanged in the market and provide a compensation to the landowner for the loss of the right to develop (Berry and Steiker, 1975). When the DR market is competitive, DRs can be redeemed for an adequate price that will exceed the value of the land under agricultural use, but that it will also fall short of the most profitable use of the property. However, this is, after all, the situation that will occur in most of the land market transactions without TDR.

Fourth, in communities facing urban sprawl and suffering from pressures to develop, the outcome of a TDR program is an efficient market allocation of land to its most valued use: the market maximizes the aggregate value of the land (Thorsnes and Simons, 1999). Under these circumstances, the TDR market compensates landowners for their decision to participate in TDR programs because it will be attractive for developers to buy and use DR in the receiving areas.

For the reasons presented, it would appear that TDR programs are more effective than zoning in accomplishing preservation goals, while they allow a more equitable distribution of benefits and costs. These distributive implications will be discussed further ahead. Next, I turn to the mechanisms underlying the market for DR and highlight the conditions that have to be present to secure the success of TDR programs.

The Market for Development Rights: Problems and Solutions

The market for development rights (DR) is often plagued with problems that prevent exchanges from taking place and fail to provide compensation to landowners that forego the development rents. This section identifies some of the problems most commonly faced and suggests possible solutions to curtail them.

The identification of areas for preservation is of crucial importance to determine the supply-side of the DR market. The supply of DR is difficult to determine since the landowners' decision to sell depends on the compensation he or she expected if the land was developed in the absence of the TDR program (Barrows and Prenguber, 1975). In an empirical study conducted in Hadley, Massachusetts, Conrad and LeBlanc (1979) found that the agricultural value of the sending area, the age of the landowner and the interests of prospective heirs potentially affect the supply of development rights.

If the number of DR holders is small and the demand is strong, high prices of DR can be attained and speculation can become a problem. Higher DR prices have the advantage of assuring "fair compensation" of landowners in the preservation area, but may increase development costs which can, ultimately, be passed from developers to consumers through increased housing prices. This situation is of concern because newcomers in the development area can be negatively affected twice: by increased densities and increased housing prices.

Low demand is more likely the product of slow growth in the area covered by the program, in which case, landowners in the preservation area would have difficulty selling their land for development anyway. When the number of DR is large and demand is low, DR holders may decide to hold on to the DR and wait for development pressures to increase in order to obtain better compensation for relinquishing them. This should not affect owners of a large number of DR, but can create difficulties for small landowners, especially if the TDR program is mandatory. For these situations, TDR banks can purchase DR to allow landowners to overcome financial stress and sell DR for just compensation.

The literature mentions the possibility of downzoning the receiving areas to force developers to acquire DR and, hence, increase their price (Barrows and Prenguber, 1975). Although this is an attractive solution to improve the TDR market, its application is subjected to intense political scrutiny and, ultimately, may not be politically feasible.

TDR banks can be a more viable solution, since they balance DR supply and demand to enable the program to work successfully (Danner, 1997; Roddewig and Inghram, 1987).

The establishment of the demand-side of the market depends on a careful choice of the development areas. The receiving area should be large enough to avoid the crowding out of developers from areas where DR are necessary to build above legally established densities, but small enough to generate demand for DR. Metropolitan areas are more likely to fulfill these conditions, but large cities should also be adequate.

Density bonuses allow private developers to buy certain existing zoning restrictions (floor area ratio, number of dwelling units, setback requirements, among others) from the municipality in exchange for the DR that result from the preservation of the sending parcels or areas. Developers are likely to support TDR programs because density bonuses allow them to build at higher densities and, therefore, reduce land and site development costs and diffuse costs over a larger number of housing units (Municipal Research & Services Center, 1992). The provision of density bonuses in the receiving areas constitutes a crucial element for the demand-side of the TDR market, because it facilitates development in areas with available infrastructure, while avoiding ad-hoc zoning variances and up-zoning decisions (Machemer *et al.*, 1999).

The price at which the community benefits from the preservation of the sending area of the TDR program is the price of the DRs to the developer. The economic question then becomes to know what is the equilibrium price at which the transaction occurs. Theoretically, if the marginal benefits of building at the higher density outweigh the marginal costs of the DRs, developers will engage in the exchange. The determination of the optimal price, however, is difficult to achieve because local governments can only recognize if an incentive was *sufficient* to engage the developers in the transaction, not if it exceeded the optimal price. Additional social costs are imposed when “too much” bonus is given to the developers. Seyfried (1991) found that if the internal rate of return of the investment exceeds the market rate for similar investments the developer will receive a windfall profit, this implying that the bonus is too high for the public benefit provided.

Ultimately, density bonuses may fulfill the less stringent Kaldor-Hicks efficiency criterion by benefiting a large number of citizens while the inhabitants of the neighborhood bear the external costs (Kayden, 1992). However, one needs to keep in mind that higher densities place pressure upon public service provision resulting in costs in the form of increased taxation for the community as a whole (Rubin, Seneca,

and Stotsky, 1990). The authors also argue that, if the area where the incentive is given is already densely populated, external costs on the neighborhood in the form of congestion and pollution may result.

Distributional Consequences of TDR programs

TDR programs to preserve environmentally sensitive areas and open space have distributive consequences for citizens both in the sending and receiving areas. The acceptance of market-based instruments and policies by different community interest groups is dependent on the way these programs are packaged. If TDR programs are proposed along with other coherent policies and having compensation in mind, support for these measures is likely to increase (Feitelson and Lindsey, 2001).

Homeowners near the sending site are most likely supportive of this land use management tool because the value of their property is likely to increase in response to the amenities apportioned by the program. In contrast, opposition will come from homeowners at the receiving areas, which will face increased development and the provision of low and moderate-income housing (Municipal Research & Services Center, 1992). If the TDR program is established at the municipal level, support and opposition will most likely be a zero-sum game. However, if the TDR program is region-wide, redistributive consequences across jurisdictions are possible and strong opposition likely.

Property owners in the sending area are more likely to support TDR programs if they are voluntary than if they are mandatory. If the program is voluntary, property owners can choose either to use their property subject to legal restrictions or to sell the development rights. In this case, property owners opt for the solution with the largest net benefit, which may impose a higher cost on the jurisdiction and, ultimately, result in the development of the property. In contrast, if the program is mandatory all parcels are restricted whether the transfer occurs or not (Danner, 1997). Mandatory programs have a higher likelihood of success in preserving land and open space, even if they are more prone to legal challenges (Daniels, 1991).

Preservation costs using growth management techniques should be lower because of less government intervention. According to Feitelson and Lindsey (2001), the cost-effectiveness of TDR programs is fairly low, which should make them politically more appealing. Even the TDR programs, which involve the creation of TDR banks managed

by local and/or state governments, have little cost for the public. TDR banks save on transaction costs, since they provide assistance with legal and real estate procedures (Danner, 1997).

When TDR banks are not involved, the development rights of the area to preserve (sending area) can be transferred to a designated receiving area at an even lower cost to the jurisdiction (Danner, 1997). Local governments are then able to redirect development to areas where infrastructure already exists, reduce environmental degradation, and protect prime agricultural land (Leo *et al.*, 1998).

Although preservation costs are small in operating a TDR program, the administration is responsible for minimizing transaction costs, which is crucial to the success of the program and may entail larger administrative capacity. Ezio Micelli points out that TDR programs are more likely to be successful if the number of property owners involved is small. Small number exchanges minimize transaction costs and facilitate exchanges, but can lead to the formation of monopolies and/or monopsonies hampering market mechanisms. The administration's role is to establish market rules, promote them, and facilitate communication and training to all actors involved (Micelli, 2002).

Local government officials tend to favor growth management techniques because they help redirect growth at lower cost when compared to command-and-control instruments. Daniels (1991) argues that, when development pressures are intense, zoning may not be sufficient to preserve land, and TDR programs are a less expensive tool to accomplish preservation goals. Furthermore, TDR programs allow local officials to minimize commitment costs because once the development rights are severed from the property to preserve, they are not easily reattached. Hence, commitment to preservation is more credible through TDR programs than through traditional zoning.

The fact that TDR is a market-based technique to manage growth does not mean that it reduces growth. Using a model of urban zoning with TDRs, Levinson (1997) shows it is possible that the overall level of development may actually increase rather than decrease. Frequently, this happens because decision makers choose the method of rights allocation before determining the total amount of development adequate for the jurisdiction (Machemer *et. al.*, 1999). However, TDR should not be employed having reduction of the level of development as a primary goal. The design and implementation of TDR programs has shown that communities are usually interested in preserving specific areas, and this goal can be effectively accomplished using TDR without

concern for the effect on the overall amount of development. As a consequence, developers are likely supportive of TDR programs because other land use management policies such as open space zoning, purchase of development rights, and the establishment of population and/or building caps are more damaging to their interests.

The support for TDR programs also comes from environmental interest groups committed to the preservation of open space, agricultural areas, wetlands, and historic buildings. Environmental interest groups prefer mandatory programs to voluntary ones, since the former are more likely to secure land preservation. They argue that voluntary programs work in an *ad-hoc* fashion and perform worse in the preservation of contiguous land parcels or tracts.

Many opponents to TDR programs contend that higher densities generate social problems and by allowing construction at higher densities in areas previously zoned for single-family housing, local governments are choosing to integrate different housing types, which may create marketability problems. Tetreault (2000) points out that, unless the demand in the housing market is low, there is no reason to fear this problem and difficulties can be overcome by investing in "...creative and attractive community design..." (p.2). Nevertheless, these are possible explanations for why certain groups may oppose TDR.

Transfer of development rights and density bonuses are politically and programatically appealing to local officials (Wiewel, Persky, and Sendzik, 1999) and used frequently as a means to preserve land and provide amenities at lesser cost, in situations where local governments are faced with fiscal stress. If the government is experiencing financial difficulties, developers may be required to provide other amenities in addition to the authorization to use DR in the receiving area. For example, local jurisdictions may require that developers use a number of DR in combination with the provision of a certain percentage of affordable housing in order to obtain the density bonus.

The approval of a density bonus involves a negotiation process between local officials and developers where electoral goals and profit maximization are the prime factors affecting the outcome. Because many of the consequences and costs of density bonuses are not immediately visible, local officials may be driven to provide "too much" incentive leading to economically inefficient outcomes.

Distributive effects of TDR programs can determine the decision of local communities and interest groups to support or oppose program enactment and

implementation and, ultimately, determine their success. However, other factors can play a role in the decision of local governments to adopt a TDR program. The following section addresses some of these determinants, which are not directly related to distributive consequences of TDR programs.

Additional Determinants of TDR Program Choice

The adoption of TDR programs by local communities is very often triggered by the goal of land preservation for agricultural, environmental or historic purposes. Regulatory instruments – purchase of development rights, condemnation procedures, open space zoning – are expensive ways of accomplishing these goals, since they involve land acquisition, high monitoring costs of decisions, and/or expensive court actions. From a financial point of view, market-based instruments are attractive ways to attain preservation goals, either because they have revenue generating properties (Feitelson and Lindsey, 2001) or because they allow great savings in accomplishing the same goals of traditional regulatory instruments. TDR programs fit in this latter category, by attributing the costs of land preservation to developers, investors, and other DR buyers. When communities face fiscal stress, they will be more likely to adopt TDR programs to pursue preservation goals.

TDR programs involve, nonetheless, administrative costs of implementation. Authors writing about TDR are almost unanimous in considering it to be a complex instrument that requires large administrative capacity by the government of the jurisdiction (Feitelson and Lindsey, 2001), especially since it should be adopted in conjunction with other land use management instruments (Micelli, 2002). Local governments with more technical skills and resources are more likely to implement TDR programs.

Case study evidence indicates that the complexity of use of TDR makes it more likely that high income and highly educated populations will favour the adoption of TDR in their jurisdiction (Feitelson and Lindsey, 2001). The reason for this support may also be a selfish one. Since TDR is likely to increase the price of new housing and diminish affordable housing, local populations may regard it as a means to keep low income newcomers out and attract only middle and upper class individuals and families.

Data and Methods

In the beginning of the year 2002, Richard Feiock and I mailed a survey to land use planners and growth managers in all jurisdictions of the state of Florida. The land use management survey instrument, entitled “Land Use Planning in Florida: Implementation and Impact”, gathered information on local comprehensive planning activities of the universe of Florida counties. Most of the independent variables are available for all 67 Florida counties. However, the number of county land use planners that responded our survey was 47, resulting in a response rate of 70 percent and an “N” of 47 observations. The survey allowed us to identify fourteen (14) TDR programs (ten voluntary and four mandatory) in place in Florida and use this information to question the circumstances under which they were adopted.

**Table 1 – Independent Variable Measurement and Predicted Coefficients
(Dependent Variable: TDR Programs)**

Variable	Description	Expected Coefficient
Sociodemographic Effects		
Density	Population per square mile	-
County Growth	Rate of population increase (1990-99)	+
Education	Percent of population w/ high school degree or higher	+
Environmental Interests	Land use planning survey (2002)	+
Developer Interests	Real Estate Firm Size (Employees / Firms)	+
Homeownership	Percent of owner occupied households	+
Partisanship	Percent Democrat Voters in 1996 Presidential election	+
Institutional Effects		
Form of Election	Number of Commissioners elected by District	-
Growth Management Grants	Growth management grants to local governments per capita (1998)	-
Administrative Capacity	Number of full time planning and development personnel	+

Table 1 describes the independent variables and expected coefficients of the estimation of the model. The data to estimate this model are drawn from several sources. The variables measuring socio-demographic effects are available in the 2000 edition of the Florida Statistical Abstract, with the exception of the environmental interests variable, which was collected by the survey instrument referred to above and varies from “1” indicating no environmental interest group activity and “5” characterizing jurisdictions where environmental interest groups are extremely active. Socio-demographic characteristics of county population are expected to reflect citizens’ preferences regarding TDR programs. *Density* and *county population growth* (1990-

1999) are included as control variables. All the variables report to 1999, except where noted.

Form of election is measured as the number of county commissioners elected by district and data were collected from the Florida Association of Counties website (www.fl-counties.com). Data on state *growth management grants* to local governments were obtained at Florida’s Department of Business and Finance (<http://www.dbf.state.fl.us/audit.html>). *Administrative capacity* is measured as the number of full time planning and development personnel employed by the jurisdiction. Table 2 reports the descriptive statistics for the independent variables.

Table 2 – Independent Variables – Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Socio-demographic Effects				
Density	29.3	15.7	9.2	87.3
County Growth	24.6	10.2	9.4	57.5
Education	70.4	9.0	54.5	84.9
Environmental Interests	4.2	.82	2	5
Developer Interests	7.9	4.2	3.5	27.4
Homeownership	75.5	8.0	54.9	86.4
Partisanship	44.0	6.98	28.3	66.4
Institutional Effects				
Form of Election	2.7	3.4	0	14
Growth Management Grants	4.6	5.2	.35	21.37
Administrative Capacity	9.5	11.9	1	60

The dependent variable used in this analysis has two possible outcomes. Since county governments face the choice of adopting (or not adopting) TDR programs, it is relevant to predict the likelihood that a county will adopt. The probit model employed here allows us to determine the probability that a jurisdiction, given its specific characteristics, will choose to adopt³. The probit model is estimated through nonlinear maximum likelihood. Heteroscedasticity-robust standard error procedures were undertaken to deal with heteroscedasticity and its undesirable consequences (underestimation of standard errors and overestimation of *t*-scores).

Empirical Results

Table 3 reports the estimated coefficients and standard errors for two Probit models. The dependent variable in the first model includes all TDR programs adopted (1 = adoption; 0 = no adoption), whereas the dependent variable in the second model

includes only the adoption of voluntary TDR programs (1 = voluntary program; 0 = otherwise). Transfer of development rights programs are more common in Democrat counties, with larger administrative capacity, receiving less state growth management grants, and where commissioners are elected at-large.

Table 3 - Probit Analysis Estimates
Dependent Variables: Total TDR Programs and Voluntary TDR Programs

Variables	TOTAL TDR		VOLUNTARY TDR	
	Coefficient	Std. Error	Coefficient	Std. Error
Sociodemographic Effects				
Density	-.010	.016	-.031*	.019
County Growth	-.010	.038	-.029	.040
Education	.003	.037	.117**	.050
Environmental Interest Groups	.120	.409	-.434	.518
Real Estate Interest Groups	.358***	.132	.510***	.123
Homeownership	.023	.049	.006	.057
Partisanship	.084**	.040	.098	.088
Institutional Effects				
Form of Election	-.322***	.123	-.698***	.176
Growth Management Grants	-55.48***	21.07	-71.0***	20.1
Administrative Capacity	.091**	.045	-.118*	.063
Constant	-8.828	5.759	-12.2*	7.11
Wald χ^2		24.31		40.79
Probability > χ^2		0.006		0.000
Pseudo R ²		0.52		0.59
N		47		47
*** P < 0.01				
** P < 0.05				
* P < 0.10				
All tests are two-tailed				

The use of district representation reduces the likelihood of adoption of a TDR program. This may indicate representation of geographic interests in local politics makes the types of exchanges and agreements necessary for TDR more difficult to achieve. In particular, opposition to TDR is more likely successful if commissioners are elected by district rather than at-large, because elected officials are less able to diffuse the effects of TDR programs. In other words, TDR programs entail positive or negative impacts across different electoral districts, thereby favoring electoral chances of local officials running by districts benefiting from TDR and hindering the chances of officials running by districts where TDR has negative impacts.

The negative effect of growth management grants in TDR adoption confirms the hypothesis that this market-type transaction is adopted when local jurisdictions face fiscal stress situations. Local governments in the state of Florida, especially county

governments, are heavily dependent on state growth management grants. When these revenues are reduced, county governments will look for less expensive ways to pursue land preservation policies.

The hypothesis that real estate developers favour the adoption of TDR programs is fully confirmed. Developers are likely to see in TDR a less threatening instruments to their interests. The use of more blunt land use regulation such as population/building caps or open space zoning hurts developers' interests significantly, and explains their preference for TDR programs, which may constitute business opportunities for real estate firms. The support of homeowners does not receive full empirical support, possibly because TDR is frequently a zero sum game in terms of redistributive consequences for homeowners.

Conclusions and Future Research

Transfer of development rights (TDR) is a market-based technique employed by local governments to preserve from development land with agricultural, environmental or cultural value. The growing importance of market-based instruments to preserve land and manage growth such as TDR, impact fees or exactions, density bonuses, among others, calls for a deeper understanding of the motivations present in the adoption of these techniques.

This work focused on the economic analysis of TDR markets and on the distributive consequences of TDR programs. Empirical data from county governments in the state of Florida indicates that TDR adoption is mainly influenced by institutional factors such as the financial situation and the administrative capacity of local governments. The hypothesis that TDR is a less costly preservation technique, but requires larger administrative capacity to be implemented is fully confirmed by the model. The analysis also suggests that TDR is a complex technique to understand and implement. It requires administrative efforts by the enacting government and highly educated communities to guarantee successful implementation.

The analysis also supports the idea that there is not a specific group that completely opposes TDR. Transfer of development rights is adopted in counties where real estate firm size is larger, which constitutes a strong indicator of support of this policy. The evidence regarding homeowners and environmental interest groups is mixed.

The preliminary analysis indicates that we have reason to believe that TDR is a more consensual land use management instrument than traditional command-and-control regulation and has potential to be used by other local governments in Europe and the United States. Future research should concentrate on collecting systematic data on program characteristics to allow further testing of the hypotheses developed here. In addition, comparisons between TDR programs should be made to establish which characteristics contribute to the successful attainment of program goals.

Notes

1. TDR programs can be single zone or dual zone, depending upon the existence of a single area where the transfer occurs between parcels or two areas (one sending another receiving) respectively (Johnson and Madison, 1997). Here the analysis is centered in dual zone transfer programs.
2. Maximum restricted value is defined as “the value of the property under the most stringent restriction that would be allowed by the courts under the police power” (Barrows and Prenguber, 1976: 764).
3. The estimation of predicted probabilities for several meaningful values of the independent variables was made, but the impacts were close to zero and are omitted.

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