

Gauging support for innovative farmland preservation techniques

Joshua M. Duke · Lori Lynch

Published online: 12 July 2007
© Springer Science+Business Media B.V. 2007

Abstract Given growing concerns about the loss of farmland in the US, governmental and nonprofit groups are seeking innovative, cost-effective methods to preserve lands that will elicit additional landowner participation. This article describes four innovative farmland preservation techniques and derives implications for the policy process through interviews of key stakeholders: program administrators, lawmakers, and landowners. Experts on farmland preservation were also interviewed to ensure stakeholder perceptions substantively inform the policy process. Four techniques were selected for assessment from approximately 30 novel techniques. Reactions to these policy options reflect stakeholder perceptions of a baseline condition; the perceptions help evaluate which options are likely to survive the policy process and what attributes will lead to their acceptability because few of these techniques have yet become policy. Although the stakeholders may have more limited experience with the policy process, land preservation experts validated many of the results and the possibility of success in the “rough and tumble” of the policy process. Of the four investigated techniques rights of first refusal was the most favored, although respondents thought effective implementation would require careful targeting and a dedicated funding source. Experts agreed this technique was most likely to survive in the political arena. Agricultural conservation pension was also viewed favorably, though it was considered administratively difficult to implement. Several experts thought that, though inchoate, the pension plan could potentially be more cost effective than rights of first refusal. Land preservation tontines were perceived to be an interesting concept, but confusing, difficult to implement, and ill-defined. Term conservation easements were viewed unfavorably because they did not preserve land permanently.

J. M. Duke (✉)
Food and Resource Economics, Legal Studies, and Economics, University of Delaware, Newark,
DE 19716-2130, USA
e-mail: duke@udel.edu

L. Lynch
Agricultural and Resource Economics, University of Maryland, College Park 20742 MD, USA
e-mail: llynch@arec.umd.edu

Keywords Rights of first refusal · Term easements · Land preservation tontine · Agricultural conservation pension · Agricultural land preservation

Beginning in the mid-1950s, concern about the loss of farmland led to the creation of various farmland protection policies. Farmland preservation programs have sought to preserve a productive land base for the agricultural economy, to preserve the amenity values of open space and rural character, to slow suburban sprawl, to provide wildlife habitat, and to provide groundwater recharge in areas where suburban development is occurring (Gardner 1977; Wolfram 1981; Fischel 1985; McConnell 1989; Bromley and Hodge 1990; Nelson 1992; Kline and Wichelns 1998; Duke and Aull-Hyde 2002). A recent national analysis of state preservation program enabling legislation found that states indicate five important goals (with the first three appearing most frequently): food security, environmental services, protection of rural amenities, planned development patterns, and a healthy local economy (Hellerstein et al. 2002).

Preserving farmland has widespread support among the public. Stated preference and other valuation studies have found significant willingness to pay for land preservation (for example, Halstead 1984; Bergstrom et al. 1985; Bowker and Didychuk 1994; Johnston et al. 2003; Duke and Ilvento 2004). Public choice research on the voting outcomes also indicates public support (McLeod et al. 1999; Kline and Wichelns 1994). According to Land Trust Alliance (2002) data, US voters have continued to pass ballot initiatives to fund open space and farmland preservation: in 2002, \$5.7 billion in conservation funding was authorized; in 2001, \$1.7 billion; and in 2000, \$7.5 billion. Furuseth (1987) also found that citizens living near farmland support preservation programs.

Support for preservation manifests in the proliferation of techniques to retain farmland, notably agricultural zoning, preferential property taxation, purchase of development rights/agricultural conservation easements (for simplicity, PACE), and transfer of development rights (TDR). All 50 states now have some version of preferential taxation for agricultural land. More than 124 governmental entities have implemented farmland preservation programs¹ (AFT 2001, 2005a, b) and over 1.67 million acres are now in preserved status. Spending in both state and local programs to purchase this acreage was \$3.723 billion (AFT 2005a, b). About 24 states permit agricultural zoning, six states have implemented growth management statutes that address farmland conversion, and 16 states have agricultural district laws with a variety of incentives to encourage farmers to participate (AFT 1997a).

Despite these established policies, there remains a seemingly broad and vocal consensus lamenting that too much farmland is being converted and that new and innovative techniques are needed (e.g., Levy and Melliar-Smith 2003).² The principal reasons given, which support the call for new techniques, are that: (1) PACE is too expensive; (2) TDR is not effective; and (3) preferential taxation only slows the rate of farmland loss but does not permanently retain the land (MALPF Task Force 2001; Gardner 1994; Lynch and Carpenter 2003; Blewett and Lane 1988; Parks and Quimio 1996; Heimlich and Anderson 2001). Some argue that existing techniques are insufficient (Adelaja and Schilling 1999), while others explicitly call for new techniques in urbanizing areas (Parks and Schorr 1997;

¹ Although there are 50 TDR programs, only 15 of them have protected farmland (AFT 2001).

² Although the preservation seeks to address inefficiencies (Nelson 1992), this article does not address the larger issue of whether farmland preservation is socially optimal or how many acres should be preserved.

Diaz and Green 2001) or the use of multiple techniques (Nelson 1992; Beesley 1999; Feitshans 2003; Daniels and Nelson 1986; Brabec and Smith 2002). Moreover, Daniels and Lapping (2005) claim that some regulatory approaches have actually exacerbated the problems preservation seeks to address. Similarly, Geoghegan et al. (2003), Irwin (2002), and Roe et al. (2004) find that preservation efforts can generate positive amenities for adjacent homeowners and may increase demand for housing near preserved parcels, which makes achieving the goals of preservation more difficult.

The published literature finds that existing techniques are either ineffective or not very effective and that many do not address the goals of farmland retention (e.g., Beesley 1999). For example, spillover effects and farmland fragmentation led Pfeffer and Lapping (1995, 85) to argue that “without strict zoning regulations farmland often becomes parcelized” and that “a ‘checkerboard’ distribution of farmlands” occurs such that farmers cannot operate at optimal scales. This suggests that a critical mass of adjacent farmland should be a goal of farmland preservation techniques and a rationale for prioritization for funds (Lapping 1979; Daniels and Lapping 2001). Even with this as a goal, however, programs do not often achieve it (Lynch and Musser 2001) and PACE alone will not likely achieve the goal (Daniels 1991). Furthermore, different techniques may be needed in different areas (Beesley 1999).

Given this backdrop, this article describes and investigates support for four innovative preservation techniques: (1) term conservation easements; (2) land preservation tontines; (3) rights of first refusal; and (4) agricultural conservation pension (ACP) with PACE. These techniques were selected so as to satisfy the goals of most farmland preservation legislation (Hellerstein et al. 2002), including the overall goals of maintaining the agricultural economy by preserving productive and profitable farmland, retaining open space, and limiting sprawl development (dealing with the population growth in a way that does not consume farmland at an excessive rate). These goals have been characterized by whether they maximize the number of acres preserved, preserve productive farms, preserve farms most threatened by development, and preserve large blocks of land (Lynch and Musser 2001). In addition, new techniques must be attractive to those landowners who have not chosen to participate in the existing preservation programs.

This research deviates from previous research in several ways. Three existing studies were identified that surveyed planners and/or other experts; Pfeffer and Lapping (1994) interviewed planners, Diaz and Green (2001) surveyed local officials, and Beesley (1999) surveyed, mainly, professors and planners. Zollinger and Krannich (2001) interviewed and surveyed landowners about their attitudes towards preservation techniques. In a Wyoming survey, Inman and McLeod (2002) estimated an empirical model explaining support for public versus private solutions to agricultural land-use problems and, surprisingly, found that landowners support public approaches when one controls for acreage owned. In a recent study, Korfmacher and Koontz (2003) interviewed a sample of members from Ohio’s “task forces,” which were convened to help establish PACE programs. Korfmacher and Koontz (2003) were mainly interested in how these task forces used information, but their approach was similar to ours: semi-structured interviews of citizens and officials involved in developing retention plans using a community based management model. This study extends these efforts with parallel interviews about innovative techniques using three groups of key stakeholders—farmland owners, lawmakers, and program administrators. These interviews were then supplemented by interviews with farmland preservation experts.

Beesley (1999) found that politicians and farmers are most important in the preservation process, followed by government agencies and planners. The interview approach differs

from the studies examining public support for preservation (mentioned above) and the studies explaining why landowners did or did not participate in an existing farmland preservation program (Phipps 1983; Pitt et al. 1986; Conrad and LeBlanc 1979; Rilla and Sokolow 2000; Lynch and Lovell 2003), which most often used survey data and reference single, more-common programs. In our study, respondents were asked baseline questions about what the landscape should look like, how much farmland is needed, and what preservation goals should be. Then, respondents were asked specific questions about the techniques themselves.

Third, this research specifically examines attitudes toward new techniques, while three other studies focus on more traditional techniques (Pfeffer and Lapping 1994; Diaz and Green 2001; Beesley 1999). Fourth, the techniques chosen for evaluation satisfy many of the goals and attributes identified by the demand-side, stated-preference, and other studies of farmland preservation. The four innovative techniques described and assessed may offer a way to lower the costs of preservation activities, increase participation, and/or increase the acceptability of preservation techniques (and thus political feasibility) among key stakeholders.

Fifth, this research provides a detailed investigation of an early stage of the policy process. Policy emerges from a process beginning with problems, constructing solutions, and implementing a selected policy. Evaluations of the process consider context and criteria. This research focuses on three stakeholder groups' perceptions of the possible ensuing policy processes associated with four unfamiliar policy options—these options are complex, only recently designed by administrators and experts, and have not been implemented. Specifically, the results help understand these groups' perceptions about these options and the broader process. The stakeholder results are then evaluated by a group of land preservation experts as to their completeness and for possible biases. Experts understand more of the nuance of the techniques, cost concerns and the difficulties of adoption and implementation in the policy arena. The article provides evidence on how the policy process will work based on our sampling of stakeholders and experts who are likely to participate in any subsequent policy process. In addition, the results suggest hypotheses about the performance of the ensuing processes and whether these policy options will achieve the goals stakeholders are likely to anticipate. The addition of the experts' evaluations suggest that "expert" testimony during the policy process will reflect similar concerns and recommendations to those expressed by the stakeholder groups. In addition, the experts could identify existing programs with similar provisions and how these could instruct the policy process in developing new techniques.

This article is organized as follows. The four techniques are described in the second section. Then, the third section describes the context of the study. The data collection methods and interview instrument are described in the fourth section. The fifth section presents the results of the stakeholder interviews. Likely acceptance is evaluated by analyzing the responses from the interviews with key stakeholders. The section derives synthetic results from the respondents, and then provides the expert evaluation of the synthesis with respect to rights of first refusal (ROFR) and ACP. A final section discusses the results.

Conceptual framework: four preservation techniques

Duke and Lynch (2006) describe and classify 29 distinct preservation techniques in four types—regulatory, incentive based, participatory, and hybrid. Regulatory techniques define agricultural land markets by specifying the maximum intensities of both agricultural and

nonagricultural land uses. Incentive-based techniques increase the costs facing landowners who convert agricultural land or lower the costs facing landowners who pursue socially desirable preservation goals. Incentive-based techniques differ from regulatory techniques in that they do not alter the institutional structure of markets; they simply alter relative prices within markets. Participatory techniques involve the government acting as a demander (buying land fee simple) or supplier (selling land with an easement attached) in a land market. Hybrid techniques combine the characteristics of two of the preceding types of techniques.

This section describes two types of participatory techniques: rights of first refusal and term conservation easements. One incentive-based technique and one hybrid technique are also evaluated: the land preservation tontine and the agricultural conservation pension. Table 1 offers a summary evaluation for the four techniques from Duke and Lynch (2006). In effect, these claims provide hypotheses to be compared with data collected from landowners, administrators, and the lawmakers. The results show that most of the hypotheses proposed in Table 1 are supported by the stakeholders. However, some were not. For example, landowners did not support term easements, and administrators suggested that the ACP would be too difficult to implement. For some techniques, it was unclear whether the hypotheses were supported or refuted because the subjects could not provide well-constructed opinions. More details on the specific program design were needed for them to make a complete evaluation.

Rights of first refusal

Rights of first refusal enable agencies to match offers that agricultural landowners receive from developers (Malcolm et al. 2005). ROFR ensure that agencies are “at the bargaining table” whenever landowners decide to sell for development and allow an agency to decide whether to match the price negotiated between the developer and the landowner. If the offer is matched, the agency prevents a conversion and buys the land. Unlike other preservation programs, the government does not pay any money—or, only nominal sums for the right—until an offer has been made, the farmer has decided to sell, and conversion is imminent. ROFR should be a cost-effective land preservation tool because only those parcels actually threatened with conversion are targeted.

After purchasing those parcels deemed desirable, an agency can resell the land for an agricultural use with an easement attached and thus only bear the costs of the conservation easement. Rights of first refusal are classified as a government-participatory technique because a state agency participates in an existing market for lesser rights in land (Duke and Lynch 2006) and can be linked to other programs. For instance, agreeing to ROFR could be a condition for participating in a use value assessment program. Or, the government could use eminent domain to obtain ROFR in key areas. This technique could be voluntary or compulsory in a targeted area.

Developers may be opposed to this technique since they invest resources in developing offers. It also could decrease the supply of land available, which will increase the price of developable land. Agricultural landowners and developers also could potentially collude to increase the price of the land. Implementation challenges may arise. For example, administrators would need to justify the purchase of individual parcels. Purchasing the land is more expensive than purchasing development rights. Furthermore, once purchased, administrators would either need to sell the land with easements attached (potentially taking a loss) or manage the property with all the inherent staff and resources needed.

Table 1 Evaluation of farmland preservation techniques (relative to the average technique)

Evaluation criteria	Explanation	Term easements	Land preservation tontine	Rights of first refusal	Agricultural conservation pension PACE
<i>Property rights issues</i>					
Right holder	Implied holder of rights to develop	Landowner	Landowner	Landowner	Landowner
Duration	How long is the retention supposed to last?	Temporary	Temporary	Permanent	Permanent
Credibility of persistence	How easy is it to redefine rights, say, through variances?	Persistent	Persistent	Persistent	Persistent
<i>Satisfaction of the goals of farmland preservation</i>					
Acres enrolled	How does the technique promote one goal relative to other techniques?	Average	More effectively	Less effectively	Much more effectively
Conversion prevented		More effectively	Average	Much more effectively	More effectively
Productive farms		Average	More effectively	More effectively	Average
Critical mass		More effectively	Much more effectively	More effectively	Average
<i>Financing</i>					
Financing source	From what source will preservation be funded?	General tax revenues & bonds	Self-funding or general tax revenue & bonds	General tax revenues & bonds	General tax revenues & bonds
<i>Stakeholder acceptance</i>					
Agricultural landowner	How likely is the technique to be accepted relative to the other techniques?	Very high	Somewhat high	Average	High
General public		Somewhat high	Somewhat high	Somewhat high	Somewhat high
Environmentalists		Very low	Somewhat high	Somewhat low	Average
Developers		Somewhat low	Average	Very low	Somewhat low
Program administrator/simplicity of implementation	How challenging is it to implement the technique relative to the other techniques?	Easier	Harder	Easier	Average

Table 1 continued

Evaluation criteria	Explanation	Term easements	Land preservation tontine	Rights of first refusal	Agricultural conservation pension PACE
<i>Attract nonparticipants</i>					
Attract	Does the program have an ability to attract (or force) participation from those not participating in existing farmland preservation efforts?	Some ability	Some ability	Unusual ability	Unusual ability

Source: Adapted from Duke and Lynch (2006)

Term conservation easements

Term conservation easements preserve land by allowing a government or nonprofit agency to pay landowners a rental fee in exchange for a negative easement, prohibiting a set of activities associated with development for a set period of time. Duke and Lynch (2006) classify this as a governmental-participatory land preservation technique because the government acts as a participant in an existing market for lesser rights in land. Agricultural landowners are familiar with buying and selling leases to farmland for production and conservation. Some landowners who chose not to participate in PACE might be attracted to a “lease” of conservation easements because it is familiar and because it is for a temporary period.

These leases should be less expensive (per year and for the set period) than PACE because there is no permanent commitment. In this sense, term easements could be used to preserve, at a lower cost and temporarily, critical areas during periods when there are insufficient funds for higher levels of preservation. Moreover, because participation ought to be greater under the shorter time frames, leases could be used in a similar fashion to moratoria to stabilize a particularly threatened region until a more permanent solution could be adopted. However, given that some landowners do not participate in PACE because of perceived obstacles or insufficient payments paid, these landowners may actually need higher payments to participate in a term conservation lease than existing PACE participants.

Land preservation tontines

An agricultural land preservation tontine is a contract that internalizes the negative pecuniary and technological externalities³ that one agricultural landowner who converts imposes on neighboring owners remaining in agriculture. Specifically, the tontine provides incentives for owners to maintain agricultural land use through:

- (1) claims to a fund that owners forfeit when they convert (prototypical version); or
- (2) claims to a penalty that converting owners pay to owners remaining in agriculture (alternate version).⁴

Duke and Lynch (2006) offered an original development of the prototypical version after they were unable to find a written source that describes the use of tontines for agricultural land preservation. This article evaluates the prototypical version. Tontines address the external effects that neighboring agricultural landowners have on one another rather than acting as a method of providing the amenities and environmental benefits (public goods) from farmland preservation. They could be used alone or in conjunction with other preservation techniques.

³ Several impacts on remaining farmers arise from conversion. First, conversion brings residents into agricultural areas so that remaining farmers likely operate below their most intensive, profitable level to prevent agricultural nuisance lawsuits. Second, these changes are capitalized as a lower value for remaining lands in agriculture land use, which in turn raises the incentive to convert. The impact of conversion also may lower or raise the value of land in developed use, depending on several factors in the land market. The authors contend it is likely that the value of agricultural land in developed use rises as neighbors convert. Hence, the incentive to convert increases further.

⁴ Michael McGrath, a planner with the State of Delaware, first sketched the alternate version of this technique in the following scenario. Assume 10 farmers agree to the land preservation tontine contract and assume that there is no initial capital. If one owner sells to a nonfarmer or gets a subdivision plan approved, then the remaining nine share 10% of the proceeds. In this version, there is no need for any member or the government to establish a cash fund.

The land preservation tontine provides an increasingly powerful incentive because, as more of their neighbors convert, the pool of remaining owners shrinks and their payouts rise with the last owner of agricultural land “winning” the entire fund. Tontines are essentially contracts among landowners rather than an interaction between landowners and governments. The conversion decision of any one agricultural landowner in productive areas affects the viability of his or her neighbors’ operation—even though that landowner has the right to convert. In this sense, tontines are designed to achieve a key preservation goal of avoiding the fragmentation, and maintaining a critical mass, of agriculture land.

Agricultural conservation pension

Since many agricultural landowners say the equity in their land is their retirement fund (Lapping 1979), one assumes that, if their retirement could be financed another way, then the owners would not need to sell for development when they retire. The ACP plan concept guarantees retirement income to farmers who attach an easement to their land as well as other benefits. The guaranteed income attenuates the risks owners face if their accumulated savings is too low to retire merely on the proceeds of selling their land for its agricultural value rather than its development or market value. In addition, the expected value of the pension may be higher than the expected returns to selling land. States are better positioned to insure against cyclical savings risks than individual farmers because they can pool risks over the population of farmers and/or state employees. This technique also benefits the taxpayers by spreading the financial burdens of PACE over a long period of time.

Duke and Lynch (2006) classified this technique as a hybrid of an incentive-based technique (pension incentive) and a participatory technique (government participation in the market for less-than-fee-simple rights in land). Two general versions are the pension tied to the land as an annuity and the pension tied to the owner.

In the annuity version, described by McGrath, a pension runs with the land rather than a specific owner. If one farms for X years in the program, the pension runs for X years. In the owner version, the payments would be tied to an individual/couple and act as a pension from a retirement age (say, 65 years) until the person’s death. This version takes advantage of the risk-pooling benefits of the state. In both versions, the easement restriction is permanent.

Alternatively, the program could be designed as a reverse mortgage, which converts the value of the conservation easement into cash to live on during retirement. In this case, the owner could extract a percentage of the land value each year to finance living expenses. The government could ensure that these payments will continue for the life of the owner and/or spouse in exchange for an easement or outright sale of the land. When the owners die, the estate would be settled so that the land is sold for farming purposes and the following owner would not be eligible to participate in the pension plan. During the interviews, the respondents were initially presented with the “owner” version, but many variations arose in the discussions. As such, the comments presented below were more exploratory than a definitive reaction to a single version of the technique.

Context

The geographic and administrative context for this study requires explanation. In addition, the land-use pressures which drive and interact with stakeholders need to be clarified.

Delaware and Maryland are neighboring states in the Mid-Atlantic area of the eastern United States. They share a coastal edge to the Atlantic and a common border with one another on the Delmarva Peninsula. They have similar agricultural regions and share a major interstate highway shipping products to markets along the Washington, D.C.–Boston corridor.

Both Delaware and Maryland have lost a large percent of their farmland in the last 50 years; 32% loss of Delaware farmland and 47% loss of Maryland farmland (USDA 1999) as their populations have increased 135% and 119% respectively (U.S. Census Bureau 1999). And the threat of continued loss remains high. The American Farmland Trust ranked the Northern Piedmont region (southeastern Pennsylvania, Maryland, and northeastern Virginia) as the second most threatened agricultural area in the US; and the Mid-Atlantic Coastal Plain/Delmarva Peninsula (Delaware and Maryland's Eastern Shores) as the ninth most threatened based on each area's market value of agricultural production, development pressure, land quality, and high rates of farmland conversion (American Farmland Trust 1997b).

The Maryland Office of Planning predicts that 500,000 more acres of farms, forests, and other open spaces will be converted to development over the next 25 years under current trends. In the Washington, D.C., metropolitan area, the rate at which land is being consumed exceeds the population growth rate by almost 2.5 times (Chesapeake Bay 2002). Both Maryland's and Delaware's populations are projected to increase by 2020. Maryland's population is projected to grow 11.5% to 6 million people by 2020 and Delaware's population 24.5% to almost 1 million people. Therefore, the ongoing concerns about the conversion of agricultural land to housing and commercial development are well founded.

Faced with the high rates of agricultural land conversion, Maryland became one of the first states to introduce a state-wide preservation program in 1977. It has preserved almost 200,000 acres at a cost of \$335 million or \$48 per capita. Delaware began its program in 1991 and has protected 65,000 acres at a cost of almost \$70 million or \$87.14 per capita. In addition, 12 of Maryland's 23 counties have begun local preservation programs. Three of these counties rank in the top 10 nationwide in terms of acres preserved. Preserving more land continues to be an important objective in both states. For example, Maryland has set a goal of preserving more than 1 million acres of farmland with an expected additional cost of \$4.58 billion (Lynch et al. 2007). However preservation is becoming more costly as the value of land continues to increase; between 2005 and 2006 13% in Maryland to \$8,900 per acre and 21% in Delaware to \$10,200 per acre. Faced with the land-consuming development patterns mentioned above and limited budgetary resources, both Maryland and Delaware are seeking alternative strategies to increase the rate of preservation as waiting lists of landowners increase in both state programs. Maryland accepts less than half of the offered parcels for preservation due to budget concerns.

Data

Data for this study were collected using interviews of various stakeholders and decision makers. In-depth individual or small-group interviews were conducted with four landowners, four lawmakers, and six administrators. Of these, nine were male and five were female. Sample statistics are presented in Table 2.

The three types of respondents were selected to represent the principal actors in an ensuing policy process, where one or more of these techniques would be refined and implemented. University human subjects' protections prevent us from describing

Table 2 Summary of interviews conducted in Delaware (11) and Maryland (3)

Interviewees	Participants	Gender
Landowners	4	2M, 2F
Public program administrators/officials (all individual interviews)	5	5M
Nonprofit program administrator/official	1	F
Lawmakers (one group and one individual interview)	4	2M, 2F
Total	14	9M, 5F

respondents in ways that may reveal their identity. The administrators would play three roles. They are experts in land use planning who design and best understand the sophisticated planning techniques described here. Administrators also would serve as experts in the policy process, where their opinions may be of higher value to certain stakeholders and where there may be a tendency to “champion” one version of a policy. In the policy process, administrators will also be influenced by concerns and goals regarding their subsequent role in implementing policy. Lawmakers and landowners have not been involved in the construction of the techniques; however, they would take an active role in the policy process. Lawmakers would likely regard the policy process as a way to balance the interests of competing constituencies, with a tendency to favor policy options that would most satisfy their political base and personal preferences. Landowners would be expected to direct the policy process in ways which would personally benefit their values in land use and those that they wish to perpetuate. Although landowners and lawmakers would be concerned about policy implementation, *vis-à-vis* their interests, they will both have a broader perspective than administrators who would be relatively more concerned about the details of implementation.

Respondents for this analysis came from both the Piedmont Area and Delmarva Peninsula mentioned above as the second and ninth most threatened agricultural regions in the US. All the respondents, except the lawmakers, have been landowners or involved in land preservation for the last decade—most for 20 years. They have been involved in farming, private nonprofit organizations such as land trusts, regional organizations and public statewide preservation programs. All the administrators would know one another but may not collaborate on a daily or even monthly basis as they tend to attract different landowners. All the respondents are intimately familiar with the rate of farmland loss and the difficulties in enrolling farmland given the increasing land values and limited budgets. Given the states’ experience with both private and public attempts to preserve land, respondents were selected to interview based on their capacity to evaluate new techniques and the possibility of implementing them.

The same instrument (script of questions) was used in each interview, although the emphasis on specific items in the instrument varied in response to the dynamics of the interview process. Program administrator and landowner interviews began with several baseline questions about preservation preferences: (1) What should the agricultural landscape look like?; (2) How much agricultural land is needed?; and (3) What should the goals of farmland preservation be?

Then, the enumerator would describe a technique in disinterested terms and a series of questions would guide discussion of that technique:

1. Do any aspects of program X appeal to you?
2. Do you find any aspects of program X to be not appealing (or objectionable)?

Landowners were asked these additional questions:

1. Would you consider participating in program X?
2. Do you think your neighbors would consider participating in program X?
3. What would participation hinge upon?

Administrators were asked these additional questions:

1. What aspect of X is easy (or hard) to administer?
2. What aspect of X is easy (or hard) to fund?
3. What is your perspective on constituents' support or opposition to this program?

Lawmakers were asked one additional question:

1. What is your perspective on constituents' support or opposition to this program?

Interviews with all three groups concluded with a question asking for a specific comparison about which technique is the most attractive. Interviews lasted between 45 min and 2 h. Each session was tape recorded and then transcribed.

After establishing the baseline condition with the stakeholders, additional interviews with experts were conducted to determine the feasibility, appropriateness, and likely cost effectiveness of the two most promising techniques: ROFR and ACP. Respondents included four national land preservation experts who understand the institutions of land preservation and the policy process by which these processes are further refined and implemented. Interviews were conducted individually via the telephone guided by the instrument below. The interviews were conducted in March 2007. Experts were presented with the findings from the initial round of interviews and then asked:

1. What do you think are the main advantages of ACP and ROFR? Would you say these concur with the stakeholders?
2. What do you think are the main shortcomings of ACP and ROFR? Again, have the stakeholders identified similar ones and/or missed others?
3. Do the stakeholders' evaluation of ACP and ROFR seem realistic? Biased?
4. Of possible farmland preservation techniques, do you think these two approaches are the most cost-effective?
5. Of possible farmland preservation techniques, do you think these two approaches would elicit participation and society could achieve its goals?

Results

All three stakeholder groups thought ROFR was most appealing in terms of both cost and acceptability. Although significant implementation hurdles were noted, the interviewees had the ideas and motivation for overcoming these challenges. In contrast, no group found term conservation easements appealing and many respondents found the temporary nature of the program to be a fatal flaw.

Most respondents viewed the land preservation tontine technique as interesting but too unusual to be acceptable, and they noted significant implementation challenges. Tontines were described only in general terms and, not surprisingly, many respondents had trouble understanding the concept. This result is similar to Zollinger and Kranich's (2001) finding that PACE programs were generally unpopular and were only acceptable to those landowners who were already familiar with them. Almost all respondents found the agricultural

conservation pension to be an attractive technique. Like tontines, however, most wanted further details to determine how acceptable and cost-effective it would be in practice. The main concerns involved the formula for turning land value into pension payments and the method for compensating the successors in interest (to the land) or survivors (of the owner). For both tontines and the pension plan, the technique could be redesigned to be more specific and then further research may be warranted.

General perceptions about preservation⁵

Collectively, administrators express a broad, yet nuanced, vision for the agricultural landscape (Table 3). Landowners, in contrast, were more interested in the details of land use planning and the state land preservation process. While landowners expressed preferences for some landscape attributes, they did not articulate specific preservation goals. Administrators offered many goals for farmland preservation, classified here as agricultural, orderly development, and other goals. The administrators lack agreement on the importance of aesthetic and open space services. Balancing these competing goals was a challenge noted by Pfeffer and Lapping (1994) in their survey of planners.

Both landowners and administrators supported using preservation to perpetuate a historically agrarian landscape while allowing agricultural uses to evolve over time. Landowners expressed frustration with the state using eminent domain powers for roads. The importance of eminent domain to these landowners reinforces Beesley's (1999) concern that the effectiveness of a technique will be affected not only by the incentive structure of the technique, but also by external conditions affecting the agricultural region and other public policies. Landowners were especially concerned about changes currently occurring in agricultural areas and the recent escalation in land prices for development.

Following the discussion of general views about farmland preservation, the three groups were asked the scripted questions about the four techniques. The following subsections synthesize each group's thoughts about the techniques. In addition, Tables 4–6 contain the specific comments made by administrators, lawmakers, and landowners, respectively. The rows in these tables represent the interview questions outlined in the data section, while columns refer to techniques. Comments in each cell are further organized in terms of three main challenges associated with preservation techniques identified in Duke and Lynch (2006): (1) cost, i.e., whether the technique is perceived to be more or less cost-effective; (2) acceptability, i.e., to landowners and other interested parties; (3) timing, i.e., in terms of enrollment, permanency, etc.; and (4) other relevant comments about acceptability.

Term conservation easements

Term conservation easements found little favor from administrators, lawmakers, and landowners. Most respondents viewed negatively the temporary attribute of term easements relative to the permanence of PACE. Although some respondents identified important benefits of the technique—such as attracting new participants—most respondents viewed the temporary nature of term easements to be a fatal flaw. This flaw likely explains most of the respondents' disapproval and contrasts with previous results on support for the similar, but permanent, PACE technique; Pfeffer and Lapping (1995) report

⁵ This set of questions was asked only of the landowners and program administrators

Table 3 General views on land preservation

	Program administrators	Landowners
What Should the Goals of Farmland Preservation Be?	<p><i>Agricultural Goals:</i></p> <p>Viable agricultural economy</p> <p>Agricultural productivity/protection of best soils</p> <p>Agricultural, not an open space, focus</p> <p>Avoid impermanence syndrome</p> <p>Need for critical mass</p> <p>An adequate agricultural land base</p> <p>Improve farm practices and water quality</p> <p><i>Orderly Development Goals:</i></p> <p>Stop development from gaining momentum</p> <p>Not spreading cluster development in countryside</p> <p><i>Other Goals:</i></p> <p>Protecting sensitive ecological areas</p> <p>Scenic and open space values</p> <p>Cultural and historic values</p> <p>Preserve as much land as possible</p>	<p>Landowners had no specific vision for program goals because they have concerns (distrust) about state and local governments' ability to solve land problems—however they can picture the landscape they would like (see below)</p> <p>Appreciate ability to pass on land to family</p> <p>Concerned about rapidly escalating value of land—help keep farmland affordable</p>
What Should the Landscape Look Like?	<p>Historic agricultural landscape with working farms</p> <p>Agricultural use that evolves over time</p> <p>Aesthetics should be an “outcome, not an objective”</p> <p>OK to mix agriculture with other uses sometimes</p>	<p>Open space</p> <p>Historical agrarian landscape attributes</p> <p>Natural wooded settings</p> <p>Concentrate development and avoid rural sprawl</p>
How Much Agricultural Land is Needed?	<p>Triple the acreage preserved</p> <p>Can vary given other goals</p> <p>Uncertain—number of acres is a moving target</p> <p>Enough to support infrastructure of agricultural input sector</p> <p>Enough so the area looks agricultural</p>	<p>Enough to avoid condemnation for roads</p> <p>Agriculture cannot compete with development in the price of land—difficult to keep in agriculture</p>

that planners thought 45% of farmers would support PACE. Few respondents thought new funding for the term conservation easements could be obtained.

Administrators did not support this technique, although they acknowledged certain benefits. Specifically, term easements might enroll a large number of acres at a low cost, thus buying time to employ alternate preservation techniques, and might attract new participants who are wary of long-term commitments. Nonetheless, administrators perceive this technique to provide merely temporary benefits with the same or even higher administrative costs than PACE because of anticipated higher levels of monitoring and enforcement. Overall, term easements would have questionable cost effectiveness and, for this reason, would be tough to sell to lawmakers and the general public. The administrators lacked consensus about whether the technique would actually be less expensive—when all costs are considered—than PACE.

Table 4 Program administrator responses

Term easements	Agricultural preservation tontine	Rights of first refusal	Agricultural conservation pension with PACE
Appealing	<p><i>Cost</i> Increased trust among neighbors would reduce monitoring costs Progressively increasing incentive to remain in farming No downside for owners if state financed A collective way to manage risk—at a lower cost <i>Acceptability</i> A private solution—no governmental role Would appeal to owners who distrust government Creates a formal incentive to stay in agriculture—everyone wants to be the surviving owner A grassroots solution—farmers want to ensure that their area remains in farming <i>Timing</i> May help bind farmers to a course of action when the farm is owned by many owners (say siblings or cousins) Chain reactions: developers leave; farmers invest</p>	<p><i>Cost</i> Should be inexpensive if owners are comfortable with government <i>Acceptability</i> Should be some interest among certain types of farmers Offers flexibility <i>Timing</i> Targets parcels truly threatened so timing matches threat <i>Other</i> Could be designed to target certain areas in the state requiring intervention Gives policy makers a high degree of control Can target key parcels Appealing if integrated into the use-value assessment program—also may stop developers from taking advantage of use-value assessment</p>	<p><i>Cost</i> Pooling of risks provides advantages^a <i>Acceptability</i> Generate new participants—many avoid PACE because “my land is my pension” Deals directly with an important, frequently cited incentive to convert—retirement^a Could this plan correctly counteract the conversion incentive and satisfy owners? <i>Timing</i> Leverages dollars as PACE payments paid over a long period of time Expedite the transfer of land to young farmers <i>Other</i> Provides security^a Paying people to be farmers with a pension Buying annuities rather than easements</p>

Table 4 continued

	Term easements	Agricultural preservation tonline	Rights of first refusal	Agricultural conservation pension with PACE
Unappealing/ Objectionable	<p><i>Cost</i></p> <p>“A glorified transfer payment of public funds to farmers”</p> <p>Questionable cost effectiveness—much of enrolled land would not be developed, so what benefit is secured?</p> <p><i>Acceptability</i></p> <p>May undercut perceived attractiveness of existing permanent programs</p> <p>May attract the wrong type of participants, like developers waiting to develop</p> <p><i>Timing</i></p> <p>Temporary^a</p> <p>Questionable durability^a Landowners enroll while they wait to develop—join once but not re-enroll</p> <p>“Going in the wrong direction” because the durability of permanent easements is increasingly being challenged</p> <p><i>Other</i></p> <p>Not clear what is being purchased</p> <p>Not adaptable to future circumstances</p>	<p><i>Cost</i></p> <p>Potential for bad incentives, including corruption</p> <p><i>Acceptability</i> “Strange” and “weird”^a and so unusual</p> <p>Do not call it “tonline” “I just do not see how it could work”</p> <p>Landowners will have trouble understanding this and would not risk participating</p> <p>Why not just create a farmer’s cooperative?</p> <p><i>Timing</i></p> <p>Will the incentive really stop the farmer who has a life event?</p> <p><i>Other</i></p> <p>Difficult to understand—do not see what government’s role will be^a</p> <p>If funded publicly, could farmers collude to undercut the incentives</p> <p>May create animosity among neighbors</p> <p>How could the pot provide a large enough incentive to override the incentive to convert?</p>	<p><i>Cost</i></p> <p>Difficult to get the rights voluntarily</p> <p>May require a lot of money up front, with little immediate returns on what that money was spent for</p> <p>Inflate cost of purchasing land/rights</p> <p>“Large” offer may be contingent on a subdivision, which has little chance of being approved</p> <p>Unlike PACE, which preserves now at low cost, ROFR waits and could be very high cost</p> <p><i>Timing</i></p> <p>Farmers and developers will figure out which parcels are enrolled on their own, through word of mouth</p> <p>Uncertain how this will affect speculation</p> <p><i>Other</i></p> <p>Opportunities for fraud</p> <p>State is going to be taken advantage of by developers and owners will abuse/manipulate the system if targeted parcels are known^a</p>	<p><i>Cost</i></p> <p>Annuity has to be large enough to “get people’s attention”</p> <p><i>Acceptability</i></p> <p>Health insurance is more important</p> <p>Might not leave enough money in the land for heirs in large families</p> <p><i>Timing</i></p> <p>More attractive to young farmers</p>

Table 4 continued

Term easements	Agricultural preservation tontine	Rights of first refusal	Agricultural conservation pension with PACE
<p><i>Difficulties in Administration and Funding</i></p> <p><i>Cost</i> High monitoring and enforcement costs— even more than permanent easements^a More staff time than the permanent program Need dedicated source of funding Participants need assurances that money will be there each year in the future May be cheaper to purchase permanent easements^a <i>Acceptability</i> IRS passed regulations requiring that easements be perpetual to be tax deductible <i>Timing</i> Difficult to negotiate a yearly payment 10 or 20 years into the future—how do you account for land market changes and inflation?</p>	<p><i>Cost</i> Must figure out the state's role in enforcement to avoid litigation every time a farm is sold Need a significant amount of state funding to get landowners interested—say, dividends Where will the money come from? A lot of administration effort in getting groups to agree Managing the money may be easy, but not managing the participants if behavior degenerates Higher management costs than PACE <i>Acceptability</i> How to articulate, clearly, how this tool works?^a Difficult to generate participation, motivate the formation of tontines, and educate</p>	<p><i>Cost</i> Requires additional staff—more effort than PACE, although some disagree Need a database to monitor when farms are sold—need for monitoring mechanism^a State could hold purchased properties over time, but with more management expenses Large funding required at uncertain times^a; need an “Emergency Land Protection Fund” Need funding up front to attract owners Use seed money to begin purchases, then account rises with land sales and falls with purchases Unlikely to have a large endowment that the state promises not to touch <i>Acceptability</i> Not all agencies can own land fee simple Ownership may be a burden on the state Easier to get funding if a well- developed targeting plan exists</p>	<p><i>Cost</i> Complicated for PACE staff, but may rely on other groups in government that handle pensions Because the payment is made over time, PACE staff may be familiar with this sort of financial arrangement <i>Acceptability</i> Sell to the legislature as another way to get development rights Consider whether this is a way to avoid the estate tax? <i>Timing</i> Implement for people who are younger <i>Other</i> Difficult to determine a value—normal pensions are based on salary, but this one is different and more complicated Create a formula (instead of salary and years of service into pension) where farm value is analogous to salary</p>

Table 4 continued

Term easements	Agricultural preservation tone	Rights of first refusal	Agricultural conservation pension with PACE
<p><i>Other</i></p> <p>Difficult unless the agency has an existing permanent program with the accompanying infrastructure</p> <p>Some participants will want to break the agreement; should the contract be “iron clad” or should there be a penalty for leaving?</p> <p>A rollback penalty would counter some undesired incentives from landowners—i.e., enroll, then leave and convert</p>	<p>Unsure if people would participate; perhaps, try a pilot project to understand the challenges</p> <p>Clarity of acceptable activities essential</p> <p>Uncertainty—“How big does the pot have to be to affect the decision making of farmers?”</p> <p>Need more work on the incentives—think hard about the possibility for side deals, and how to deal with these</p> <p>May be a “bias” in the legislatures against innovation—what we do is working, so why try something new?</p>	<p>Any targeting plan will upset some folks if they are not in the targeted area</p> <p>Increase familiarity—perhaps start by having the farm community ask for ROFR with their leases</p> <p><i>Timing</i></p> <p>May take time to figure out what land is really worth</p> <p><i>Other</i></p> <p>Difficult to write law, write contracts, and defend it in litigation</p> <p>May get very complicated in rules for resale</p>	<p>State preservation is well-positioned to do this, depending on the volume</p> <p>Need to prevent fraud: if board does not act on its ROFR, then severe penalties if developer does not buy</p> <p>Publish the list of targeted farms so developers believe the state will credibly match offers</p> <p>Develop a contract-enforcement plan</p>
<p><i>Timing</i></p> <p>Challenges in the state’s role: how to make the process timely?</p> <p>Lawyers need to figure out how to write the contracts</p> <p>Legislatures need to create enabling statutes</p> <p>Figure out how a pot of money will adjust over time to reflect inflation and land-market conditions</p> <p>Might be able to combine with other tools</p>	<p>Challenges in the state’s role: how to make the process timely?</p> <p>Lawyers need to figure out how to write the contracts</p> <p>Legislatures need to create enabling statutes</p> <p>Figure out how a pot of money will adjust over time to reflect inflation and land-market conditions</p> <p>Might be able to combine with other tools</p>	<p>State preservation is well-positioned to do this, depending on the volume</p> <p>Need to prevent fraud: if board does not act on its ROFR, then severe penalties if developer does not buy</p> <p>Publish the list of targeted farms so developers believe the state will credibly match offers</p> <p>Develop a contract-enforcement plan</p>	<p>State preservation is well-positioned to do this, depending on the volume</p> <p>Need to prevent fraud: if board does not act on its ROFR, then severe penalties if developer does not buy</p> <p>Publish the list of targeted farms so developers believe the state will credibly match offers</p> <p>Develop a contract-enforcement plan</p>

Table 4 continued

	Term easements	Agricultural preservation tontine	Rights of first refusal	Agricultural conservation pension with PACE
Perspective on Constituent Support	<p><i>Cost</i></p> <p>Tough to fund (sell to lawmakers)—a cost for a nonpermanent benefit^a</p> <p>Could be seen as throwing money away</p> <p><i>Acceptability</i></p> <p>Talbot County, MD, tried this and failed because state-level politicians did not like the temporary nature</p> <p>Easier to sell if it were linked to a target group, like new farmers</p> <p>Public has to learn about the technique and be convinced that this is good policy</p> <p>Public already buys into PACE—a new term easement program may cause confusion or skepticism</p> <p>Landowners will be attracted to the temporary attribute—more flexible</p> <p>Landowners should like it because benefits are more tangible than Agricultural Preservation Districts</p>	<p><i>Cost</i></p> <p>Taxpayers will not fund it because it is too “weird”</p> <p><i>Acceptability</i></p> <p>“Free market crowd” may find this appealing</p>	<p><i>Acceptability</i></p> <p>Farming community will not accept it if it is perceived to be a new regulation (i.e., is coercive)^a</p> <p>May feel “creepy” to landowners if coerced or as a requirement for participation in another program</p> <p>Passionate agricultural landowners may participate, but other may not without a strong incentive</p> <p><i>Other</i></p> <p>If the state exercised ROFR on every property in a targeted area, then developers would stop bringing offers to these farmers—this could alienate developers and drive up the costs of the contracts</p>	<p><i>Acceptability</i></p> <p>Varying views on attractiveness to farmers and whether it will generate interest</p> <p>Most farmers are already comfortable participating in government programs, so they probably will not object to the arrangement with the state</p> <p>Nonfarmers may object, saying how come we do not get a pension?</p> <p>Version with a low monthly payout and a bigger death payout would probably sell better</p> <p>Better for farmers who do not need cash for their agricultural operations</p> <p><i>Other</i></p> <p>Determine whether farmers who sell were just making “excuses” when they claimed retirement is the reason farmers would like the security^a</p> <p>Amish or Mennonite farmers may not want to be seen as employees of the state</p>

Table 4 continued

Term easements	Agricultural preservation tontine	Rights of first refusal	Agricultural conservation pension with PACE
<i>Timing</i>	Easier to sell as a solution inside a growth zone with PACE outside the zone		
<i>Other</i>	Viewed as a poor-quality technique: “Do not like investing the time and effort into anything that is less than perpetual”		

^a Indicates that atleast two people made this comment

Table 5 Lawmaker responses

	Term easements	Agricultural preservation tontine	Rights of first refusal	Agricultural conservation pension with PACE
Appealing	<p><i>Timing</i> May slow the progression of sprawl development</p> <p><i>Acceptability</i> Help where the permanent program has been less successful</p>	<p><i>Cost</i> An incentive to preserve for the last party</p>	<p><i>Cost</i> Less expensive because state could pay price of the first offer rather than after the property has been “flipped” several times</p> <p><i>Acceptability</i> An “appealing” concept Does not “penalize” the farmer Familiar tool as it is used privately</p>	<p><i>Acceptability</i> “Great concept on paper” Security in the farming community <i>Other</i> Helps address problems when an owner’s children do not enter farming Interesting^a</p>
Unappealing/ Objectionable	<p><i>Cost</i> Not sure this would be the best use of money</p> <p><i>Timing</i> Temporary—“What good does that do?”</p>	<p><i>Acceptability</i> “It’s kind of bizarre” Need to consider further before giving an opinion</p>	<p><i>Cost</i> Risk of “cash crunch”</p> <p><i>Timing</i> State does not act fast enough if a farmer is pressed for time State may not be able to come up with enough money quickly</p>	<p><i>Cost</i> Tough sell to get funded—seems like just another expensive program</p>

Table 5 continued

	Term easements	Agricultural preservation tontine	Rights of first refusal	Agricultural conservation pension with PACE
Difficulties in Administration and Funding	<i>Cost</i> How can the state compete with developers as land values rise so rapidly?	<i>Other</i> Complicated equity— participants having different acreages with different values and different-aged owners	<i>Cost</i> Need dedicated revenue stream to support it Must select priority areas to target ^a <i>Acceptability</i> Difficult to prioritize	<i>Cost</i> Difficult to fund <i>Acceptability</i> Small business owners may get option to participate in state health insurance Lawyers and legislative research staff could figure out details
	<i>Acceptability</i> Likely that landowners would want to participate, but need evidence May help address declining interest in PACE	<i>Acceptability</i> Not sure how this technique would “go over” Nonfarmers will not feel strongly	<i>Cost</i> Nonfarming community may object to the expenditures <i>Acceptability</i> Concept implies changing titles, which would intimidate farmers Constituents may favor some parcels selected, but oppose others	<i>Acceptability</i> No opposition from any group to this plan Farmers need to be educated about the program Would be of interest

^a Indicates that atleast two people made this comment

Table 6 Landowner responses

Term easements	Agricultural preservation tonline	Rights of first refusal	Agricultural conservation pension with PACE
Appealing	<i>Acceptability</i> Need a cash payment to be appealing No incentive without a payment—the pot of money is not sufficient	<i>Cost</i> Full compensation for land value <i>Acceptability</i> Voluntary nature of participating	<i>Acceptability</i> More appealing to younger farmers Would overcome incentive to sell land for retirement Depends on the tax implication of taking pension payments or a one-time payment for PACE
Unappealing/ Objectionable	<i>Timing</i> Need permanent easements—people will simply sell their land after lease term Skeptical that there will be too many loopholes that allow people to opt-out ^a <i>Acceptability</i> Will not be funded well enough to be appealing Distrust government with implementing this technique due to its use of eminent domain A rollback penalty would not be fair	<i>Acceptability</i> “Not confusing to me, but it’s just not attractive” Difficult to reconcile ownership with interest in this pot of money You could not use this interest as collateral at a bank <i>Timing</i> Might only appeal to the youngest farmers	<i>Cost</i> Figure out how to increase pension over time to keep up with appreciation in the land market Appraisal needs to be unbiased <i>Acceptability</i> Cash up front is more flexible <i>Other</i> Contingencies for accidents: Guaranteed payment and/or benefits go to survivors?

^a Indicates that atleast two people made this comment

Lawmakers did not see term easements as the best option when considering new techniques. Perhaps the most open-minded group with respect to this technique, lawmakers wanted additional information on possible landowner participation. One lawmaker rejected the technique out of hand because of its temporary duration.

Landowners were very skeptical about term easements and the government's ability to administer the program fairly. They believed that term easements would not provide the benefits of permanency they want as landowners. This result ran counter to Duke and Lynch's (2006) hypothesis that landowners would support them. One would have expected that landowners would be the primary supporters of term easements given the greater flexibility. In addition, Daniels (1991) argues that landowner support for PACE will follow directly from whether owners perceive a financial benefit; hence, it seems that landowners in this sample did not recognize a financial benefit to term easements. It also contrasts with Zollinger and Krannich's (2001) result that Utah landowners preferred tax relief programs even though they did not guarantee permanent preservation.

Land preservation tontines

Administrators, lawmakers, and landowners did not find the land preservation tontine concept to be a viable technique. Many respondents expressed a general level of interest, especially administrators. Overall, however, the concept seemed too "bizarre" and many implementation problems were noted. Since the respondents had trouble understanding the concept, a redesign for clarity and a follow-up investigation may generate more useful policy information.

Administrators were most interested in the incentive structure and the private, collective quality of the technique. However, they had many qualms. For example, administrators noted significant implementation challenges—perhaps the most of any of the four techniques—which is somewhat surprising since the land preservation tontine is a "private" solution. Many noted practical problems, such as explaining the concept, attracting participants, and preventing abuse. Understanding the concept seemed to be the main hurdle to funding and encouraging participation. Several noted that a refinement could be more workable, ranging from a simple name change to more significant modifications like eliminating the government role and explicitly modeling the concept as a cooperative.

Neither lawmakers nor landowners found land preservation tontines to be an attractive concept. Several expressed an interest in the technique and the incentives created, but most were too unsure of the concept to offer definitive opinions. One lawmaker found the technique to be "bizarre." Landowners argued that regular cash payments would be essential to any preservation effort. It is somewhat surprising that landowners did not support tontines because, in theory, tontines may be best at preventing conflicts with nonfarming neighbors. This reinforces Pfeffer and Lapping's (1994) mixed results on whether planners thought farmers would be more supportive of preservation techniques in the presence of these types of conflicts.

Rights of first refusal

Rights of first refusal held appeal for this sample of administrators, lawmakers, and landowners. Administrators were enthusiastic about the cost effectiveness of ROFR and the possibility of targeting (i.e., prioritizing) important agricultural areas. Yet, this group

expressed concerns about obtaining dedicated funds for this program and the potential for abuse by owners and developers. Most administrators agreed that a successful ROFR program would need to prioritize parcels at the outset. Targeting is a complex challenge; Pfeffer and Lapping (1994) argue that preservation as a growth management tool can be affected by market forces, which makes it difficult to target agricultural acres deemed most desirable. Furthermore, Kline and Alig's (1999) empirical analysis shows that it is unclear how effective land-use planning is in preventing development in exclusive agricultural areas. Other implementation challenges would include monitoring land sales, enforcing contracts, and managing land bought fee simple. However, the administrators had thoughts on how best to address these challenges.

Lawmakers also found the ROFR technique to be appealing. Like administrators, lawmakers suggested that prioritization was important and could possibly be achieved through existing, high-level plans such as Livable Delaware. They also stressed the need for dedicated funding to avoid a "cash crunch" when a parcel became available. Landowners had more reservations but valued the voluntary nature of ROFR.

The experts generally agreed that the key advantage to ROFR was the benefit of distributing the costs of preservation over time and acting in the present to prevent future problems. However, the experts were less concerned than the stakeholders about the other challenges to ROFR in the policy process. Because ROFR is already being used by private land trusts, it is certainly feasible and in fact no new legislation would be needed to implement it. And, as landowners suggest above, experts believe that if voluntary landowners will be comfortable with the technique. Because this technique is more common than perceived, ROFR's success in the ensuing policy process would potentially be less contentious than predicted by the stakeholders except for two key attributes: funding and targeting.

The experts believe that obtaining adequate or dedicated funds would be a policy process challenge—a challenge also mentioned by the program administrators and the lawmakers. One expert interpreted this challenge as planning to avoid a cash crunch. Another expert disagreed, arguing that the money needed would be similar to that of the current PACE program.

In addition, the experts agreed with program administrators that to be effective, ROFR must be carefully targeted—with explicit priorities—and they saw this as one of the most challenging aspects to refining and implementing an effective ROFR program. Two experts foresaw a highly contentious process in terms of targeting, i.e., establishing the area and determining which parcels are retained if the ROFR is exercised. One expert argued that a program should not attempt to preserve all land in a targeted area as this would not be cost-effective. One expert suggested requiring communities to have a well-developed land-use plan in place as a condition of participation in a state ROFR program which specifically targeted land to preserve might lessen the difficulties.

Experts did not agree on the cost-effectiveness of the technique however—in part because there was disagreement about how easily rights could be obtained in the present and how high the cost of purchasing the land would be if the ROFR was exercised. One expert argued that land trusts often obtain the rights for little or no money. However a second expert argued that landowners will not give up something of value unless there is a sufficient incentive. A third concurred with this expert, and concluded that the stakeholders did not fully understand the ROFR concept and this may affect the long-term support of ROFR. It was thought that any mandatory implementation would diminish landowner support for ROFR. Of course, if voluntary, only those who wish to participate will do so and thus implementation may be relatively easy, if limited in its impact.

In addition, cost-effectiveness depends in part on the cost of acquiring the land once the ROFR is exercised. One expert perceived that developers focus on inexpensive land and matching offers would be similar in cost to PACE, the most common technique in use. Another argued that land conversions occur in “hot” real estate markets and a state using ROFR would need to match many relatively high offers to preserve the land. In addition, this expert argued that ROFR will potentially be more expensive because preservation will be done in the future when land values have appreciated. These two perspectives cannot be reconciled here, but clearly, the perceptions of policy makers and stakeholders on the conditions in future land markets will affect the implementation of an ROFR policy even if the present budgeting problems could be addressed.

Agricultural conservation pension

Almost all respondents found ACP to be an appealing concept. Yet, all wanted more details on how the concept would be implemented, and many respondents offered suggestions on the design. The main concerns involved the formula for turning land value into pension payments and the way successors in interest (to the land) or survivors (of the owner) would be compensated. Most suggested that this concept holds greater appeal for younger owners. Further specification and research on stakeholder support is needed before possible implementation.

Administrators found this concept to be very appealing and interesting. In particular, they felt it directly addressed a common reason owners give for conversion—the need to finance retirement—which provides additional empirical support for this claim made in Lapping (1979). Because the concept was described in general terms, most of the administrators’ concerns involved the specific manner in which the technique would be designed. Administrators offered many suggestions on how it could be designed and the challenges overcome.

Lawmakers also were attracted to the concept. However, the lawmakers suggested that a single, coherent version of plan needed to be articulated. It was suggested that legislative staffs could further elaborate the details of such a plan. Similarly, landowners thought the concept offered an attractive option, but wanted more details.

The experts almost completely agreed with stakeholders about the advantages and shortcomings of ACP. The experts were unable to make detailed conclusions about ACP in the policy process (relative to ROFR) because the technique is less familiar, has not been implemented yet, and is described in considerably less detail. Specifically, the experts agreed with stakeholders that ACP was conceptually attractive as a way to pool risk, distribute preservation costs to the future, counteract the conversion incentive of retirement, and encourage participation among younger farmers. There was also agreement that farmers nearing retirement may find this technique less attractive. One expert felt that the scope—and therefore the cost—of the program was too uncertain as described. Also, one expert echoed a legislator in arguing that nonfarmers will object in the legislative process to creating what may be perceived to be a new entitlement program for farmers.

The experts did not agree about whether ACP would encourage the participation of farmers who do not find existing preservation options attractive. Two experts argued that new participants would be attracted to ACP, while one expert was less convinced. In addition, a fourth expert thought stakeholders had overlooked landowners’ concerns that politicians will not maintain pension benefits over the long term. Pensions are determined by a constantly evolving political process, but the landowners would be looking for more certainty commensurate with receiving a check in the present from a PACE program.

The experts, like stakeholders, articulated additional concerns for the ensuing policy process, which they did not foresee with ROFR. Specifically, the experts recognized that many details needed to be determined in a process, including the rules of participation, formulas for converting equity into payments, actuarial considerations, etc. These details would emerge in the initial policy process and would then affect the implementation and acceptability of the policy. In contrast, the ROFR policy is more fully developed and already has been implemented in the private sector.

Final ranking of the techniques

At the end of the interviews, the participants were asked to make final comparisons and/or rank the proposed techniques based upon the discussion. Most administrators were willing to make comparative comments. ROFR ranked the highest among administrators. One noted that it is a potentially high-benefit technique but without sufficient and secure funding it could not be successful. Another administrator ranked it first, but with the caveats that it depends on the quality of the contract instrument and careful targeting. A third administrator, who liked all of the techniques, noted that ROFR was especially promising, but also that it might be politically “sensitive” to introduce because it creates explicit winners and losers. Pension plans were deemed the second most promising technique. One administrator suggested that pension plans are high-benefit, but low-feasibility. Term easements and tontines were ranked lowest by administrators. Several noted that term easements would be unpopular because of the impermanent nature, although one suggested that it would be the best from the farmers’ points of view. Tontines were perceived by most administrators to be an interesting concept, but with low feasibility. One administrator suggested that tontines might become workable if set up explicitly as cooperatives without government funding. Another administrator expressed skepticism at the need for new techniques, arguing that higher budgets and secure, dedicated funds for existing techniques are more important.

The lawmakers also ranked ROFR as the top choice. It was noted that ROFR should be given a new, less-intimidating name. Term easements’ rankings were mixed, with lawmakers expressing both strong positive and strong negative opinions. One lawmaker said that this technique would “go over well,” but other lawmakers believed that the impermanent nature of the technique would raise many objections. The pension plan technique rankings were also mixed, tying for second place among some lawmakers, while others wanted more information before ranking. At minimum, all lawmakers thought the technique was worth exploring. Lawmakers ranked tontines the lowest, arguing either that the technique was insufficiently clear and undeveloped or that its potential for implementation and success was the lowest.

Landowners preferred pension plans and ROFR. Nothing specific was noted in the concluding questions about term easements or tontines. Landowners liked the voluntary nature of participation in ROFR. They also thought that competition in the development land market would lead farmers to get the highest possible return for their land. Landowners indicated they would rank ROFR lower if it were mandatory. Overall, the landowners said that education is important with any new program, noting that they thought they learned about PACE too late. Zollinger and Krannich (2001) came to a similar conclusion that an information campaign could increase the acceptability of PACE. Most information about land preservation came via word of mouth from neighbors rather than from the programs themselves.

While only asked to evaluate the top two selections by the stakeholders, the experts validated this ranking. They suggested ROFR has the most promise of surviving the policy process. ACP has promise but less, on balance, than ROFR.

Implications for the policy process

One limitation of this study is that the data do not allow one to conclude how these three groups will interact in an actual policy creation and implementation process; these results simply suggest how each group, in isolation, perceives how the policy process might ensue. Interactions may lead the groups to articulate or realize common goals and aspects of the process, while it is also possible that interaction may lead to a weakening of agreement and articulation of distinctive goals and process preferences⁶. This study only suggests what policy option is most likely to gain approval in a policy process and how the individual groups are likely to assess that option relative to the goals of the process—the results are less clear with regard to the process itself. Nevertheless, land use policy has become an extremely complex process—where broad goals are articulated by stakeholders, but policy development is dominated by experts—and the evidence provided by this study should assist all groups in focusing the policy process on one option. The results also should help researchers understand how complex policy options are perceived, prior to the policy process, and help with the articulation of hypotheses about how the process might ensue.

When the analysis was presented at the annual conference of the American Farmland Trust, a nonprofit organization whose mission is to promote the preservation of farmland, we found surprisingly similar thoughts expressed by the audience of approximately 70 individuals ranging from farmland owners, land trust participants, academics, and preservation program administrators and staff. While this was not designed as a focus group and the size may have inhibited some participants, a lively discussion occurred as to the four potential policy options. Interestingly, the discussion of the group concurred with those of the interviewed groups—that term easements were not acceptable and that while a retirement system might be effective it could be difficult to develop. Several people suggested potential modifications particularly to the tontine concept that might enable it to be more appealing. For the most part however, the audience focused on how to design a ROFR project that might be appealing to the landowners, easier to implement for the administrators and politically palatable.

The experts interviewed also concurred with the stakeholders about the feasibility of ROFR and potential attractiveness of the ACP technique. They raised some additional implementation issues and identified a few areas where they thought the stakeholders had overestimated the difficulties. However, overall the experts thought the stakeholders had captured the major advantages and disadvantages of the various options.

Given that experts are often called upon to assess the feasibility of policy or programs, we also asked the experts to compare the relative cost effectiveness of implementing ACP or ROFR in a community to achieve a given preservation goal. Their conclusions were made with the caveat that more details are needed on ACP. Although the experts argue in general that ROFR is more likely to be successful in the policy process, they do not necessarily see ROFR as the more cost-effective technique. The experts approached consensus on three points.

⁶ We owe a debt of gratitude to a reviewer for pointing out this limitation of the study.

First, ROFR would be the most cost-effective policy in the short run. A targeted, funded program would be inexpensive to operate in the near term. It would signal to farmers and developers that the state intended to preserve agriculture in the targeted area. Rights could be purchased for a low cost, relative to implementing PACE in the present. These conclusions were in-line with the stakeholders.

Second, ROFR would not be cost effective in the long run. Several experts were much more skeptical than the stakeholders about the cost of matching offers from developers. Concern centered on the cost of land in the future and the anticipation that land will appreciate faster than inflation. If land appreciates rapidly, it may be more cost effective to preserve land in the present using PACE, perhaps paid in installments, than to use ROFR because the development increment will be relatively more valuable in the future. However, several experts were uncertain about conditions in this future land market with ROFR, i.e., how many parcels would actually need to be purchased and how the short-term cost effectiveness would be balanced with the long-term cost ineffectiveness.

For this reason, two experts articulated a third conclusion: ACP could potentially be more cost effective than ROFR. Specifically, ACP establishes the basis of the pension in the short term—i.e., at today's land prices—but pays out in the long term and takes advantage of the actuarial gains of risk pooling. ACP therefore could potentially be superior to PACE when paid in installments.

Discussion

The general public continues to express concern about disappearing farmland and supports ongoing farmland preservation. Concern exists, however, that the current techniques are not sufficient to retain farmland either due to limited funding or inadequacies in their design and operation. While there have been many studies looking at what the general public desires from preserved farmland, there have been relatively few asking policy makers, administrators, and landowners what types of techniques they think would be acceptable and effective. This article describes four innovative farmland preservation techniques and then investigates their acceptance with these three stakeholder groups. These four techniques were chosen from a list of 29 farmland preservation techniques—representing three of the four types of preservation techniques—and were chosen as ones that may overcome some limitations of current techniques. Following interviews with representatives of these stakeholder groups, this study argues that ROFR is deemed the most acceptable of the four options. Respondents found that its permanence, voluntary nature (although it could be mandatory), cost-effectiveness, and familiarity were positive attributes. There was some disagreement as to its cost-effectiveness: it could be costly to secure the rights and the permanency benefits do not accrue for many years to come and/or the state must purchase the land at its full market value rather than for lesser rights. Overall, though, respondents thought with prioritization schemes this technique could help achieve farmland preservation goals.

Based on what was presented, two experts believed that ROFR would be more effective at achieving land preservation goals, while two did not rank ROFR and ACP. All the experts contended that it is useful to offer additional options to farmers.

While stakeholder groups believed flexibility to be a desirable attribute, they did not like term conservation easements due to their temporary nature. Respondents seemed to perceive that term easements simply give money to landowners in return for nothing, and that they had the potential to undercut existing PACE programs. Both the agricultural

preservation tontine and agricultural preservation pension plan were thought to be worth exploring, but more details would be needed before respondents could fully evaluate their acceptability and cost-effectiveness.

Investigations like this highlight some of the attributes of policies that are appealing and unappealing and could lead to further technique development. Clearly, administrators have well-formed opinions on the issues, though they do not always agree. Similarly, we found that experts did not always agree. Further interviews with this stakeholder group and further experts would be desirable after more development of the agricultural preservation tontine and pension programs. Lawmakers held some strong opinions on the acceptability and feasibility of new techniques—and they also did not always agree—but this group also tended to be open minded about learning more about new options and their constituents' opinions of these options. Lawmakers did tend to favor techniques that were most familiar and simple. Interviews with this group provided a useful reality check on whether the techniques were too complicated to be politically feasible.

Interviews with the landowners produced less useful information on the broader version of the techniques. Landowners may need more specific program proposals on which to respond to elicit additional information. They also were more focused on their specific circumstances and how the new technique might apply to them.

The results also suggest hypotheses about, and areas where little knowledge exists regarding, the performance of the policy process—should any technique actually be pursued. Landowners and lawmakers seemed to prefer simplicity in the policy options, while the administrators were more likely to appreciate, or in some cases prefer, complex policies. This suggests that the ensuing policy process may be highly contentious and, since there is little obvious way to simplify the policy options, at least one group is likely to be displeased by the process and implementation may suffer as a result. Education may attenuate this impact if a more complex option is pursued. This hypothesis accords with Hendrick's (2005) study of deliberative procedures, which found that political actors may harm deliberative procedures when they have a stake in the ultimate policy product. Some administrators in this study seemed to be "championing" policy options, although for various reasons. Similarly, any ensuing process should provide additional evidence that informs the debate (cf. Pelletier et al. 1999) on how local values (in this case, landowner interests) will merge with lawmaker and, especially, administrator interests. The impact on the policy process of this sharing of ideas and merging of interests is a real question in the literature, where existing studies have different conclusions (Wagle 2000; Hendricks 2005).

In one respect, the results also suggest that the policy process may be less contentious than expected because there is more convergence than expected among our respondents about the goal of permanent preservation. This is confirmed by the stakeholders' general level of agreement with other stakeholders' perceptions. Specifically, it was surprising that the landowners felt strongly that preservation needed to be permanent since this is the group that would seem to benefit from temporary programs. One expert suggested that these techniques would survive the policy process with less trouble than was suggested by the analysis because there is widespread agreement among all the actors in the policy process that farmland preservation should be encouraged. As such, our innovative techniques merely provide alternatives to achieving a goal everyone appears to want. This will not be highly contentious because we are simply "tinkering" with the policy instruments.

Nevertheless, one expects a fundamental tension between landowners and administrators in terms of where and how a policy option will be implemented. Landowners seem to prefer policy options that are voluntary and broadly available. Administrators, in contrast,

tend to believe that new programs must be targeted to be successful. Clearly, a targeted and mandatory policy option would be more effective, holding constant the ultimate participation by landowners. In any policy process, participation will not be held constant. The results suggest administrator and landowner interests are unlikely to be easily reconciled.

Additional issues and/or goals would probably also arise during the exchange of the policy process. For example, one expert suggested the stakeholder analysis did not sufficiently appreciate that the most significant challenge in preservation is to save farmers rather than farmland. This expert hypothesized that all of the proposed techniques whether mandatory or voluntary may not achieve the anticipated goals because of this issue. This aspect of the preservation question was not addressed here and different stakeholders may have divergent views on this aspect. While many can agree on the desirability of preserving farmland, some may find the open space or environmental amenities the overriding motivation whereas others find a strong agricultural economy most important.

Acknowledgements The Delaware Agricultural Lands Preservation Program sponsored this research. We owe a special debt to Michael McGrath, Planner for the State of Delaware, for first identifying three of these techniques in 2001 and supporting this research. We also thank the editors for their valuable suggestions for improving the manuscript during the review process. We are grateful for the assistance of the program administrators, lawmakers, landowners, and experts who were interviewed for this paper. We also thank Kristen Trevisan for help in setting up the stakeholder interviews.

References

- Adelaja, A. O., & Schilling, B. J. (1999). Innovative approaches to farmland preservation. In O. J. Furuseh & M. B. Lapping (Eds.), *Contested countryside: The rural urban fringe in North America*. Brookfield, Vermont: Ashgate.
- American Farmland Trust. (1997a). *Saving American farmland: What works*. Washington, D.C. and Northampton, MA: American Farmland Trust.
- American Farmland Trust. (1997b). *Farming on the edge*. Washington, D.C. and Northampton, MA: American Farmland Trust.
- American Farmland Trust. (2001). *Transfer of development rights: Fact sheet*. Washington, D.C.: American Farmland Trust.
- American Farmland Trust. (2005a). *Status of selected local PACE programs: Fact sheet*. Washington, D.C.: American Farmland Trust.
- American Farmland Trust. (2005b). *Status of state PACE programs: Fact sheet*. Washington, D.C.: American Farmland Trust.
- Beesley, K. B. (1999). Agricultural land preservation in North America: A review and survey of expert opinion. In O. J. Furuseh & M. B. Lapping (Eds.), *Contested countryside: The rural urban fringe in North America*. Brookfield, Vermont: Ashgate.
- Bergstrom, J. C., Dillman, B. L., & Stoll, J. R. (1985). Public environmental amenity benefits of private land: The case of prime agricultural land. *Southern Journal of Agriculture Economics*, 17, 139–150.
- Blewett, R. A., & Lane, J. I. (1988). Development rights and the differential assessment of agricultural land: Fractional valuation of farmland is ineffective for preserving open space and subsidizes speculation. *American Journal of Economics and Sociology*, 47, 195–205.
- Bowker, J. M., & Didyuchuk, D. D. (1994). Estimation of nonmarket benefits of agricultural land retention in Eastern Canada. *Agriculture and Resource Economics Review*, 23, 218–225.
- Brabec, E., & Smith, C. (2002). Agricultural land fragmentation: The spatial effects of three land protection strategies in the Eastern United States. *Landscape and Urban Planning*, 58, 255–268.
- Bromley, D. W., & Hodge, I. (1990). Private property rights and presumptive policy entitlements: Reconsidering the premises of rural policy. *European Review of Agriculture Economics*, 17, 197–214.
- Chesapeake Bay Foundation. (2002). *Future growth in the Washington, D.C. metropolitan area*. Annapolis, Maryland. Accessed online at: http://www.savethebay.org/land/landuse/maps/future_growth.html
- Conrad, J. M., & LeBlanc, D. (1979). The supply of development rights: Results from a survey in Hadley, Massachusetts. *Land Economics*, 55(2), 269–276.
- Daniels, T. (1991). The purchase of development rights: Preserving agricultural land and open space. *Journal of the American Planning Association*, 57, 421–431.

- Daniels, T., & Lapping, M. (2001). Farmland preservation in America and the issue of critical mass. American Farmland Trust National Conference, November 13, 2001, Chicago, IL.
- Daniels, T., & Lapping, M. (2005). Land preservation: An essential ingredient in smart growth. *Journal of Planning Literature*, 19, 316–329.
- Daniels, T. L., & Nelson, A. C. (1986). Is Oregon's farmland preservation program working? *Journal of the American Planning Association*, 52, 22–32.
- Diaz, D., & Green, G. P. (2001). Growth management and agriculture: An examination of local efforts to manage growth and preserve farmland in Wisconsin Cities, Villages, and Towns. *Rural Sociology*, 66, 317–341.
- Duke, J. M., & Lynch, L. (2006). Four classes of farmland retention techniques: Comparative evaluation and property rights implications. *Land Economics*, 82, 189–213.
- Duke, J. M., & Aull-Hyde, R. (2002). Identifying public preferences for land preservation using the analytic hierarchy process. *Ecological Economics*, 42, 131–145.
- Duke, J. M., & Ilvento, T. W. (2004). A conjoint analysis of public preferences for agricultural land preservation. *Agriculture and Resource Economics Review*, 33, 209–219.
- Feitshans, T. A. (2003). Meshing compensatory and regulatory approaches in the preservation of farmland. In N. De Cuir, A. D. Sokolow, & J. Woled (Eds.), *Compensating landowners for conserving agricultural land* (pp. 35–48). Davis, California: University of California, Davis Press.
- Fischel, W. (1985). *The economics of zoning laws: A property rights approach to American land use controls*. Baltimore, MD: Johns Hopkins University Press.
- Furuseth, O. J. (1987). Public attitudes toward local farmland protection programs. *Growth and Change*, 18, 49–61.
- Gardner, B. D. (1977). The economics of agricultural land preservation. *American Journal of Agriculture Economics*, 59, 1027–1036.
- Gardner, B. L. (1994). Commercial agriculture in metropolitan areas: Economics and regulatory issues. *Agriculture and Resource Economics Review*, 23, 100–109.
- Geoghegan, J., Lynch, L., & Bucholtz, S. (2003). Capitalization of open spaces: Can agricultural easements pay for themselves? *Agriculture and Resource Economics Review*, 32, 33–45.
- Halstead, J. M. (1984). Measuring the non-market value of Massachusetts agricultural land: A case study. *Northeastern Journal of Agriculture Economics*, 14, 12–19.
- Heimlich, R. E., & Anderson, W. D. (2001). Development at the urban fringe and beyond: Impact on agricultural and rural land. *USDA Economic Research Service, Agricultural Economic Report No. 803*.
- Hellerstein, D., Nickerson, C., Cooper, J., Feather, P., Gadsby, D., Mullarkey, D., Tegene, A., & Barnard, C. (2002). Farmland protection: The role of public preferences for rural amenities. *USDA Economic Research Service, Agricultural Economic Report No. 815*.
- Hendricks, C. M. (2005). Participatory storylines and their influence on deliberative forums. *Policy Sciences*, 38, 1–20.
- Inman, K., McLeod, D. M. (2002). Property rights and public interests: A Wyoming agricultural lands study. *Growth and Change*, 33, 91–114.
- Irwin, E. G. (2002). The effects of open space on residential property values. *Land Economics*, 78, 465–480.
- Johnston, R. J., Swallow, S. K., Bauer, D. M., & Anderson, C. M. (2003). Preferences for residential development attributes and support for the policy process: Implications for management and conservation of rural landscapes. *Agriculture and Resource Economics Review*, 32, 65–82.
- Kline, J. D., & Alig, R. J. (1999). Does land use planning slow the conversion of forest and farm lands? *Growth and Change*, 30, 3–22.
- Kline, J. D., & Wichelns, D. (1994). Using referendum data to characterize public support for purchasing development rights to farmland. *Land Economics*, 70, 221–233.
- Kline, J. D., & Wichelns, D. (1998). Measuring heterogeneous preferences for preserving farmland and open space. *Ecological Economics*, 26, 211–224.
- Korfmacher, K. S., & Koontz, T. M. (2003). Collaboration, information, and preservation: The role of expertise in farmland preservation task forces. *Policy Sciences*, 36, 213–236.
- Land Trust Alliance. (2002). More than \$7.3 billion committed to open space protection. Accessed online at: <http://www.lta.org/policy/referenda2000.htm>
- Lapping, M. B. (1979). Agricultural land retention strategies: Some underpinnings. *Journal of Soil and Water Conservation*, 34, 124–126.
- Levy, D. C., & Melliar-Smith, R. P. (2003). The race for the future: Farmland preservation tools. *Natural Resources and Environment*, 18, 15–17.
- Lynch, L., & Carpenter, J. E. (2003). Is there evidence of a critical mass in the Mid-Atlantic agricultural sector between 1949 and 1997? *Agriculture and Resource Economics Review*, 32, 116–128.

- Lynch, L., & Lovell, S. J. (2003). Combining spatial and survey data to explain participation in agricultural land preservation programs. *Land Economics*, 79, 259–276.
- Lynch, L., & Musser, W. N. (2001). A relative efficiency analysis of farmland preservation programs. *Land Economics*, 77, 577–594.
- Lynch, L., Palm, K., Lovell, S. J., & Harvard, J. (2007). *Expected cost of tripling Maryland's preserved acres: Using a hedonic price analysis on agricultural land values from 1997–2003*. Wye Mills, MD: Maryland Center for Agroecology.
- Malcolm, S. A., Duke, J. M., & Mackenzie, J. (2005). Valuing rights of first refusal for farmland preservation policy. *Applied Economics Letters*, 12, 285–288.
- Maryland Agricultural Land Preservation Foundation (MALPF Task Force). (2001). Report of the Maryland Agricultural Land Preservation Task Force. Accessed online at: <http://www.mdp.state.md.us/planning/MALPP/FINAL2.pdf>
- McConnell, K. E. (1989). The optimal quantity of land in agriculture. *Northeastern Journal of Agriculture and Resource Economics*, 18, 63–72.
- McLeod, D. M., Worihaye, J., & Menkhaus, D. J. (1999). Factors influencing support for rural land use control: A case study. *Agriculture and Resource Economics Review*, 28, 44–56.
- Nelson, A. C. (1992). Preserving prime farmland in the face of urbanization: Lessons from Oregon. *Journal of the American Planning Association*, 58, 467–488.
- Parks, P. J., & Quimio, W. R. H. (1996). Preserving agricultural land with farmland assessment: New Jersey as a case study. *Agriculture and Resource Economics Review*, 25, 22–27.
- Parks, P. J., & Schorr, J. P. (1997). Sustaining open space benefits in the Northeast: An evaluation of the conservation reserve program. *Journal of Environmental Economics and Management*, 32, 85–94.
- Pelletier, D., Kraak, V., McCullum, C., Uusitalo, U., & Rich, R. (1999). The shaping of collective values through deliberative democracy : An empirical study from New York's north country. *Policy Sciences*, 32, 103–131.
- Pfeffer, M. J., & Lapping, M. B. (1994). Farmland preservation, development rights and the theory of the growth matching: The views of planners. *Journal of Rural Studies*, 10, 233–248.
- Pfeffer, M. J., & Lapping, M. B. (1995). Prospects for a sustainable agriculture in the northeast's rural/urban fringe. *Research in Rural Sociology and Development*, 6, 67–93.
- Phipps, T. (1983). Landowner incentives to participate in a purchase of development rights program with application to Maryland. *Journal of the Northeastern Agricultural Economics Council*, 12, 61–65.
- Pitt, D. G., Phipps, T., & Lessley, B. V. (1986). Participation in Maryland's agricultural land preservation program: The adoption of an innovative agricultural land policy. *Landscape Journal*, 7, 15–30.
- Rilla, E., & Sokolow, A. D. (2000). *California farmers and conservation easements: Motivations, experiences, and perceptions in three counties*. University of California, Agricultural Issues Center. Research Paper No. 4. December.
- Roe, B., Irwin, E. G., & Morrow-Jones, H. A. (2004). The effects of farmland, farmland preservation, and other neighborhood amenities on housing values and residential growth. *Land Economics*, 80, 55–75.
- U.S. Census Bureau, *Statistical Abstract of the United States: 1999*.
- U.S. Department of Agriculture, National Agricultural Statistics Service. (1999). *1997 Census of Agriculture*, 1A, 1B, 1C cd-rom set.
- Wagle, U. (2000). The policy science of democracy: The issues of methodology and citizen participation. *Policy Sciences*, 33, 207–223.
- Wolfgram, G. (1981). The sale of development rights and zoning in the preservation of open space: Lindahl equilibrium and a case study. *Land Economics*, 57, 398–413.
- Zollinger, B., & Krannich, R. S. (2001). Utah agricultural operators' attitudes toward commonly used agricultural land preservation initiatives. *Journal of the Community Development Society*, 32, 35–64.