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Estimating Amenity Values: Will It Improve Farmland Preservation Policy?

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There is a growing awareness that farmland provides a host of nonmarket services, or amenities. Amenities are external benefits of farmland, i.e., beyond commodity production revenues, accruing to all types of residents (or “amenity consumers”) in rural, suburban, and urban areas. Farmland amenities may include aesthetically pleasing views, habitat provision, groundwater recharge, and a lack of development (Irwin, Nickerson and Libby 2003). Although not necessarily amenities, farmland also provides closely related environmental benefits such as flood control and carbon sequestration (Legg 2007). The term “multifunctionality” reflects all of these services from active farmland: commodities, amenities, and other environmental services.

Land-use change threatens future amenity provision. At the rural-urban fringe, high-value development often outbids agricultural land uses. The public perceives conversion as too rapid, or poorly planned, and worries about reduced amenities. Strong political support exists for policy solutions, and some policies make cash payments to landowners in exchange for amenity provision. But are the benefits of preservation policy larger than the costs? An important step in assessing and improving the policy process is the proper *valuation* of amenities.

Figure 1. Conservation Easements

Conservation easements are legal instruments that restrict landowners from pursuing developed land uses—typically, the wholesale conversion from agricultural and natural land uses to residential and commercial uses. Legally, conservation easements are “negative” easements in that they prevent the easement seller (the landowner) from using his or her land in a specified manner. Conservation easements do not give the easement buyer (governmental agencies, land trusts, etc.) the right to use the easement seller’s land; they only prevent uses. The easement seller thereby retains all other use rights typically associated with agricultural and natural land ownership.

At least 28 different types of policies exist to retain agricultural land use in the United States (Duke and Lynch 2006). Some of these policies simply alter zoning, changing land-use rules to encourage farming or to discourage development. Governments use incentive-based policies to subsidize agricultural uses (use-value tax assessment) or to penalize conversion activities (impact fees and exactions). The public is likely most familiar with participatory policies, through which governments enter land markets to expand demand for agricultural land use. The purchase of agricultural conservation easements (PACE) is the flagship participatory policy. Under PACE, governments buy negative easements to prevent development and, in effect, create market demand for amenities where little or none existed before. By 2004, over \$1.6 billion had been spent in the United States on PACE (American Farmland Trust 2004).

The Economic Union (EU) also has an extensive set of policies that affect amenity provision (Bell 2007). Unlike the U.S., the EU has more unified multifunctional policies that address both soil/water management and land preservation, and also may include rural development provisions (Bell 2007; von Haaren and Bills 2007). Yet in both the United States and the EU policymakers face the challenge of balancing regulatory restrictions with payments to landowners and find that existing policies are not always perceived to be effective by the public (von Haaren and Bills 2007). U.S. and EU policies are somewhat difficult to compare because U.S. policies that directly affect amenity provision tend to emanate from the state and local levels. The EU has cross-compliance standards in their agri-environmental policies and other norms that allow for systematic comparisons of policy effectiveness, especially regarding pollution prevention but also related to amenity provision (Brouwer and Jongeneel 2007).

Unfortunately, in the United States and the EU there appears to be a large disconnect between research and

Figure 2. Key Research Findings on Farmland Amenities

What are the key research findings on amenity values? Irwin, Nickerson and Libby (2003) report that demand for farmland amenities:

- Rises with income levels.
- Increases with educational attainment levels.
- Increases with population growth, especially near the rural–urban fringe.
- Increases as agricultural land becomes scarcer.
- Decreases when other nonfarm, rural lands are abundant.
- Is higher for those located near preserved parcels, except when too many nonagricultural residences are nearby.

Figure 3. How Large Are Amenity Values?

Duke and Johnston (2007) calculate farmland amenity values for Delaware residents and for an assortment of land uses. The following are examples for parcels in Delaware at high risk of development and where preservation is conducted using a state–purchased conservation easement:

- | | |
|--|--------------------|
| • Forest providing moderate levels of public access | \$131,881 per acre |
| • Cropland with no public access | \$54,691 per acre |
| • Nursery providing moderate levels of public access | \$117,598 per acre |

Duke and Johnston (2007) also find that amenity values differ when parcels are at a low risk of development.

- | | |
|--|-------------------|
| • Cropland with no public access | \$2,233 per acre |
| • Cropland with high levels of public access | \$65,132 per acre |

policy regarding the measurement and use of amenity values. It is useful to clarify exactly what amenity valuation research can and cannot provide to policy makers. This paper summarizes both research results and remaining research challenges, and it guides policy makers in interpreting research results. The impact of research on policy is the exclusive focus of the concluding section.

Research on Amenity Values

The market price of a land parcel does not capture its amenity value. Economists view such situations as market failures because society's demand for amenities does not affect the price of land when a farm is sold for development. Nonmarket valuation measures amenity value using revealed preference and stated preference techniques. Revealed preference studies use transaction data on market goods, which are associated with a nonmarket good, to infer amenity values. Stated preference studies use

formal survey protocols to estimate amenity values directly, typically targeting amenities that have public good characteristics and thus are independent of observed market choices. This article focuses on evidence from the latter, and does not address complications associated with negative impacts from agriculture (see Poe 1997; Bell 2007; Legg 2007).

A recent review finds that amenity values are affected by parcel size, local scarcity of farmland, development pressure, land productivity, the intensity of farming, and whether food is produced for human consumption (Bergstrom and Ready 2009). In a *Choices* article on amenity values, Irwin, Nickerson and Libby (2003) argue that some farmland–preservation benefits are unrelated to farming. Indeed, the public values the continuation of farming and long-term food security, but it also values the provision of wildlife habitat, groundwater protection, and growth controls. These benefits tend to vary

by location. Hence, in some locations the highest amenity value lands may be the most productive, or “prime,” farmland, while in others they will be more marginal but with more rural or environmental amenities (Irwin et al. 2003; Duke and Johnston 2007). Even urban areas may deliver high-value amenities and lower value, lower acreage production (Adelaja, Lake and Colunga-Garcia 2007).

Challenges and Alternative Approaches

Accurately measuring amenity values is important for developing effective policy, especially when these values are used to justify payments to landowners. This section describes current research challenges in terms of accuracy of valuations and in explaining spatial and other preference patterns.

Do We Have Accurate Measures of Amenity Value?

Research on amenity values offers many results and relentlessly refines its methods to test and improve survey instruments and statistical techniques. However, measurement accuracy remains a persistent challenge. Recent studies are the most accurate because they better capture current conditions and are most likely to have used the most recent techniques. Choice experiments provide a good example of the latter claim. Choice experiments are a generalized form of contingent valuation in that they allow one to measure the separate contributions to amenity value of a host of land attributes, such as parcel land use, parcel size, and growth pressure. The results of choice experiments increase the diversity of parcels to which estimated amenity values can be applied.

Do We Understand How Amenity Values Vary across Space?

Explaining how amenity values change across the landscape challenges current methods. Studies using “distance–decay” find evidence about

how values decline as residents are located farther from the preserved site (e.g., Bateman and Langford 1997). Using voting data, Bell (2007) also finds a distance impact. These and other studies suggest that amenity values may often extend beyond the boundaries of the political unit proposing preservation—a potential complication to policy (e.g., Loomis 2000). For instance, if Connecticut is proposing to fund the preservation of 10,000 acres of farmland but the benefits extend to residents of Rhode Island and Massachusetts, then preservation may be undersupplied because Connecticut will tend to only fund a program that meets its own needs. More effective policies must reflect the entire population holding values for preservation.

Do We Understand Patterns in Amenity Value?

Other research suggests that patterns are more complicated than just distance. Land preservation amenities have many public-good characteristics. Once supplied, these services are supplied to everyone (without diminution) and no one can be precluded from enjoying them. This is especially true when a “nonuser” enjoys the amenities, i.e., one who values, say, knowing that groundwater quality is protected but never anticipates using that water (Duke and Johnston 2008). Some nonuser values are found to decay with distance while others appear immune to such decay. This complicates efforts to identify fully the population enjoying amenities and to measure, correctly, the spatial patterns of value. Policy makers thus will have difficulty identifying the full set of beneficiaries associated with preservation.

Are Amenity Values Valid beyond the Locality Where Data Were Collected?

Some inconsistencies in amenity-value patterns have been documented (Irwin, Nickerson and Libby 2003; Bergstrom and Ready 2009), and this

seems to suggest that amenity values are highly site-specific (Legg 2007). This is intuitive—the housing market is driven by the maxim, “location, location, location,” so the amenity market should be, too. Population characteristics, geography, and local scarcities in land use will affect values measured at different locations. Residents in Rhode Island may value habitat provision from farmland preservation more than those in Delaware, whose interests are tied to water protection and perpetuating farming as a way of life. Similar stories could explain why values vary between local regions, states, or even countries.

However, this complicates the use of amenity values because it limits the broader applicability of applied research. Valuation research is a reasonably expensive undertaking, and efforts would have to be increased by many orders of magnitude if all existing preservation programs required amenity valuation measures of their own. One possible solution to this policy problem is “benefit transfer,” or adapting existing research results to new contexts (Rosenberger and Phipps 2007). This research suggests that transferring values will be most accurate when the preservation sites are similar, i.e., the data were collected on a parcel sharing land market, population, and geographic characteristics with the parcel of unknown amenity value (Rosenberger and Phipps 2007). In addition, the likelihood of accurate transfer likely increases when the scale of preservation is similar, i.e., a community in one state was studied and values are being transferred to a similarly sized community.

Do Amenity Values Reflect the Variety of Preferences?

A recent methodological advance, mixed logit econometric analysis, allows for amenity-value estimation that reflects the variety of preferences in a population. The main advantage of mixed logit is that the researcher

can still examine the importance of various drivers of preference (i.e., the parameters) while also testing for heterogeneity in those drivers (i.e., the standard deviation of the parameters). For instance, researchers now can estimate, say, that 70% of the population holds a positive value for dairy farm amenities, while 30% holds a negative value. Policy makers will increasingly find researchers reporting these more nuanced, more accurate, characterizations of amenity value. It will be a challenge for policy makers to determine how best to use these results to design policies.

Implications for Policy

The preceding section clarifies the current state of amenity valuation research and offers some ideas for bridging the research-policy gap. This section explores the question, “What is to be done with amenity values?” This question has received minimal treatment from researchers, but with a proper understanding policy makers can appropriately employ amenity value measures to improve policy.

How Should Amenity Values Be Used in Benefit-Cost Analysis?

Amenity values are typically presented as the benefits of preserving an acre (or hectare) of farmland with certain attributes (land use, risk of development, etc.), i.e., $\$X/\text{acre}$. Economists probably anticipate that policy makers will then conduct a single-parcel, benefit-cost test. With preservation costs of $\$Y/\text{acre}$, preservation is efficient if benefits exceed costs ($\$X > \Y).

However, many policymakers want to know how much land should be preserved in total, across the jurisdiction, and amenity value research cannot offer much guidance. Amenity value estimates are applicable to the next few parcels preserved. Large preservation efforts involving many parcels will generate amenity values, per parcel, that are less than the research calculated. The law of demand

tells economists to expect these lower values, but economists have little or no understanding of how fast they will drop. There are several implications for policy. First, amenity values are best used for benefit–cost tests or prioritization. Second, additional measurement should be conducted after any major preservation effort has been implemented.

What Preservation Policy Should Be Used?

Amenity values should not automatically direct policymakers to PACE. There is an urge to do so, probably because per–acre benefit measures are so easy to compare to the per–acre cost estimates for PACE with which policymakers are familiar. But there are economic and philosophical problems with this.

Economically, research finds that people also may value the preservation policy process itself (Johnston and Duke 2007). Amenity values may depend on whether they are delivered via PACE, by outright purchase of the land, or by conservation zoning. Amenity values may also depend on whether governments or private land trusts provide preservation. Although conservation zoning tends to generate the lowest preservation benefits, it will also tend to be the least expensive (Johnston and Duke 2007). In addition, Seidl, Ellingson, Magnan and Mucklow (2007) show that achieving preservation with three different tax policies and a zoning policy can have very different, important financial impacts on communities. Policy makers thus should carefully evaluate the various means of reaching preservation goals and not automatically exclude the possibility of using regulations.

Philosophically, there is a danger that policymakers will treat amenity values as indisputably objective simply because they are precise and generated through a complicated, statistical process. Yet amenity values are

calculated using a process with subtle value judgments. Valuation researchers pose survey questions in terms of a respondent's willingness to pay for amenities because it has been shown to be the best way to ask about hypothetical market behavior. However, this does not mean that the public should be buying amenity services in all circumstances. Some policies, such as PACE, imply that development is a landowner's property right (Duke and Lynch 2006; Legg 2007). Actual land–use decisions, however, are largely directed by zoning. Zoning laws dictate permissible land uses at a given time—they do not necessarily define property rights.

It is a value judgment whether or not the public should take on a buyer–type role (PACE, fee simple) or a seller–type role (impact fees) in preservation transactions (Duke and Lynch 2006; Legg 2007). Similarly, it is a value judgment whether current land–use rules should be altered via rezoning. Policymakers are advised to seek the guidance of local political bodies and stakeholders in making these judgments. Amenity values from economists can help suggest priorities, but should not automatically and uncritically be used to dictate a specific policy process.

For More Information

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