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The effect of landowner amenity rents in conservation easement policies

Abstract

This paper examines landowner and societal motivations behind land conservation, and specifically conservation easement policy. Andreoni (1988) and others have shown that people receive a "warm glow" when they contribute to public goods. This raises the question of how much society should pay for conservation when private landowners have a warm glow from their donation. Previous authors have connected the concept of "nonpecuniary returns" to land protection (Duke, 2004; Marshall, 2002), but there is a need to connect this information to economic efficiency. We believe that implementation problems with conservation easement appraisals, transfer payments, and land trust incentives indicate a need for formalized consideration of landowner motivations related to the warm glow they receive from private amenity rents.

As this study and previous studies have shown, land trusts and conservation organization assume and expect a level of landowner commitment to conservation. However, price discovery for non-market amenities is very difficult and pricing mechanisms are complex. We adapt the classic externality model to explore a policy that requires landowners to also financially contribute towards the protection of their lands. This is done by disaggregating the marginal private benefit curve to better specify where market inefficiencies might take place.

Key words: conservation easements, land conservation, private donation to public goods (PDPG), externalities, private amenity rent (PAR).
JEL Classifications: Q50, Q51, Q58, P28.

Introduction

Conservation easements (CEs) are one of the most common tools for protecting private lands that provide public goods, such as wildlife habitat, aesthetic views or historical significance (J. Bergstrom, Dillman, and Stoll, 1985; Wyerman, 2006). Land remains in private ownership, but the landowner enters into a contractual agreement to place restrictions on development or use of the land in return for benefits, which may include tax benefits and other forms of remuneration. In order to implement a conservation easement, a landowner must work with a conservation organization, usually a land trust, which enforces the agreement and agrees to ensure that the conservation values of the land are protected. In the case of a donated conservation easement, the land trust facilitates the conservation easement contract, but does not directly pay the landowner. Not to be confused with transferable development rights, the CE contract effectively limits or "extinguishes" the land's development rights in perpetuity, regardless of whether the property is transferred at a future point in time to another owner (Gustanski, 2000).

The somewhat complex relationship between land trusts and landowners makes the CE market difficult to model. Contributing to this complexity is the fact that CEs can either be conducted as an outright purchase or a charitable private donation to a public good (PDPG). In the case of the latter, the public good is a conservation value, such as "open space", that is institutionally defined in Section 170 of the United States Internal Revenue Service Tax Code.

The type of transaction affects the land trust's incentive to understand landowner reservation prices. If there is a CE purchase, land trusts serve as the "buyer", and there is incentive to negotiate the lowest price possible. However, it is more common for landowners to donate CEs (Keske, Gripne, Sherrod, 2008), which provides less incentive for trusts to attend to prices. In the case of a donated CE, the land trust serves as a facilitator of the transaction, enabling the landowner to receive compensation from a federal or state agency. Furthermore, land trusts often help producers acquire as much funding as possible, since to them the funds are an open access good.

This paper contributes to the literature by connecting CEs to PDPGs and impure public goods (Kotchen, 2006) to model sources of inefficiencies in the CE market. We assert that inefficiencies in the CE market may arise when the landowner's non-market amenity rent, or "warm glow" for donating land, is not known. This is often the case because landowner amenity rent is difficult to measure and landowners have incentive not to reveal this value. Using a descriptive model of marginal benefits and costs that reflects the appraisal literature, we mathematically and graphically demonstrate how this private amenity rent or "PAR" (Marshall, 2002) affects conservation easement efficiencies. We assert that there is sufficient evidence to conclude that most landowners exhibit some level of PAR. As a result, in the case of donated CEs, land trusts and government policy makers should explore ways to account for

these values. For example, policies could require landowners to financially contribute towards the protection of their lands. This practice would capture some of the PAR from producers and enable risks to be shared with the land trusts who agree to steward the protected land in perpetuity; thus more land can be preserved with less public money. We corroborate our observations with qualitative and quantitative models, based upon surveys of land owners and land trusts. We embellish on our results from the graphical economic model to support our suggestion that economic efficiency in the CE markets would be improved if land trusts required land owners to share in the cost of establishing and maintaining easements. Further linkages from the PDPG literature are encouraged in future studies in order to capture other lessons.

1. Methods

The theoretical discussion is framed using the example of conservation easement policy, a timely topic in environmental economics. Development of the theoretical model in this paper involves a mixed methods research model that integrates both qualitative and quantitative data. Mixed methods research involves the integration of qualitative and quantitative data to form a research model. Readers interested in learning more about mixed methods research should review seminal texts by Denzin (1970), Newman et al. (2003), and Tashakkori and Teddlie (2010).

Data were collected and synthesized by the authors in three stages. The first phase involved qualitative data collection, which consisted of nine structured group interviews at the 2005 annual Land Trust Alliance Conference in Madison, Wisconsin. These focus groups were comprised of land protection specialists, land protection attorneys, appraisers, and land trust executive directors (Keske, 2008). Forty-four landowners were also interviewed in seven more focus groups conducted at three agricultural conferences in the Rocky Mountain West by Miller et al. (2011). For both the landowner and land trust interviews, the process was started with short stories, or vignettes designed to stimulate discussion. This "guided conversation" format allowed for a number of follow-up questions and free flowing discussion, as well as spontaneous dialogue (for additional details regarding focus group procedures see Keske (2008) and Miller (2011)). It was during this "guided conversation" that land protection professional and landowners articulated the importance of PAR and the potential for pricing ambiguity. For example, one landowner from Wisconsin said "the preservation goal is for the visual pleasure of it, but also for the wildlife habitat. …One of the goals is preservation but also to, I guess, to have a little dent, to try to stop some urban sprawl" (Keske, 2008, p. 125).

The qualitative interviews revealed that some landowners were willing to accept less than fair market value to keep their land from being subdivided. Others wanted a higher price than land trusts were willing to pay. One landowner in Colorado stated: "There are very few land trusts willing to spend any money. The only [one] that I have ever seen spend money is The Nature Conservancy. Therefore, I have sold one side of the ranch for development. I sold it for $1,000 an acre because I can't run cattle on it. The Nature Conservancy called in protest when they heard I was going to subdivide it and I told them, "Bring your checkbook." People need to recognize, this is business". The qualitative research reported by Keske (2008) and Miller et al. (2011) indicates a clear, but partial, overlap of values between land trust agents and landowners for amenities protected, leading to ambiguities about who is paying for what in an easement.

Results from the qualitative research phase guided the construction of a survey used in the quantitative phase of the project (Phase II). Quantitative results have been published in Cross et al. (2011). Specifically, agricultural landowners (N = 2266) in Colorado and Wyoming were surveyed about their sense of place for their land, their attitudes towards land trusts, and perceived need for land conservation. Factor analysis of twelve measures of sense of place indicated that place identity, conservation ethic, and economic dependence were distinct dimensions of sense of place among agricultural landowners. Logistic regression analyses revealed that economic dependence had a significant and negative relation with landowner's trust of land trusts and placement of a conservation easement on agricultural land, whereas a conservation ethic and spiritual attachment were positively related. Two main implications for land trusts are that time spent contacting landowners is time well spent and intake questionnaires could be used to screen landowners for conservation ethic.

The results from the qualitative and quantitative survey were used to develop the theoretical model presented in Section 3.

2. Theory

While it is well-established that public goods present a market failure and free riding, there is a substantial literature on the private provisioning of public goods. Formalization of the private provisioning of public goods was first presented by Olson (1965), and thoroughly expanded since that time by others, including Warr (1982, 1983). An excellent summary of this literature is presented in T. Bergstrom, Blume, and Varian's (1986) seminal article that explores the implications of private provisioning of public goods

through a descriptive model and comparative statics. Among the authors' conclusions is that government expenditures towards supporting a public good can crowd out voluntary private contributions towards these goods. This is based upon the assertion and expansion on Warr's work (1983) that redistributions in income between private and government supporters (e.g. tax transfer payments) ultimately do not affect the provision of a single public good.

We assert that donated conservation easements are an example of a private donation to a public good (PDPG). However, the Bergstrom, Blume, and Varian models refer to traditional public goods. We maintain that conservation easements are more reflective of an "impure" public good (Cornes and Sandler, 1984; 1994) or a "green market" (Kotchen, 2006). Work by Cornes and Sandler defined impure public goods as public goods that only arise from private provisioning. Expanding on this definition Kotchen (2006), characterizes green markets as goods that arise through joint production of a private good and an environmental public good. In a mathematical and graphical illustration, Kotchen concludes that green markets have the potential to either improve or decrease environmental quality and social welfare. This is due, in part, to the simultaneous existence of a positive externality and the private funding of a public good.

Early appraisal literature indicates that a CE would be placed if someone other than the landowner valued the protected amenities more than a landowner could get for the option to develop (e.g., Tegene, Weibe, and Kuhn, 1999; Capozza and Sick, 1994). Many studies have reviewed successful regional and national land protection programs that compensate landowners for land protection (Duke and Aull-Hyde, 2002; Lynch and Lovell, 2003; King and Anderson, 2004; Rissman et al., 2007; Duke and Lynch, 2007). However, some observers have noted that most landowners get only a portion of the development value that they gave up with a conservation easement (Duke, 2004; Elconin and Luzadis, 1998). Hoag et al. (2002), for example, found that less than 20 percent of the people interviewed received any financial compensation beyond existing tax benefits and most of those received less than two-thirds of the land's extinguished option value.

The concept that private individuals contribute to public goods, and obtain a "warm glow" from doing so, is well referenced in the literature about conservation easements and other public goods (Andreoni, 1988; Elconin and Luzadis, 1998; Bergstrom, Blume and Varian, 1986). Marshall (2002) termed this type of warm glow private amenity rent (PAR). Keske (2008), in recent interviews of landowners and land trusts, found that the PAR from placing a CE can be substantial. A private landowner may feel compelled to protect his or her land from development, despite the fact that he or she may derive greater commercial rents from development than protection, or receive less than expected financial compensation.

While others before us have made the connection that private agricultural lands can generate public goods such as wildlife habitat (Bergstrom, Dillman, and Stoll, 1985), we characterize conservation easements as a PDPG that contributes to a green market. In a manner similar to Bergstrom, Blume and Varian (1986), and Kotchen (2006), we present mathematical and graphical arguments to support our assertions. However, we do so in a positive externality graph of marginal private and social benefits and costs, which we believe provides a more intuitive understanding of the pricing nuances. We elaborate on the positive externality model suggested by Kotchen to characterize this market and to identify the effect of landowner PAR on market efficiency. Like Kotchen, we find that the private provisioning of these public goods may either increase or decrease efficiency. We also discuss how land trusts, in their role as unofficial representatives of public and private contributions, have taken their own steps to take advantage of the knowledge that private individuals will help donate a portion of their easement that is often a very large share of its total value.

3. Results: an economic representation of conservation easements as private donations to public goods

Results from both the qualitative and quantitative phases of the study motivated the authors to further review the literature pertaining to the private provisioning of public goods. Hence, the results section of this paper presents a mathematical and graphical depiction the private provisioning of public goods using the example of conservation easements.

A key to establishing an efficient market is to quantify the land's private and social benefits. Economically speaking, a landowner is not predicted to alter his or her land use unless the commercial rents for the "converted" land are greater than the rents from the original use (Geltner, Riddiough, and Stojanovich, 1996). The landowner's externality is internalized and an efficient amount of land protection takes place when landowner compensation is equal to the difference between the marginal private benefits (MPB) and the marginal social benefits (MSB), from the point where MSB equals marginal social cost (MSC). This is shown as the difference between B and D in Figure 1 (see Appendix), where the dashed line is MPB and the thick solid line is MSB. A landowner would need to be compensated equal to the vertical distance between B and D to

protect the socially optimal level of land, A_D. This graphical representation can be linked effectively and easily to the appraisal literature about CE valuation. For ease of discussion, we will present the case of a conservation easement purchase, although the same presentation could be made for the net compensation of a donated CE.

From the appraisal literature (Plantinga and Miller, 2001; Tegene, Weibe, and Kuhn, 1999; Capozza and Sick, 1994; Capozza and Helsley, 1989), the value of land with unrestricted development rights is expressed in price per acre. The market price of an undeveloped acre today ($t = 0$) faced by buyers and sellers is:

$$V^u(0) = \int_0^{T_{con}} Ue^{((\lambda - r_u)t)}dt + \int_{T_{con}}^{\infty} De^{((\alpha - r_u)t)}dt - TCe^{(-r_u * T_{con})}, \quad (1)$$

Where V^u – value of undeveloped land with no development restrictions; U – undeveloped land rents in time t; D – net developed land rents in time t; TC – Conversion cost incurred when undeveloped land is converted to developed use at $t = T_{con}$, with $T_{con} \in [0, \infty]$; growth rate for future undeveloped land rents $\lambda \sim N(\mu_\lambda, \sigma_\lambda)$; α – growth rate for developed land rents $\alpha \sim N(\mu_\alpha, \sigma_\alpha)$; r_u – landowner's risk equivalent discount rate; T_{con} – optimal date of conversion.

Restated, equation (1) defines the present day value of undeveloped land $V^U(0)$, as being equal to the sum of the capitalized and discounted commercial rents (U) from the *undeveloped* land up to an optimal date of conversion ($t = T_{con}$), and the potential capitalized and discounted commercial rents from the *developed* land (D), should the landowner decide to develop the land sometime in the future, less a one-time cost of conversion in time "T" (TC). As expressed in equation (1), the landowner's allocation of land is purely a function of commercial rents across time, and the model assumes that the landowner possesses complete information to determine the optimal conversion time that will maximize the return on land investment.

The integration of equation (1) results in equation (2), which shows that today's price of convertible, undeveloped land, is equivalent to capitalized undeveloped and developed rents as follows:

$$V^u(0) = \frac{U}{r_u - \lambda}(1 - e^{(\lambda - r_u)T_{con})}) + \left(\frac{D}{r_u - \alpha} e^{((\alpha - r_u)T_{con})} - TCe^{(-r_u * T_{con})} \right). \quad (2)$$

(A) (B) (C)

This integration represents two separate parts: the commercial value of the undeveloped land (B), and the option for future development of the land (C). If a landowner were to separate the net developed rents (C) and extinguish them through a conservation easement agreement [(A) – (C)], the only remaining value for the undeveloped land would be the present day commercial value (B). Without considering the option values, undeveloped acreage would equal to A_B at price P_B, or B in Figure 1. When both commercial and option values are added, the result is undeveloped acreage equal to level A_C at Price P_C, or C in Figure 1.

Still ignoring PAR, undeveloped land should include the discounted social value, or public interest values (PIV's), provided by the land's amenities:

$$V_u(0) = \int_0^{T_{con}} Ue^{((\lambda - r_u)t)}dt + \int_{T_{con}}^{\infty} De^{((\alpha - r)t)}dt + \int_0^{T_{con}} Se^{((\theta - r)t)}dt - TCe^{(-r * T_{con})}, \quad (3)$$

where S – "undeveloped land" social values in time t; θ – Growth rate for societal land benefits, as land rents become more scarce over time $\theta \sim N(\mu_\theta, \sigma_\theta)$.

A third marginal benefits curve, the MSB, is added in Figure 1 to reflect the public amenity values (PIV's). The MSB curve includes PIV's, but excludes option value for development, because development and the natural amenities provided by the PIV's are mutually exclusive alternatives. Since PIV's are greater than for the land, the MSB curve can be anywhere to the right of the private marginal benefits curve. For purposes of exhibition, the fact that the MSB curve is placed to the right of the option value curve shows that land is worth more in conservation than in development. The distance between B and D is greater than B and C. The necessary, but not sufficient, condition for a CE is that the social value for which someone is willing to pay exceeds option values for development,

which requires the MSB (including PIVs) to be at least as large as MPBB. The socially optimal level of land preservation occurs at A_D if the "public good" provided by private land is funded at a cost of the vertical distance between D and B – which outcompetes the amount developers are willing to pay in this example, which is C-B.

This conventional accounting approach can adequately explain easement valuation in cases like this when PAR is not considered. What happens if landowners have PAR and are willing to donate to the cause of providing a CE, as is the case in a "green market"? The impact of joint services can be added to the traditional example shown in Figure 1. Figure 2 presents the landowner's marginal private benefits curves when they include commercial rent, option value, and non-commercial private rent (private amenity rent or PAR). Since the landowner also enjoys private amenity rents, another marginal benefits curve can be constructed, shown as MPB_C. In this case, PAR > Option Value, so the landowner would protect to the level of A_E.

Discussion and conclusions

Understanding landowner PAR forms the crux for effective CE policies. Like other goods in Kotchen's green market, there is a joint private and public product. The private provisioning of public goods from conservation easements can lead to either greater or less efficiency. A specific application is that a land trust could acquire a CE for less money when PAR > 0. In the previous example, the landowner did not even require additional compensation for this utility, or rent, received from the land. Providing values to make this more concrete, consider a farm that is worth $4 million based on commercial rents (farming), but has a market value of $6 million. Ignoring PAR, it could be deduced that the option value is $2 million – the difference between market price and commercial value. The land trust need only make up the shortfall of PIV to option value, when Option Value>PAR. A land trust would need to have a PIV equal to more than $2 million to deter the landowner from developing the property. Suppose that land trusts would be willing to pay $5 million for a CE. The CE price would then be between $2 million (the option value) and $5 million (land trust reservation price). Now let the landowner have a PAR for the land of $3 million. As illustrated in Figure 2, $3 million is greater than the option value, so the landowner will choose to keep the land protected. If this $3 million is added to the commercial rents, the land would be worth $7 million to the landowner to remain undeveloped, so there is no need for a CE. However, the trust might not know this, so the trust might offer to pay for an easement when it did not need to do so. In this case, there is less efficiency for the provisioning of public goods on private lands.

Changing the values again, if the landowner PAR was only $1 million, the landowner would choose to develop the land, because the $1 million PAR does not exceed the $2 million in option value. Assuming the same land trust reservation price of $5 million, a land trust would only need to provide a slightly over $1 million for a CE to make up the shortfall to the development option value. This results in improved efficiency. If landowner PAR is known, then the land trust does not need to come up with the $5 million that it would be willing to pay. However, if an information asymmetry exists and the landowner PAR is not revealed, a land trust may believe that it needs to provide the full $5 million and substantially overpay for the CE, leaving less funds available for the protection of other desirable lands. It is important for the sake of efficiency that these savings not reflect a pure transfer payment, or welfare is not increased. Fewer acres of land will be preserved for every dollar overpaid since this is an impure public good. Dollars overspent reside with the landowner who, by definition, has a lower contribution to welfare (that dollar was taken from taxpayers and redirected for conservation where its impact is presumably highest).

Conservation easements are a specific example of a private investment in a public good. In theory, welfare could be improved if land trusts could account for PAR. Of course, the challenge is in the implementation. As previously presented, market prices reflect commercial rents, option values, PAR and PIV's. However, the CE market is thin and information is scarce, so appraisers often have a difficult time finding comparable sales to justify the before and after values of a conservation easement appraisal, even when reviewing data attained through hedonic modeling (Keske, 2008).

However, the qualitative study reported by Keske (2008) revealed that land trusts are aware of, and even expect, a certain level of landowner PAR, particularly in the case of donated CEs. While inconsistencies in CEs and land prices and institutional complexities may make it difficult to calculate landowner PAR, we assert that land trusts assume that PAR is present and craft policies with this assumption in mind, particularly since land trusts are accountable for the stewardship of CE lands to maintain the land's conservation values. In order to capture some of the PAR that landowners would be willing to donate, land trusts could require landowners to share in the cost of a donated conservation easement.

Interestingly, a growing number of land trusts are doing just that. Several land trusts require that land-

owners return to the land trust either a percentage of their CE donation, or a flat fee (often around $10,000). In fact, The Land Trust Alliance, the governing and accrediting organization for U.S. land trusts, recommends that organizations engage in landowner cost sharing as a part of its accreditation process (Land Trust Alliance, 2009). Several land trusts also encourage landowner donations in addition to the mandatory fees. Our results suggest that there is sound economic theory to back what many land trusts already intuitively put into practice.

Moreover, these results suggest non-market research into PAR could provide valuable information for conservation easement markets. Research into techniques to allow for the revelation of such values could allow conservation organizations to reduce potential information asymmetry before sitting down to the bargaining table. Research into potential assessment tools that could be used might be helpful. Perhaps an application of such an assessment could be done through a screening questionnaire prior to entering into a contractual arrangement.

In summary, conservation easements (CEs) are one increasingly popular tool being used to protect public goods on private lands from development (Land Trust Alliance, 2007). Research by Keske (2008) and Miller et al. (2011) coupled with the frequency of donations of conservation easements (Keske, Gripne and Sherrod, 2008) suggests the potential for many landowners to receive private amenity rents from entering into CEs. Drawing on the literature regarding the provision of impure public goods, we develop a model and graphically illustrate the potential for overpayment to landowners entering into conservation easements. Such overpayment would result in inefficiency in this market and ultimately exacerbate the potential for this market to undersupply public goods through improper allocation of resources.

These results suggest that addressing information asymmetries relating to landowners' PAR values could improve efficiency in this market. Land trusts could explore implementing policies to capture some of those rents through such things as cost sharing, as many are apparently already doing. Moreover, research efforts regarding PAR values and techniques to assess landowners' PARs could be useful and enhance market efficiency related to CE transactions. We only draw from one aspect of the PDPG literature. It stands to reason that other observations in that relatively unrelated and extensive literature could benefit the CE market. For example, the phenomenon of government payments crowding out private donations has been noted in the PDPG literature but to our knowledge has not been explored in the CE literature. In other words, while capitalist market principles might appear to increase efficiency of environmental markets in theory, the actual success of their implementation in the market for conservation easements has yet to be measured.

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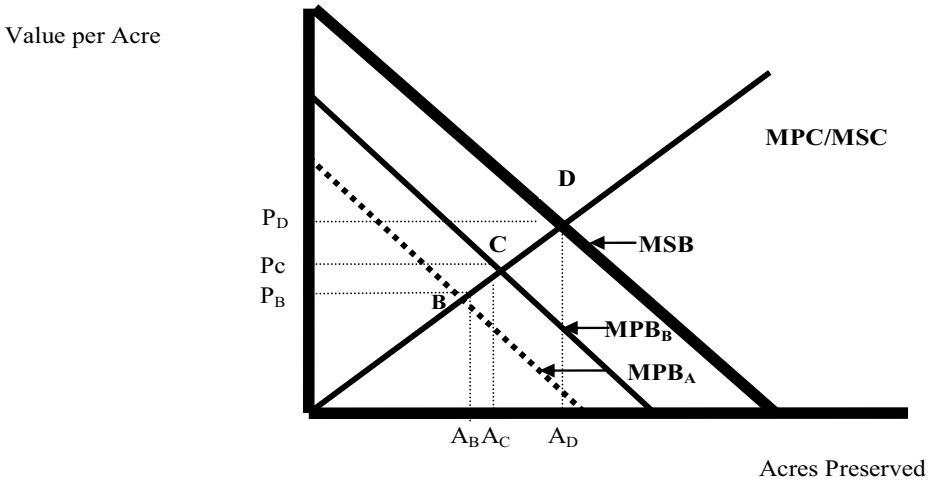
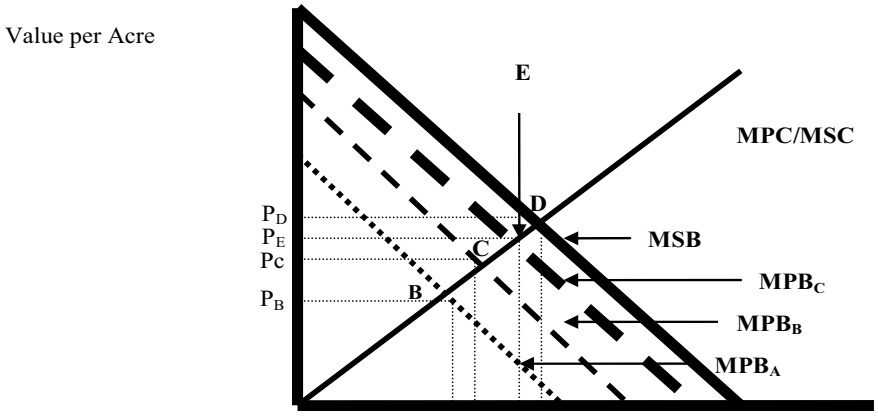
Appendix



Notes: MPB_A = Commercial rents only; MPB_B = Commercial rents + Option values; MSB = Commercial rents + PIV (PAR=0); P_D = reservation price for social value + private value; P_C = landowner reservation price for land with commercial rents and option value; P_B = landowner reservation price for land with commercial rents only; measured in acres of undeveloped land

Fig. 1. Marginal social benefits and marginal private benefits from a parcel of undeveloped land



Notes: MPB_A = Commercial rents only; MPB_B = Commercial rents + Option values; MPB_C = Commercial rents + PAR; MSB = Commercial rents + PIV; P_D = reservation price for social value + private value; P_E = landowner reservation price for land with PAR and commercial rents; P_C = landowner reservation price for land with only commercial rents and option value; P_B = landowner reservation price for land with only commercial rents; measured in acres of land preserved or undeveloped.

Fig. 2. Market for land preservation, including PAR