Land Trusts: The Growth of the Non-Profit Land Conservancy Movement

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Land Trusts: The Growth of the Non-Profit Land Conservancy Movement

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This paper investigates the growth of the local and regional non-profit land-use conservation movement.[2] This movement is spearheaded by organizations, commonly referred to as land trusts, that are becoming the instrument of choice for those wishing to protect open space, farmland, watersheds, and other natural features of the landscape (Meiners and Yandle 2001). This paper develops a positive theory to explain the occurrence of successful new land trusts across states. I also develop an historical analysis of selected state and federal regulations that have affected the operation and structure of land trusts. Using this historical analysis and a panel data set based on information published by the Land Trust Alliance, the national membership organization of land trusts, I use Poisson panel regression analysis to explain the expansion of the land trust movement and the variation in the frequency of successful new land trusts across states. I find that a $1000 increase in real per capita income increases by 6 to 9 percent the likelihood of establishing a new land trust. I also show that the enactment of private easement enabling legislation results in a 56 percent increase in the probability a new land trust is established in a year for any state. I also find that if a state loses 1 additional percent of farmland from its 1950 baseline level, during any calendar year, there is a 2.7 percent increase in the likelihood a new land trust will be established. And finally, I find that a rise in the skepticism of government action increases the likelihood that a land trust is established.

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[2]A land conservation organization, commonly referred to as land trust is defined as a "nonprofit organization that, as all or part of its mission, works to conserve land by undertaking or assisting direct land transactions - primarily the purchase or acceptance of donations of land or easements" by the Land Trust Alliance. The Land Trust Alliance is a national membership organization of local, regional, and national land trusts. The analysis here only includes land trusts' activity at the local and regional level and does not included the growth of regional chapters of national organizations such as Ducks Unlimited.

The paper first examines the impact of pressure groups on the welfare of their members. The second section develops a theory for why land trusts exist and have grown in size and number. In the third section, I examine how changes in the quantity of natural open space protected may be explained by changing agricultural production techniques, the growing distrust of government action, and private easement-enabling legislation. This section also discusses how these changes affect the number of land trusts. Using Poisson analysis, the fourth section explains the growth in the number of successful new land trusts across states. The analysis sheds light on the evolution of citizens' concerns, what demand land trusts meet, and why and how they have become one tool of choice for the supply of natural open space. I conclude and suggest some future research in the final section.

Section I. Toward a Theory of Land Trusts

Sitting on top of the Hyalite Mountains, looking down on southwestern Montana, one sees the tapestry of land uses; residential, industrial, and agricultural intertwine to form the landscape. A closer look, however, reveals many more intricate relationships of contracts and transactions. One of the more recent evolutions includes contracts between non-profit groups and local ranchers that prevent the development of the ranchers' land into industrial or residential use. These contracts represent only one of many methods now at the disposal of organizations wishing to maintain the landscape in its natural, undeveloped state.

Just south of Montana's Hyalite Mountains sits one of the first examples of publicly supplied natural open space. Yellowstone National Park, established in 1872, marked the federal government's first foray into land protection. While the federal government had earlier drafted rules regulating the intensity of federal land use, this was the first time it had prohibited the extraction of resources simply in order to preserve and protect the landscape. This also marked the first time that enough political pressure for publicly supplied natural open space was generated on a national level to compete with other pressure groups vying for federally provided benefits (Anderson and Hill 1996).

Pressure groups, usually defined by some homogeneous characteristics like age, occupation, etc., form in order to enhance the well-being of their members. The competition for costly regulation among these pressure groups determines how taxes, subsidies, and regulations

are allocated (Stigler 1971; Peltzman 1976; and Becker 1983). Groups that become more efficient at producing favorable outcomes, through devising more persuasive arguments or inventing more efficient organizational structures, are able to produce a more favorable outcome for their members with the same amount of resources.

Producing political pressure is costly. While the amount of money and time available for the production of political pressure increases as the size of the group increases, so too does the possibility of free riding. Each individual would like to impose the cost of producing the wealth-enhancing pressure on other members (Olson 1965 and Becker 1983). In order to produce political pressure efficiently, these groups create rules and regulations to reduce the effects of free riders, improving their ability to produce public goods (Demsetz 1978). Rules attempting to control free riding, such as fines and tiered membership prices, are costly to create. Moreover, as the group increases in size, the rules become more costly to enforce. The groups that more efficiently solve the free rider problem are able to create a greater level of pressure with a given amount of resources.

One way to reduce free riding is to induce the government to implement taxes or subsidies. Yet the coercion associated with taxes and subsidies creates distortions in the use of resources throughout the economy. These distortions, called deadweight costs or losses, are another driving force in how taxes, including costly regulations, and subsidies, such as barriers to entry, are determined. Becker (1983, 383), points out that deadweight costs caused by distortions "are lower when supply (and demand) is less elastic." Firms and individuals, through investment in physical and human capital, cause supply to be more elastic in the long-run. Hence deadweight losses often increase as individuals adjust to the new constraints they face. These adjustments generate an ever changing field on which pressure groups operate. Those groups, whose actions generate lower deadweight costs, will face less opposition by other pressure groups, enhancing their ability to produce benefits for their members.

Because information and operation costs exist, differences in groups' abilities to generate benefits for their members will determine the allocation of publically provided benefits (McCormick and Tollison 1981). Pressure groups that find more efficient methods to increase the welfare of their members will grow and receive larger amounts of private and public funds. The groups work toward preserving natural open space have exhibited such success in recent

years. By using both private and public methods, these pressure groups seemingly have evolved through competition to overcome the inefficiencies associated with deadweight losses and free riders.

Section II. The Art of Cooperation, Conservation, and Coercion

In the late 1800s, there were many environmental amenities available for the citizens of the United States to experience. The few crowded cities were surrounded by lush, open land that could be accessed in short order. Individuals were able to enjoy these environmental amenities at little or no cost. They could easily find open pasture in which to have a quiet picnic or a desolate sand dune from which to watch the waves. As the United States grew, these environmental amenities became more and more scarce in the areas to which workers and manufacturers were drawn. The landscape became less natural and more man-made; pastures became mills and paths became streets teeming with the motion of commerce.

Because the natural open space was, at least initially, relatively non-rivalrous, individuals who demanded natural open space could simply enjoy natural open space provided by others. As such space became more scarce, individuals searched for ways to prevent the industrial and commercial development of natural open space, joining together in organizations directed at achieving this goal. To cope with free riders, these groups initially used their resources to pressure state and federal agencies to finance the public acquisition of land though general taxation. By forcing all individuals to bear some of the cost of land use protection through taxes, these organizations reduced the ability of individuals to free ride, simultaneously reducing deadweight costs by spreading taxes over a large number of people. These groups targeted lands such as Yellowstone and the Grand Canyon that often had little or no production benefit and therefore were inexpensive relative to agriculturally or industrially productive lands. Because the groups were increasing the quantity of publicly supplied natural open space with little deadweight loss, few pressure groups opposed the initial federal and local land holdings that resulted.

As the amount of publicly provided natural open space increased, the management costs and the deadweight costs associated with federal land ownership increased. Other pressure groups competing for public resources were able to generate enough pressure to stop or slow the

protection of land through federal ownership. Moreover, as protection spread to lands of higher economic value, the costs associated with supplying additional acres also began increasing. Environmental amenity-loving groups, including those demanding natural open space, responded by seeking new ways to protect environmental amenities from commercial and industrial development.

One of these new protection methods, private fee simple ownership, was proposed in the 1890 writings of Charles Eliot. This son of the then-president of Harvard University authored an article published in the fledgling *Garden and Forest* journal established in 1888 by Charles Sprague Sargent, the founding director of the Harvard Arnold Arboretum. *Garden and Forest* was the first American journal devoted to horticulture, botany, landscape design and preservation, national and urban park development, scientific forestry, and the conservation of forest resources (Library of Congress 2001). The article by Eliot, a pioneering landscape architect and regional planner, set into motion the creation of private and public land conservation efforts. His writings persuaded Massachusetts' citizens and their Governor, William E. Russell, to support and sign into law Chapter 352 of the Acts of 1891. This Act, established the Trustees of Reservations as the "nation's first private statewide conservation and preservation organization." (Freeman 1994 and Poole 1992). [3] Later that year, the trust acquired the its first property: 20-acre Virginia Woods in Stoneham, Massachusetts.

Fee simple ownership by conservation land trusts provided a new avenue for individuals wanting to protect natural open space. Unlike other types of organizations, fee simple ownership by conservation land trusts bound future members to protect the natural habitat forever. Unlike private hunting grounds and preserves, land trust ownership effectively eliminated the possibility of future commercial or industrial development. Because land trusts often consisted of a small number of like-minded individuals who received benefits from specific environmental amenities, such as a watershed, city green space, etc., the organizations were able to minimize the amount of free riding of their members. These groups generated much more localized benefits than the previous, large, publicly funded programs. Moreover, they avoided many of the

[3] While there is some debate as to the identity of the first organization to privately supply natural open space, the Trustees of the Reservation are generally accepted as the first organization to be founded solely for this purpose. For more see (Freeman 1994 and Poole 1992).

deadweight costs present in political pressure groups and used their resources not to generate pressure, but rather, to privately supply natural open space through fee simple ownership.

As the northeastern United States grew more industrialized and populous, land trusts slowly became more specialized in the types of habitat they protected. While some land trusts formed in order to provide green space within city centers, others, such as the Edmund Niles Huyck Preserve in New York, began buying and maintaining small tracts of open space that included many small watersheds (Edmund Niles Huyck Preserve and Biological Research Station 2001). As the demand for natural open space grew, the creation and enforcement of organizational rules and regulations in order to reduce the free rider problem became increasingly costly. As a practical matter, the land trusts were supplying goods that offered non-rivalrous consumption to their members, each of whom placed different values on the goods. Thus, land trusts often had to create different prices for different groups within the membership in order to maximize the amount of open space they could supply through both direct fee simple ownership and political pressure for public open space acquisition (Demsetz 1973 and Thompson 1968). Another difficulty that faced many land trusts was rising land values. Rising per capita income was raising the demand for residential, commercial, and industrial property; and land trusts were increasingly trying to protect open space with greater development value. Because land trusts could supply natural open space only through direct fee simple ownership or political pressure for public open space acquisition, the increases in land values created incentives for individuals to develop new methods to supply natural open space.

A. Easements: Pressure for Public, then Private Protection

Although the few land trusts that existed in the early 1900s were becoming well organized and more skilled at land acquisition, management, and political pressure, they were often attempting to protect the most economically valuable land around the rapidly expanding urban fringe. Because fee simple ownership was the only tool available for public and private natural open space protection, only a few small additional plots could be added at a time. In response to an increase in the number of free riders and land values, land trusts devised the scenic conservation easement (Gustanski 2000).[4]

This new natural open space protection tool was, at least initially, narrowly defined as a legal agreement between a property owner and a public agency to restrict the type and amount of development that could be undertaken on a specific plot of land. Because owners of undeveloped land could be compensated for the commercial or residential development value alone and could still receive economic value from the land by means not precluded by the agreement, scenic conservation easements represented a lower cost mechanism for natural open space protection. More natural open space could be supplied for a given amount of funds; equivalently, fewer resources were needed to protect the same amount of additional natural open space.

Scenic conservation easements represented a shift in the way easements had been applied in the past. All previous types of easements had been defined by the law of property at common law, under which the majority of easements were made up of affirmative rights that granted the non-owner a right to use land for a particular purpose. Scenic conservation easements, a type of negative easement, prevented the owner from engaging in certain land uses and initially were only recognized by the courts under a highly selective number of situations (French 1982).

Even though scenic conservation easements were a new, unrefined land protection tool, the National Park Service employed them during the Great Depression in order to maintain the natural beauty of the Blue Ridge Mountains. In 1936, Congress, as part of the Blue Ridge Parkway, authorized the purchase of land, averaging 100 acres per mile of roadway, and to create scenic easements on 25 acres per roadway mile (Roe 2000). These conservation easements

[4]The first American conservation easement was written by landscape architect Frederick Law Olmstead in the late 1880's. It was created to protect parkways in and around Boston, but the use of easements on a larger scale did not immediately follow (Gustanski 2000.)

represented one of the first times that an entity, in this case the federal government, held easements on a large scale simply for scenic reasons without full fee title ownership of an entire property. The Blue Ridge Highway easements enabled the government to acquire the scenic rights to the property and allowed the title owner to maintain all other property rights.

The scenic conservation easements acquired by the National Park Service, while one of the first used to protect natural open space, were quite similar to traditional appurtenant easements benefitting only the owner of adjacent parcels of land. Appurtenant easements attach to and relate to the land of the so-called "dominant owner" who owns the land that benefits from the easement. The owner of the land that serves or provides the easement is called the "servient owner". His land is "burdened" with the easement. Appurtenant easements are typically access rights-of ways such as for roads and overhead and underground utilities. Because the National Park Service purchased land adjacent to the scenic conservation easements, common law courts were more likely to enforce the contracts.

Although scenic conservation easements represented a movement toward a lower cost means of land protection, the first scenic conservation easements obtained by the Park Service were often vaguely written and poorly understood by original and subsequent land owners. Over time, the National Park Service experienced numerous contractual conflicts that generated a mistrust of the use of scenic conservation easements by government agencies (Roe 2000). These misunderstandings and the possible conflicts with common law initially engendered a sense of apprehension about the use of scenic conservation easements and thus slowed the acceptance of this new form of land protection.

These problems did not deter land trusts from searching for new ways to increase the amount of natural open space protected. As the demand for undeveloped land increased, states such as California in 1959, began enacting public easement-enabling legislation. These laws enabled state government agencies to hold scenic conservation easements *in gross*. Unlike the appurtenant scenic conservation easements used by the National Park Service, these easements *in gross* granted a government body the legal right to be the "Holder" of the easement, essentially taking the place of the "dominant" owner under the common law of easements. Most scenic conservation easement legislation eliminated the requirement that a conservation easement serve, attach to, or be appurtenant to any other property. Government agencies were

given this right in order to maintain areas "predominantly in their natural, scenic or open condition, or in agricultural, farming or forested use, to permit public use, and to forbid or limit any or all" development and changes in the land scape (Massachusetts General Laws. 1969. Ch. 184 §§ 31 (Paragraph 1)).

As the demand for environmental amenities continued to increase, environmental groups, including land trusts, began pressing for public support of more specific environmental amenities. One result was the creation of the Outdoor Recreation Resources Review Commission (ORRRC) in 1958. In 1961, this commission recommended that the United States, and each state individually, develop policies and fund programs that preserved the benefits of outdoor recreation. As a result, the Land and Water Conservation Fund (LWCF) was signed into law in 1964. The LWCF appropriated federal funds to establish a national policy to protect the lands that promised benefits in the form of outdoor recreation. The fund also generated matching funds for states to develop and implement programs designed to acquire and preserve the natural landscape. The fund averaged $100 million per year from 1965 through 1979, with a high of $369 million in 1979.

Just a few years after the establishment of the LWCF, land trust organizations began pressuring the state governments for the right to draft private scenic conservation easements as a way to supplement public use of such easements. Beginning with Massachusetts in 1969, states began passing easement legislation enabling private land trust organizations to supply natural open space with private conservation easements. These new state statutes allowed private land trusts and charitable organizations to be the "holder" of conservation easements much like government agencies could hold public easements. The legislation defined how land could be conveyed, what type of land could be protected, and who was eligible to hold private conservation easements.

B. Freedom of Information and Sunshine Laws: Higher Costs for Government Action

At about this same time, distrust between citizens and government agencies had amassed political pressure to increase the openness of government operations. (U.S, House 1974. HR 12471). At the federal level, this political pressure culminated in the 1966 passage of the

Freedom of Information Act, or FOIA, giving greater public access to the official records and meetings of federal agencies. Even though this statute represented the first federal law guaranteeing access to federal records and meetings, many states, including some early movers such as Massachusetts in 1851 and Montana in 1895, had long before passed open records statutes enabling individuals to view official state documents. Other states, such as Alabama in 1915, had enacted statutes, sometime referred to as Sunshine Laws, requiring government agencies to hold most sessions open to the general public.

These laws required government agencies to follow specific operational guidelines (Dando 1993). In general, these rules created time for public hearings and discussion, which sharply reduced the speed of government action. The laws also increased the amount of resources government agencies needed in order to propose and carry out any course of action. This rise in costs and in the time needed for public action increased the costs associated with all publicly supplied goods.

The higher costs of government action created opportunities for land trusts, which specialized in private natural open space protection. As land trust organizations spread and became more specialized, particularly in highly industrialized and populous states, they searched for additional ways to supply natural open space. As more state governments enacted FOIA and Sunshine Laws, private land trusts began growing in size and number; the growing number of states with private conservation easements-enabling laws further shifted the balance in favor of supplying natural open space privately. At the same time, a few land trusts were slowly evolving into larger conservation organizations that specialized in political pressure.[5] Among these were the Nature Conservancy, the Trust for Public Land, and the American Farmland Trust.

In 1976, two changes in tax law increased the viability of conservation easements: a provision was added in the Internal Revenue Service code that allowed the decline in economic value caused by an easement to be tax-deductible; the Act also subjected all large estates to higher tax liability. This combination gave land trusts a more favorable climate for creating easements. The Historic Structures Act, included in the Tax Relief Act of 1976, also permitted

[5]While many of these now large organizations were not new in the late 1960s and early 1970s, the way in which they operated had evolved greatly from their early beginnings. These organizations began focusing more effort on the crafting of national and state government policy.

tax deductions for historic and conservation easements. Although the initial 1976 tax code, section 170(f)(3)(b)(iii), "allowed a taxpayer to claim an income tax deduction for the charitable donation of a thirty year easement, a year later the law was amended to make such a deduction available only if the taxpayer donated a perpetual easement." (Small 2000). While the legislation initially was set to expire in 1981, the Treasury Department drafted new permanent legislation, section 170(h), which was signed into law in 1980.

As a practical matter, changing federal law to make easements deductible had an uneven impact across the country. Although federal tax deductions on scenic conservation easements were possible in some states in 1976, many state property statutes did not allow individuals and private land trust organizations to create easements, while other states did not permit the creation of perpetual conservation easements. The new federal tax incentive generated considerable pressure for changes in many states' property laws.

Land trusts and taxpayer organizations began pressuring state legislative bodies to enact various private conservation easement laws. These laws varied from state to state according to the strengths and weaknesses of the states' pressure groups. While some states were quick to introduce easement-enabling legislation, others were not. Due to the differences in demand and supply of environmental amenities, and the actions of other pressure groups in the state, the resulting legislation varied widely; in two instances states chose not to did not draft any private conservation easement legislation.[6]

Given the widespread interest in private conservation easements, the National Conference of Commissioners on Uniform State Laws drafted the Uniform Conservation Easement Act in 1981. The UCEA provided a structure on which to base a statute restricting land use through private means while taking advantage of the federal tax provision. The UCEA reduced the common law and IRS code conflicts associated with the protection of natural open space through private conservation easements. Since 1981, twenty-one states have adopted the

[6]Currently North Dakota and Pennsylvania still have not enacted easement enabling statutes. In Pennsylvania, the coal and utility industries have worked against easement statutes due to the possible conflicts with mineral rights. This has not, however, stopped land trusts in Pennsylvania from acquiring private conservation easements. In 1998, land trusts in Pennsylvania held just over 59,000 acres in easement, the ninth highest total of any state in the Union. In North Dakota, the state government has purchased many perpetual easements to maintain waterfowl use of the land. However, much litigation, including United States v. Albrecht, has been brought against the program and has generated apprehension about the use of conservation easements.

UCEA verbatim or with modification (Squires 2000). Twenty-five other states have passed similar private conservation easement-enabling legislation.

The new tax law, when the UCEA was first drafted, contained terms such as "for the scenic enjoyment of the general public" and "significant public benefit" which were not yet defined, nor with precedent. From 1982 to 1984, the IRS issued private letter rulings and a Notice of Proposed Rulemaking on section 170(h) (Small 2000). These rulings continually expanded the ways private conservation easements were of "significant public benefit" and, therefore, tax deductible. Because the protection of scenic value and endangered species habitat became defined as benefitting the public, land owners who wished to encumber their land with easements could exclude public access and still receive tax benefits, if such access would impair achievement of the easement's purpose. As the ability to exclude expanded through court rulings, land trusts increasingly could exclude public access on both land held fee simple and land encumbered by scenic conservation easements (Small 1986).

As areas of high population growth witnessed a rise in the conversion of agricultural land to industrial use, groups such as the Lancaster Farmland Trust (Pennsylvania), the Montana Land Reliance, and the American Farmland Trust, were able to generate enough pressure to create farm protection programs. The federal and state governments established the Purchase Agricultural Conservation Easements (PACE) program, the Wetland Reserve Program (WRP), the Conservation Reserve Enhancement Program (CREP), and other programs to increase the acreage protected from residential and commercial development.

The agencies administering these new programs, encumbered by a rigidly defined process, often lost bids or were unable to make bids before competing private development contracts were signed. In order to overcome these difficulties, government agencies turned to land trusts for assistance. Land trusts were not constrained by regulatory procedures and had employees and members who were more familiar with the methods of natural open space protection. As noted by a member of the Alachua Conservation Land Trust of Gainesville, Florida: "Land trusts can operate with less public scrutiny than a government agency. Trusts don't have to give public notice or hold hearings on their actions" (Thomas 1999, 15).

When a private land trust buys land in advance of a government agency's ability to attain it, then sells the land to that agency, it is called a preacquisition. Land trusts are said to "bring

agility to projects" (Endicott 1993, 4), because they are able to quickly purchase land by more flexible means, such as at auctions or through installments, than are available to government agencies. Preacquisition enables the land trust to quickly obtain the land, giving the public agency time to raise the funds to purchase the property and perform the necessary public hearings. The land trust assures the government agency that the land will not be sold in the interim.

The practice of preacquisition also generates direct monetary benefits to the land trust involved. Because of the tax deductions available tor individuals who sell or donate land or easements to land trusts, land trusts are able to acquire land or easements at below market prices. When a land trust acquires this land, the organization can then sell the entire property or easements to a government agency at market value, realizing the difference. Thus, for example, in 1989 the Bureau of Land Management (BLM) paid The Nature Conservancy (TNC) $1.4 million for land TNC had bought for $1.26 million. TNC was able to increase the amount of land protected from residential and commercial development while also increasing its funding. Transactions such as these have played a growing role in the spread of land trusts, but also mean that acreage held by a land trust is no longer always an accurate measure of its activity.

Section III. The Supply and Demand for Natural Open Space

In the late nineteenth century, most land in the U.S. was either in a natural state or used for agricultural production. Both of these land uses supplied natural open space for all who lived and worked in these settings. Initially, few of these open spaces were threatened by emerging industrial production. Because the technology used to produce agricultural products was land intensive, relative to today's standards, it took vast tracts of land to produce the agricultural products demanded. Because farmers, ranchers, and foresters jointly produced agricultural products and natural open space, consumers were able to enjoy most natural open space free of charge.

Over time the population of the United States increased; the productivity of agricultural and industrial production increased simultaneously as a result of technological change (Griliches 1957). Technological change in agriculture reduced the number of acres needed to produce a given amount of agricultural output, helping to reduce the number of acres devoted to

agricultural production. Meanwhile, technological change also increased the return from industrial land use. As the return from industrial land uses became greater, relative to agricultural uses, land was converted from farms, forests, and other agricultural uses to industrial sites.

New industrial production techniques also generated higher real wages than did agricultural production, inducing many individuals to switch from agricultural work to industrial work. As farm families moved to the cities, they could no longer easily access the natural open spaces they previously enjoyed. Moreover, as agricultural land and other open space was developed for commercial and residential uses, those people already living in the cities also suffered from the decline in the amount of natural open space. At the same time, the growing distrust in government, noted earlier, made matters worse. State passage of open record and open meeting laws (FOIA and Sunshine Laws) increased the marginal costs of supplying natural open space through public means. This in turn hampered the ability of public agencies to acquire open lands before they were converted to commercial or industrial uses.

This reduction in the supply of natural open space induced a growing number of individuals to search for alternative ways to supply natural open space. State governments responded by enacting private easement enabling legislation, allowing private organizations to pay for the benefits received from natural open space instead of paying the full cost of direct ownership. This in turn facilitated the ability of private organizations to acquire open lands before they were converted to commercial or industrial uses.

Meanwhile, rising real income was leading to an increase the demand for open space. When combined with the other forces noted above, the result was threefold:

1. a change in the mix of open space, from space freely supplied as a byproduct of agricultural operations, to space acquired outright for open space purposes or protected under easements;
2. an expanding role for private sector organizations, such as land trusts, in the provision of open space amenities; and
3. a growing amount of land contractually protected (via acquisition or easement) from future commercial or industrial development.

In principle, the growing role for land trusts could be met by a few large trusts or by

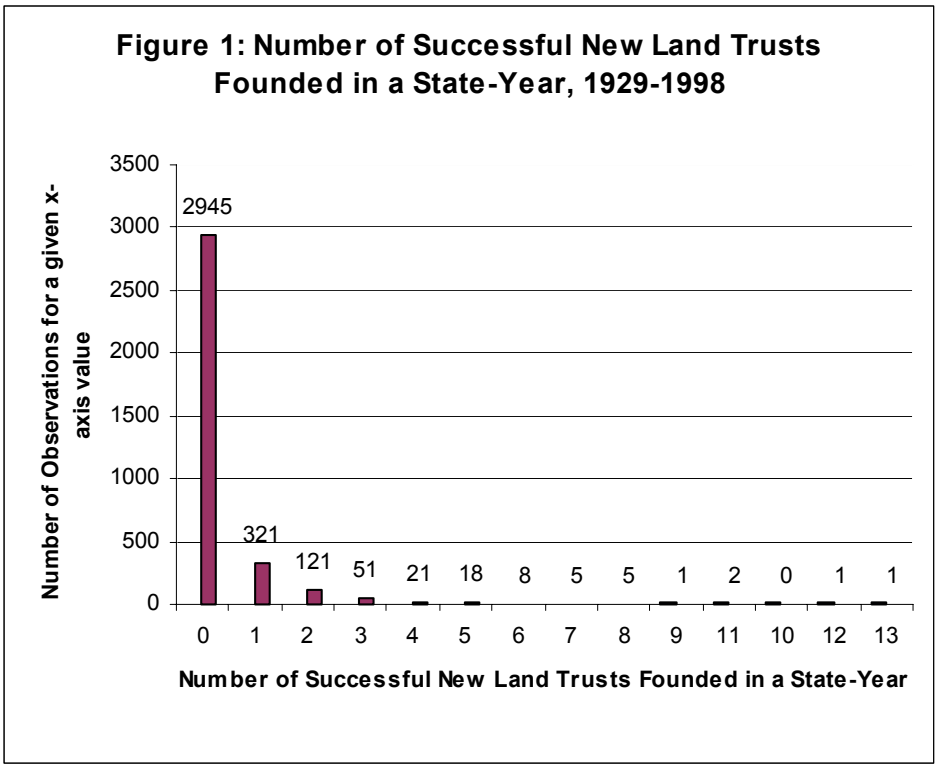
additional smaller trusts. Moreover, changes in the amount of land protected by trusts could be met by an increase in the size of the representative land trust, a change in the number of land trusts or a combination of both.[7] Depending on the cost structure of the industry, the growth might even be met by a reduction in the number of land trusts. Overall, recent data suggest that the number of acres owned and under easement per land trust in fact has been increasing, such that there are some economies of scale in their operation.[8] However, these recent data, including budget, membership, acres owned, and acres under easement, begin in 1985 and are reported about every five years. Using these data would not give a historical perspective of land trust activity.

Section IV: Poisson Analyses

During the 20th Century, most U.S. states experienced great changes in population density, real per capita income, and acreage in agricultural production. States also have enacted easement enabling legislation and FOIA and Sunshine Laws that have possibly affected the costs associated with creating and operating a conservation land trust. Using a panel data set of the 50 states from 1929 to 1998, this section attempts to determine how these changes have affected the number of new successful land trusts across states.

[7]Size is measured in number of acres privately supplied by both fee simple and through scenic conservation easements.

[8]It appears that over the last twenty years, the size of the average land trust has been increasing at an increasing rate, suggesting that the land conservation movement has experienced increasing returns to scale. For more information see (Mulholland 2003.)



The dependent variable, the number of successful new land trusts in state i, for a given year, t, is a count variable. Figure 1 presents the observed values of y_{it}. Although I would prefer to measure the amount of acreage protected by land trust activity, preacquisition activity causes data on acreage owned or under easement to be misleading. Because y_{it} represents the number of successful new land trusts founded in state i for year t and every point is a non-negative integer, it is appropriate to use the Poisson regression model. The Poisson model is based on two assumptions: (i) the probability that an event occurs within a small interval of time,) t, is given by 8) t, where 8 is a function of a vector of regressors and) t is a year in a given state; and (ii) occurrences in separate time intervals are independent events (Michener and Tighe 1992). This implies that the number of events in an interval of a given length is Poisson distributed with the probability density:

$$Pr(Y_{it} = y_{it}) = \frac{e^{-\lambda_{it}} \lambda_{it}^{y_{it}}}{y_{it}!},$$
$$y_{it} = 1,2,\ldots,$$
$$i = 1,2,\ldots,N$$
$$t = 1,2,\ldots,T$$

where y_{it} is the realized value of the random variable. This results in a distribution with mean and variance of Y_{it} equal to θ_{it}.[9] In order to estimate y_{it}, θ_{it} is defined as:

$$\lambda_{it} = e^{(X_{it}\beta)}$$

where X_{it} represents a vector of explanatory variables, including a constant, that describe the characteristics of an observation unit at time period t. This method eliminates the problems created by the large number of zeros present in the dependent variable. Because $y_{it} = 0$ is a natural outcome in the Poisson distribution, this specification handles the zero problem directly (Hausman, Hall, and Griliches 1984).[10]

[9]The dependent variable, the number of new successful trusts shown in Table 1, displays a variance larger than its mean. Due to the overdispersion of the dependent count variable, I initially estimated the model using a negative binomial panel estimator, to relax the assumption of equal mean and variance. When I compared the predicted values from the negative binomial to those predicted by the panel Poisson estimator, the panel Poisson explained a larger portion of the dependent variables variation. While I only report the panel Poisson results here, both estimation techniques generate similar qualitative results.

[10]I would like to be able to estimate the number of land trusts founded in a state. However, I only have the foundation date of currently operating land trusts. This is why I use the cumbersome terminology "successful, new."

Table 1

Variable	Obs	Mean	Std. Dev.	Min	Max	Description
nwtrust	3500	.3054	.9582	0	13	Number of New, Successful Land Trusts Founded in State, Year
income	3458	14,743.82	7,089.04	1,543.71	38,697.19	Real per capita personal income BEA ($1999)
density	3500	.2250	.3273	.000038	1.938937	Population density = population/private acres - person per acre (private acres = total state acreage minus federally owned acreage)
ease	3500	.2217	.4155	0	1	Enacting Easement Enabling Legislation for Nonprofits (Enacted = 1)-
trusts	3500	5.22	13.76	0	121	Number of Conservation Land Trusts in State, i, year, t.
records	3500	.5460	.4980	0	1	Enacting First Open Records or Freedom of Information Act (Enacted = 1)
meeting	3500	.47	.4992	0	1	Enacting First Open Meetings or Sunshine Legislation (Enacted = 1)
fund$	3500	2,369,556	5,757,455	0	6.10e7	Real State Land and Water Conservation Fund Dollars Spent ($1999)
reserve	3500	.00014	.00161	0	.0457	Percentage of Non-Federal State Land in the USDA Conservation Res. Prog.
farmloss	2382	.1905	.2177	-.3023	.7730	Percentage of Farmland Loss from state year i, 1950 to state year i,t

The variables used in the empirical analysis are summarized in Table 1,[11] while Table 2 presents the estimation results from the panel Poisson estimates. The results are reported in terms of incident rate ratios, i.e. the rate at which events occur.[12] For all models reported in Table 2, the dependent variable is the number of successful new land trusts founded in a given state-year.

In all models, an increase in real per capita income results in a slight increase in the likelihood that a successful land trust will be established in a given state-year. In Model 1, an increase in real per capita income of $1000, about 7 percent, increases the likelihood of a successful new land trusts by 9 percent, *ceteris paribus*. Natural open space is indeed a normal good.

Ceteris paribus, Model 1 shows a 68 percent increase in the likelihood that a successful new land trust will be founded in a given state-year after a state passes private conservation

[11]According to the USDA, from 1992 to 1993, Arizona and Idaho lost 21.3 percent and 20.5 percent acres of farmland respectively. This large loss during one year was a result of changes in the farm definition the USDA implemented to ensured comparability not only between the Census of Agriculture data and the annually published NASS estimates, but also between years within their publication. Removing these two observations from the analysis did not change the significance or effect of any of the independent incident rates.

[12]If the value of a coefficients is one, then a change in the independent variable has no impact on the likelihood of observing the establishment of a new, successful land trust. If the coefficients value is two, you are twice as likely to observe the establishment of a new, successful land trust if the independent variable in question increases by one unit.

easement-enabling legislation. This is consistent with the argument that private conservation easements reduce the private marginal cost of supplying natural open space. Of course, the enactment of easement enabling legislation may not just lower marginal cost; it may also reflect a higher demand for natural open space, because large increases in the demand for open space may increase demand for new protection methods such as private easements.

As the number of land trusts operating during a given state-year increases, the probability that an additional successful new land trust will be founded in that state is reduced. For instance, by 1990 there were 9 successful land trusts established in the state of South Carolina. *Ceteris paribus*, in 1990, the likelihood of a successful new land trust established in South Carolina is 7.2 percent lower than a state, such as North Dakota, that has no land trusts.[13] One way to view this result is that when some shock (such as a new piece of legislation) occurs, the full impact of this on the *stock* of land trusts in a state will be spread over a number years.

The passage of state FOIA and Sunshine Laws increases the likelihood of new successful land trusts by about 86 percent and 99 percent, respectively. The FOIA and Sunshine Laws increase the cost of protecting natural open space by direct government action because the slow the operational speed of government agencies. As the relative cost of private methods falls, the quantity of natural open space supplied through private land trust action increases. These laws also enable land trusts to specialize in preacquisition:. Because private land transactions occur without public hearings and discussion, land trusts expanded their role to include brokering for public agencies unable to make an offer before private groups finalize the transaction.

Of the two federal programs that aim to supply natural open space, the Conservation Reserve Enhancement Program (CREP) and the Land and Water Conservation Fund (LWCF), only the CREP appears to have a statistically significant effect on the probability that a new successful land trust will be established, and even here the estimated effect of the CREP program is quite small. The LWCF program has no discernable effect on the likelihood of the formation of a land trust in a state, a finding that is consistent with the fact that LWCF is primarily directed toward parks and recreation facilities, much of which consist of investments playgrounds and

[13]This is calculated by taking the incident rate ratio, .992, subtracting 1, and multiplying by the number of successful land trusts established by in South Carolina by 1990.

sports facilities for children, not the natural open space demanded by land trust members.

Yearly data on farmland by state are only available from 1950. Thus, using these data in an effort to discern the impact of farm land losses requires that I reduce the yearly observations by state from seventy to forty-eight. To provide an appropriate comparison, Model 2 is thus the same as Model 1 except for the shorter time period. It is evident that although there is some loss of precision due to the truncated sample, the fundamental impacts estimated in Model 1 continue to hold.

In Model 3, I add the percentage decline in farmland from 1950 to the current year in a given state.[14] The inclusion of percentage farmland lost reduces the estimated effects of all previously included explanatory variables. A $1000 increase in income raises in the probability of the establishing of a successful, new land by 6 percent. The enactment of easement and FOIA legislation show reductions in their magnitudes to 56.4 percent and 66.8 percent, respectively. Going from Model 2 to Model 3, the inclusion of the farmland lost results in smaller and less precise estimates of both population density and open meeting legislation.

There is a 2.7 percent increase in the probability that a new land trust will be established each time a state loses 1 percent of its farmland from the amount used in 1950. The theory hypothesizes that an decrease in the amount of farm land jointly supplying natural open space would increase the probability of successful new land trusts founded in a give state-year. Due to the highly inelastic supply of natural open space through agricultural production, I found this result to be very small. Farmers supply natural open space only if the agricultural return remains the greatest valued use. However, upon further review, the data reporting method used by the USDA, may cause the model to understate the effect farmland loss has on the establishment of successful new land trusts. Most states only report farmland changes at 100,000 acre intervals, so therefore, if a state gains or losses less than 100,000 acres of farmland, the variable *farmloss* does not change. This measurement error biases downward the estimated effects of farmland loss on the probability of the establishment of a new, successful land trust.

[14]For instance Colorado had 39000 acres of farmland in 1950. Between 1950 and 1952 the amount of land used in farm production fell by 900 acres or 2.3 percent

Section V: Conclusions and Suggestions

The traditional environmental movement has strived for the preservation of natural resources. This movement has succeeded in the creation of land trusts that privately supply natural open space. This study shows that the growth of the land trust movement has been due to several factors: increases in real income, private easement-enabling legislation, the loss of farmland, and FOIA and Sunshine laws. Increases in real per capita income result in an increase in the demand for natural open space. Every $1000 increase in real per capita income results in a 6 percent to 9 percent increase in the likelihood that a new successful land trust will be established in a state in any given year.

Easement-enabling legislation increases the probability a land trust will be established by 56 percent in a given state-year. The legislation may reduces the marginal cost of protecting additional natural open space. It could also mean that the enactment of easement enabling legislation is more of a measure of demand for natural open space than marginal cost. Large increases in demand may simultaneously result in the demand for new protection methods such as private easements.

Another driving force appears to be the decline in natural open space jointly provided by agricultural production. During any calendar year, if a state loses 1 additional percent of farmland from its 1950 baseline level there is a 2.7 percent increase in the likelihood a new land trust will be established. This recent growth in the number of land trusts does not appear endless. As the number of land trusts operating during a given state-year increases, the probability that a successful new land trust will be founded in that state is reduced. For instance, by 1990 there were 9 successful land trusts established in the state of South Carolina. *Ceteris paribus*, the likelihood of a successful new land trust established in South Carolina in 1990 was 7.2 percent greater than in a state without any land trusts.

The increase in government distrust, seen through the enactment of FOIA and Sunshine Laws, also affected the number of newly established land trusts. The enactment of FOIA and Sunshine Laws increases the probability that a new land trust will be established in a given state-year by 66.8 percent and 30.2 percent respectively.

Although this paper shows that growing distrust in government action has increased the supply of open space through land trust activities, the paper does not analyze the evolution of

these state laws over time. Since the first of these state laws was enacted, state legislatures have continued to change what is covered and not covered. Even though initial law might cover almost all government agencies, the legislation may be amended to allow additional exceptions. In other states, the opposite may have happened. Analyzing the details and evolution of each state's FOIA and Sunshine statutes would give further insight into how these laws have affected the supply of natural open space by land trusts.

As land trusts and government agencies have begun to work together, these preacquisition activities have increasingly blurred the private land trust activity and the activities of government agencies. Many land trusts have begun acting as brokers for government agencies searching for ways around FOIA and Sunshine Laws. This makes the simple analysis of the amount of privately protected natural open acreage difficult to perform because much of the publicly provided natural open space is due to the activities of private land trusts. Because reliable data on land trusts' budgets, membership, and the amount of acres owned, under easement, and transferred to government agencies, has been collected only since 1985, a study using these measures would not give a historical view of land trust growth. Furthermore, data on the amount of land publicly supplied through preacquisition activity at the state level has proved difficult to find, thus causing possible miss measurement when measuring land trust activity by private acreage alone. This analysis overcame these problems by looking at the growth in the number of land trusts.

Table 2
Panel Poisson - Random Effects Model
Dependent Variable = Number of New Trusts in a State, Year (standard errors)

exposure = year group = state	(1929-1998)	(1950-1998)	(1950-1998)
explanatory variables Incident Rate Ratio	Model 1	Model 2	Model 3
income	1.00009 (.00001)**	1.00007 (.00001)**	1.00006 (.00002)**
density	5.857 (2.965)**	4.532 (2.235)**	2.711 (1.403)*
ease	1.683 (.1788)**	1.753 (.1885)**	1.564 (.1699)**
trusts	.9923 (.0025)**	.9943 (.0026)*	.9917 (.0027)**
records	1.855 (.2859)**	1.764 (.2805)**	1.668 (.2676)**
meetings	1.989 (.2959)**	1.610 (.2419)**	1.302 (.2014)*
reserve	1.42e-78 (9.23e-77)**	9.11e-75 (5.78e-73)**	2.07e-71 (1.30e-69)**
fund$	1.000 (4.23e-9)	1.000 (4.30e-9)	1.000 (4.47e-9)
farmloss			1.027 (.0054)**
1/log(intercept)	.0723 (.2023)	.0143 (.2044)	-.0281 (.2071)
Number of observations	3458	2382	2382
Log Likelihood	-1677.34	-1588.45	-1573.82
Wald Chi-square Value	755.89	454.93	453.78
Prob > Chi-squared	0.00	0.00	0.00

** Significant from 1 at alpha = .01
*Significant from 1 at alpha = .1

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