

**AN EMPIRICAL ANALYSIS OF THE EMERGENCE OF CONSERVATION
EASEMENT ENABLING STATUTES IN THE U.S.**

by

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ABSTRACT

This thesis examines the driving forces behind a significant institutional change in conservation law regarding the emergence of state conservation easement enabling statutes. This thesis develops an economic model to explain statute adoption choice as a function of conservation demand, legal, and political factors. This model first examines demand for conservation easements, given pre-existing common law doctrine and federal tax law, as well as economic, demographic, and land characteristics. Next, a competing model is explored, which focuses on the magnitude of interest group effects on the passage of conservation easement statutes. The implications of these models are tested using state-level data on conservation easement laws, income, density, land use, land values, neighboring state laws, taxes, and interest group presence as well as three state case studies. Empirical evidence most strongly supports adoption by neighboring states and interest group influence driving the timing of a given state's choice to adopt.

1. INTRODUCTION

The use of private methods to conserve land in the U.S. has increased dramatically in the last few decades. An especially conspicuous trend has been the purchase and donation of conservation rights to land, so called “conservation easements,” by both the public and non-profit sectors. A conservation easement is a legal tool (similar to a contract) that allows the voluntary transfer of certain rights from a fee simple owner to another party; these rights are typically restrictions on certain activities, such as housing development, which are intended to maintain some desirable characteristics of the land, such as scenic views or wildlife habitat.

Since their popularization about 50 years ago, conservation easements and the organizations that hold them (often charitable trusts) have exploded in number. From 1950 to 2000, the number of local and regional land trusts increased from 52 to 1,200 and the acreage under the control of these trusts shot from under 100,000 to over 6 million. In recent years, land trusts have been forming at a rate of two new land trusts per week (Wentworth 2007). The growth in the number of conservation easement acres held by land trusts has been especially dramatic. In 1990, local and regional trusts held 450,000 acres in easements. By 2000, 2.5 million acres of land were held in easements by these trusts, implying an increase of over 400% during this decade. This phenomenon has continued in recent years with the figures from 2005 showing the number of trusts growing to 1,667 and the number of total acres conserved climbing to nearly 12 million,

with 6.2 million (an area the roughly the size of Maryland) of those conserved lands held in easements.¹ This trend is illustrated in the figure below.

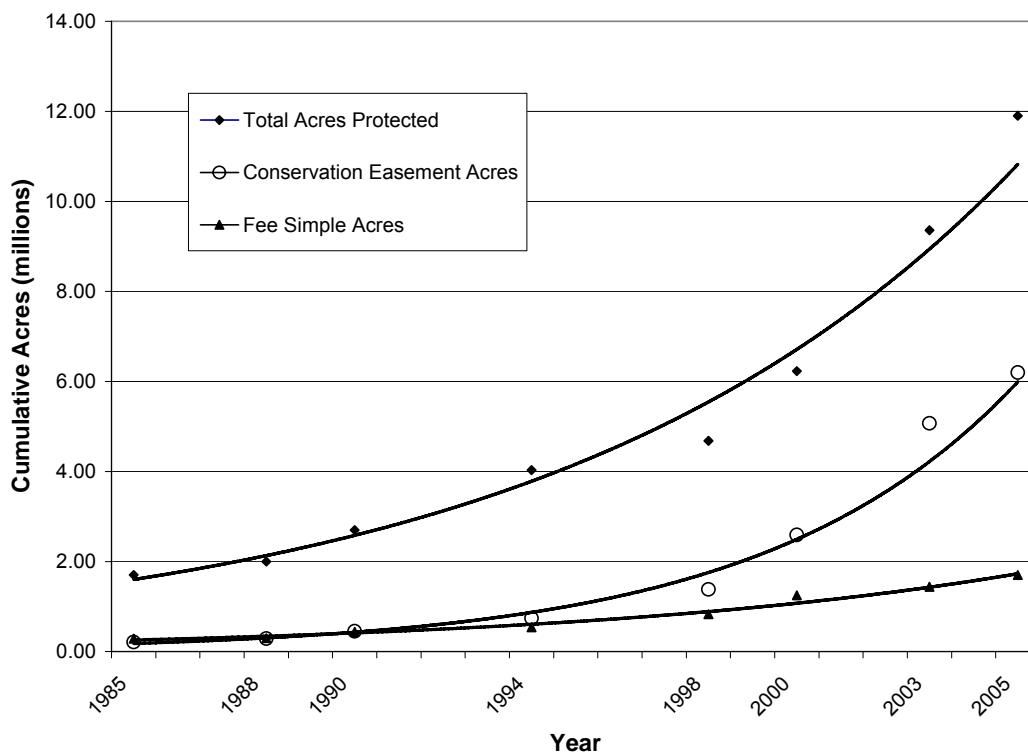


Figure 1: Local and Regional Land Trust Holdings over Time
Source: Land Trust Alliance. “2005 National Land Trust Census”

One significant institutional shift, which changed the law of property by defining these new conservation rights, may help explain part of the observed trend in private conservation. Restrictions within the common law of servitudes (of which easements are a part) were at odds with the purposes of conservation easements. Certain legal scholars cautioned against the use of easements for conservation purposes because of uncertainty regarding enforcement (Brenneman 1967). In the late 1960s, state legislatures began

¹ These data are taken from the Land Trust Alliance’s *National Land Trust Census 2005*, available at www.lta.org (accessed 12/5/06).

adopting statutes designating conservation purposes for which easements² could be created and forcing the courts to recognize and these agreements as real property interests despite their unclear place in the common law. These statutes are relatively heterogeneous in their content and complexity. However, most serve the same general purpose of definition and identification of eligible purposes and holders. The most recent state statute was passed in 2005 in Wyoming leaving only one state, North Dakota, without an enabling statute. Figure 2 illustrates the cumulative adoption of statutes over time. Table 1 lists the states adopting statutes by year.

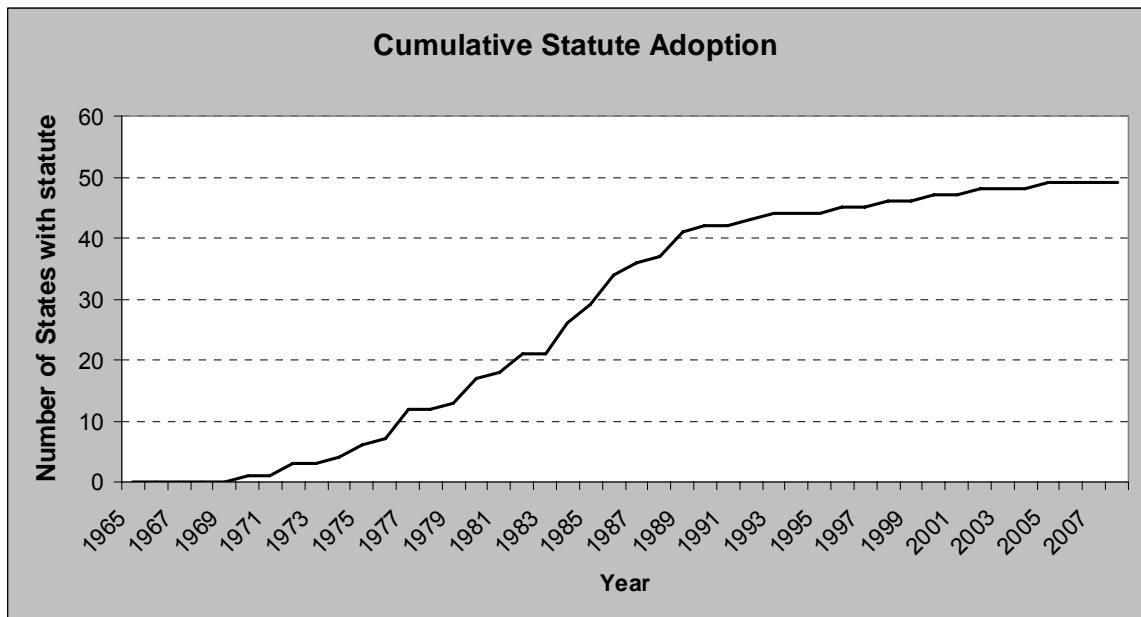


Figure 2: Cumulative Adoption of Conservation Easement Statutes

² Although “conservation easement” has become the most widely used term for these types of restrictions, the language can vary by state (e.g. conservation easement in gross, conservation restriction, an agricultural preservation restriction, a conservation right, and so forth), Mayo (2000 pp 26). Throughout this thesis, I will use “conservation easement” to refer to this type of restriction and I will refer to the state statutes generally as conservation easement enabling statutes, or simply enabling statutes.

Table 1: Adoption of Conservation Easement Statutes by State

Year	Adopting States
1969	Massachusetts
1971	Connecticut, Missouri
1973	New Hampshire
1974	Maryland, South Carolina
1975	Montana
1976	Colorado, Florida, Georgia, Rhode Island, Washington
1978	Delaware
1979	California, New Jersey, North Carolina, Ohio
1980	Michigan
1981	Nebraska, Tennessee, Wisconsin
1983	Arkansas, Nevada, New York, Oregon, Texas
1984	Indiana, Iowa, South Dakota
1985	Arizona, Hawaii, Maine, Minnesota, Utah
1986	Louisiana, Mississippi
1987	Vermont
1988	Idaho, Illinois, Kentucky, Virginia
1989	Alaska
1991	New Mexico
1992	Kansas
1995	West Virginia
1997	Alabama
1999	Oklahoma
2001	Pennsylvania
2005	Wyoming
No Statute	North Dakota*

* North Dakota does have a law which concerns conservation easements, but it simply limits the duration of any easement; therefore, I do not consider it an enabling statute.

Another factor in the upward trend in conservation easement acquisition may have been the federal tax law changes regarding the deductibility of donated conservation easements. Beginning with internal rulings by the Internal Revenue Service (IRS) in the late 1960s and major federal tax legislation adopted over the course of a decade, federal law began to allow conservation easements to be considered as nontaxable charitable donations for federal income and estate tax purposes. Until recently, up to 30% of a

donor's adjustable gross income (AGI) could be deducted per year for a maximum of six years, until the value of the donation was reached. In August, 2006, a law was passed to increase the donor benefits to allow for deduction of up to 50% AGI over a maximum period of 16 years and up to 100% AGI for farmers and ranchers.³ Additionally, conservation easement donations may reduce state property and income tax liability. Some states define further tax benefits which can be claimed.⁴

These institutional changes have major implications for demand for private conservation. The delineation of conservation rights, allows separation of rights and specialization of use of land attributes. These changes also have implications for the cost of supplying private conservation goods. The ability of qualified holding organizations to acquire the same conservation acreage for a fraction of the full estate value⁵ reduces the cost of land protection. Additionally, if the common law does impede enforcement of conservation easements against violators, then the presence of an enabling statute in the state should reduce enforcement costs for easement holders. Theoretically, these combined elements would increase the attractiveness of conservation easements relative to outright purchase and would increase the demand for easements by land trusts and the supply of conservation goods to the public.

³ This law will expire 12/31/07 unless extended by Congress. Donors are able to deduct 100% AGI if they derive at least 50% of their income from a farm or ranch. Land Trust Alliance "News and Updates on the Conservation Easement Tax Initiative" available at www.lta.org (accessed 12/1/06).

⁴ For example, in 2006 Colorado passed a law allowing state tax credit for easement donations. Colorado Donated Easement Transferable Tax Credit Statute, CO; State Laws; Colo. Rev. Stat. § 39-22-522 (2006)

⁵ Easements are valued as the difference between the land's full market value and its encumbered value. Even if the easement is donated, the trust will likely have some acquisition cost of negotiating and appraising the easement.

Some legal scholars have argued that these common law restrictions did impede the enforcement of conservation easements, inhibiting the creation of beneficial contracts. Therefore, they argue that the adoption of statutes was inherently efficient.⁶ This argument is consistent with the idea of efficient legal evolution, which posits that inefficient rules will be continually contested until they approach efficiency (Priest 1977, Rubin 1977). These legal scholars frame the adoption of enabling statutes across the country as an efficient response to lagging common law rules, given rising demand for the use of conservation easements. However, in many states, land trusts and other entities held conservation easements prior to the passage of an enabling statute. In Pennsylvania, in the year 2000, when the state still did not have an enabling statute, land trusts in the state held over 88,000 acres in conservation easements. If the argument of legal scholars is correct, why did we see conservation easements emerge before statutes?

Other law and economics work challenges the legal evolution idea by examining the extent to which legal change is driven by organized interest groups (Buchanan and Tullock 1962 and Becker 1983). This thesis seeks to examine the economic and political context in which the institutional shift in conservation easement law occurred. The analysis will focus on identifying the driving forces behind the changes and what implications this has for the efficiency of law. The differential adoption of statutes across the country offers ideal variation in both timing of legal change and legal characteristics for examination of the relationship between common law and legislative law.

⁶ Among legal scholars of conservation easements, the overwhelming view is that the state laws arose to clarify definitional and enforcement issues left uncertain in the common law and that this clarification is implicitly efficient (e.g., Dana and Ramsey 1989, Hollingshead 1997, Gustanski and Squires 2000).

1.1 Key Questions and Methodology

The key questions this thesis seeks to answer are: Did the common law impede the efficient evolution of property rights to land by impeding the development of a private conservation market by making transaction costs unnecessarily high? What were the incentives of different groups to lobby for or against statutes given their perceptions of statute implications for the transaction costs of acquiring or exercising their respective property estates? What were the driving forces (economic, legal, and political) of statute adoption and how do these forces fit into our current understanding of institutional change? I explore the answers to these questions by first examining the common law and its relationship to conservation easements. I then develop a model for conservation easement demand and costs from which predictions about legal change are derived. These hypotheses are then tested using state level data and case studies.

1.2 Thesis Organization

In Chapter 2, I first enumerate the characteristics of modern easements, their purposes, and the organizations that hold them. I then discuss the common law of servitudes and how conservation easements fit (or do not fit) into that legal structure. I also review the legal literature on conservation easements in order to provide a perspective of analysis. I then present the history of conservation easement enabling statutes—patterns of adoption and statute content. A comparison of the functions of the

different types of law (statutory and common) is made and federal tax law and its relationship to this legal change is discussed.

Chapter 3 develops an economic framework in which to analyze conservation easement enabling statutes. I rely on recent work in the field of law and economics which has examined different aspects of private conservation (Parker 2004, Albers and Ando 2003, Dana and Ramsey 1989, Lueck and Dnes 2004), literature on legal change and public choice (Posner 1973, Rubin et al 1999, Tullock 1975, Becker 1983, Wittman 1995), and literature on property rights and transaction costs (Williamson 2005 and Barzel 1997). I then model landowner allocation with and without a market for amenities (conservation goods), as well as transaction costs of easement holders, and political equilibrium with interest group competition. From these models I derive hypotheses about the actions of different groups and the market conditions under which statute adoption would be expected to occur.

Chapter 4 introduces the data used to empirically test the predictions from my models. I expand on the variables and procedures used and then present and explain the results obtained from using pooled probit and nested probit models to examine the likelihood of statute adoption over time. I then provide case study analyses of statute adoption in four states to further test my propositions. The final chapter, Chapter 5, summarizes the findings and outlines the conclusions. In this chapter, I link my findings to the current literature on institutional change and explore the implications of my work for the understanding of the common-statutory law relationship. I conclude with a discussion of avenues of future research.

2. HISTORY OF CONSERVATION EASEMENTS

In order to understand modern easements and the adoption of enabling statutes, it is essential to examine the law of servitudes and the treatment of conservation easement restrictions under the common law. This section first discusses characteristics and goals of modern easements and the different branches of servitudes from which these modern easements are derived. I then examine the adoption of the statutes across the U.S. and the evolution of the tax law as it relates to the qualification of easements as charitable deductions.

2.1 Defining Conservation Easements

Numerous attempts have been made to define conservation easements; the definition I will employ here is from the Uniform Conservation Easement Act (UCEA) of 1981, which states that a conservation easement is:

A nonpossessory interest of a holder in real property imposing limitations or affirmative obligations the purposes of which include retaining or protecting natural, scenic, or open space values of real property, assuring its availability for agricultural, forest, recreational, or open space values of real property, assuring its availability for agricultural, forest, recreational, or open space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the architectural, archaeological, or cultural aspects of real property.⁷

⁷Uniform Conservation Easement Act of 1981, available at www.law.upenn.edu/bll/ulc/fnact99/1980s/ucea81.htm (accessed 10/11/06).

Less formally, a conservation easement is a legal tool that allows the voluntary transfer of certain rights from a fee simple owner to another party; these rights can take the form of restrictions on certain land uses, such as housing development, such that some desirable characteristics of the land (wildlife habitat, scenic views, and so on) may be maintained. Features of many modern easements may include the prevention of certain activities such as development or subdivision (depending on the easement's purpose) and the right to engage in certain activities, such as fencing livestock from riparian areas. Easement beneficiaries may include the general public and are not restricted to adjacent landowners. Easements transfer the specified rights for a defined duration (usually in perpetuity).

Whyte (1959) was one of the first to write about conservation easements as a tool for preserving open space. He writes of the conservation easement as a tool which may be "of considerable usefulness, but which is not well known." He notes that the purchase of easements will be less costly than the purchase of the entire estate and that easements allow the land to be "kept alive" in a productive sense. Many years later, Hollingshead (1997) in discussing land preservation strategies such as government purchase, notes that as private arrangements, conservation easements provide "an appealing alternative." He advocates conservation easements as an efficient conservation tool because "the landowner keeps what the public does not need, which generally costs less than outright purchase" and the maintenance costs are borne primarily by the fee simple owner. It is positive accounts of conservation easements like these that may have helped publicize the availability of this tool and spread its application.

Although I have primarily discussed private easement holders, government agencies, counties, and municipalities also hold millions of acres in easements. In fact, it is thought that conservation easements were first used by government entities.⁸ The first known easements of this kind were those created in the 1880s by the Metropolitan Park Commission in Boston to protect a series of parkways along the Charles River, which were designed by Frederick Law Olmstead. Several decades later, the National Park Service also used easements to protect scenic parkways by limiting development.⁹ In the 1930s and 1940s the Fish and Wildlife Service (FWS) purchased easements in the Dakotas and Minnesota for refuge areas and in the 1960s, FWS began to purchase easements on farms in the Prairie Pothole Region to secure habitat for waterfowl.¹⁰ National conservation and regional conservation organizations and smaller statewide or local land trusts have become large holders of conservation easements. In 1982, a national umbrella organization, The Land Trust Alliance was founded in order to try to increase the sustainability of conservation easements and the private land trusts that hold them.

⁸ Although it is impossible to say when tools like conservation easements were first used because private land contract data is difficult to obtain unless a dispute arises.

⁹ There are examples from several states for these types of easement projects during this period. See Whyte (1959, pp 11-15) and Gustanski and Squires (2000, pp xvii) for discussion.

¹⁰ Hollingshead 1997, pp 333 and U.S. Fish and Wildlife Service. "Conservation Easement Examples." <http://www.r6.fws.gov/pfw/r6p8b1.htm> accessed 3/14/07.

2.2 Conservation Easements and the Common Law of Servitudes

Conservation easements are an outgrowth of the law of property contracts, or the common law of servitudes.¹¹ The common law of servitudes, derived from British judicial precedents, is actually comprised of three distinct branches. These three branches are easements, real covenants, and equitable servitudes. Although all of these servitudes govern arrangements of real property (rights, obligations, and restrictions regarding ownership and use of land), each has its own restrictions as to who can hold rights, for what purpose, and when they are transferable. French (1982) made the following statement regarding the law of servitudes, “The law of easements, real covenants, and equitable servitudes is the most complex and archaic body of American property law remaining in the twentieth century.” It is in this section that I explore the nature of these strands of contract law and the restrictions they place on the recognition and enforcement of agreements concerning land conservation.

Under the common law, an easement grants rights of use in some aspect of land to the easement holder. One of the most commonplace uses of easements is for access. For example, if there are two adjacent landowners, A and B, and A’s property is located next to a highway, B might purchase an easement on A’s property so that he can construct an access road from his own property to the highway. In this example, the easement is considered affirmative because it grants the holder some positive right of use. The

¹¹ Although now almost exclusively referred to as conservation easements, these arrangements are really no closer to easements than to real covenants or equitable servitudes. The writers of the Uniform Conservation Easement Act noted that they considered giving the agreements an entirely new name, but chose to use conservation easements simply because it would be the least confusing for lawyers to work with.

easement holder's land is considered the dominant estate, while the land affected by the easement is known as the servient estate.

Historically, the common law courts only recognized affirmative easements. Over time, so called "negative easements" were allowed, but only a distinct set of negative rights were enforced. Only if the owner of the servient estate conducted some activity which denied the dominant estate owner light, air, or flow of water in an artificial stream, could the dominant owner be granted a negative easement (French 1982). If, as in my example, the benefits of the easement are attached to a dominant estate, the easement is considered to be "appurtenant." Easements that are appurtenant "run with the land" such that they become a binding part of the titles of the dominant and servient estates and can be enforced in perpetuity by the courts. If the benefit of the easement is not attached to some dominant estate, but is instead attached to some person or entity, the easement is considered to be "in gross." Traditionally, the court did not enforce easements in gross in perpetuity and these easements were extinguished upon the death of the owner (Hollingshead 1997).¹² Later, American courts did begin to enforce easements in gross in those cases dealing with commercial interests, but the old rule still applied to non-commercial interests.

Dnes and Lueck (2004) point out that if the modern conservation easement were classified according to the common law of easements, it would be considered a negative easement in gross. Because the purpose of most conservation easements is the

¹² Some believe that this reluctance on the part of courts to enforce in gross easements was the limited recording system which existed in England and the possible difficulty of tracing the negative rights to the easement holder's successors (see French 1282-83).

preservation of some land qualities or attributes, conservation easements may require certain land use restrictions in order for the goals of the agreement to be achieved. Thus a conservation easement would be considered a negative easement.¹³ Additionally, because conservation benefits do not flow to a single property, but often provide benefits which are public in nature, a conservation easement is considered to be in gross. At least theoretically, common law easement characteristics impede the use of easements for conservation purposes. Even if a court allowed a negative easement, in order for the easement to be enforced in perpetuity, the easement holder would need to acquire land adjacent to the servient estate in order to meet the necessary condition of appurtenance; if this condition was not satisfied, the easement may not be transferable to successive owners of the servient estate, which may destroy the intent of the parties that created the conservation easement.

The other two branches of servitude law are real covenants and equitable servitudes. Real covenants are derived from contract law and equitable servitudes are similar arrangements, but are enforced in courts of equity. Both of these servitudes recognize negative rights as well as affirmative rights. However, as with the law governing easements, there are certain qualifications that must be met in order for these agreements to run with the land. The covenant must “touch and concern” the land, there must be “intent of transferability” at the time of covenant creation, and there must be “privity of estate” between the owners of the properties involved. The “touch and

¹³ Some conservation easements may also include some affirmative rights, such as access rights for purposes of monitoring or rights to fence for purposes of habitat enhancement. Parker (2004) notes that some trusts acquire easements not only for preservation purposes but for enhancement or restoration purposes.

concern” requirement is similar to that of appurtenance; it requires the benefit to increase the value of the holder’s land and the burden to decrease the value of the encumbered land. The “intent of transferability” is easily satisfied by explicit language in the agreement regarding the servitude’s duration. Privity of estate refers to the relationship of the parties involved in the agreement. In some jurisdictions, privity of estate necessitates that the owners have a simultaneous interest in the land; for example, a landlord-tenant relationship, in others, it may require only that the owners be successors to the original parties (Hollingshead 1997). Equitable servitudes follow somewhat different legal rules. There is no requisite for privity of estate between parties under equitable servitudes, thus increasing the likelihood of transferability and perpetual enforcement. However, equitable servitudes do uphold the need for the benefit and burden to “touch and concern” the properties for the servitude to run with the land. Therefore, these branches of law seem to inhibit the enforceability of modern conservation rights over time. At the very least, the common law seems to impose some cost on the holder to try to meet requirements for perpetual enforcement.¹⁴

2.3 History of Conservation Easement Enabling Statutes

In 1969, Massachusetts became the first state to adopt legislation specifically addressing private conservation easements. Prior to this law, however, many states did

¹⁴ The common law resistance of enforcing contracts in perpetuity is related to the idea of dead hand control. This is the idea that a single landowner should not be able to capriciously lock a parcel into some specific land use forever, because as values change, such a use might be inefficient (French, Dana and Ramsey).

have statutes which enabled public agencies to acquire easements for certain conservation purposes, such as erosion control and scenic highways.¹⁵ Following Massachusetts, many other states began to enact statutes regarding conservation easements and such laws are now present in all states but North Dakota. Table 2 provides a summary of statutes by state, including the date of adoption (Uniform Conservation Easement Act or other) as well as any similar statutes (such as scenic easements) that existed prior to the adoption of a conservation easement statute.

Although many of these statutes vary in content by degree, almost all serve the same general purpose. State enabling laws define conservation easements as rights, or real non-possessory interests in land, forcing their recognition as such by the courts (and as I shall discuss later, the Internal Revenue Service). Although they are not termed “conservation easements” in all states, the name is trivial because through their legislative definition they are, in a sense, removed from any of the common law servitude restrictions and are required to be enforced in their new definition. These enabling statutes generally outline the following: purposes for which conservation easements can be created, eligible holders, eligible enforcers, duration, and legal remedy. Others outline the procedure to be taken in order to properly record the property encumbrance.

¹⁵ Dnes and Lueck (2004 pp 9).

Table 2: Summary of Conservation Easement Statutes

State	Year	UCEA	Explicit Tax Language	Related Statutes
Alabama	1997	1997		
Alaska	1989	1989		
Arizona	1985	1985		Highway (1982), Scenic (1988)
Arkansas	1983	1983		Highway (1967)
California	1979		Yes	Open spaces (1974)
Colorado	1976		Yes	
Connecticut	1971			
Delaware	1978	1996	Yes	
Florida	1976	1986		Agriculture (2001)
Georgia	1976	1992	Yes	Highway (1967)
Hawaii	1985			
Idaho	1988	1988		
Illinois	1988		Yes	River (1973)
Indiana	1984	1984	Yes	River (1973)
Iowa	1984			Highway (1974)
Kansas	1992	1992		
Kentucky	1988	1988		
Louisiana	1986	1986		Highway (1999)
Maine	1985	1985		
Maryland	1974		Yes	
Massachusetts	1969			
Michigan	1980			
Minnesota	1985	1985	Yes	Highway (1967), River (1990), Erosion (1989)
Mississippi	1986	1986		Highway (1935)
Missouri	1971		Yes	
Montana	1975		Yes	
Nebraska	1981		Yes	
Nevada	1983	1983		
New Hampshire	1973			
New Jersey	1979		Yes	Trails (1974), River (1977)
New Mexico	1991	1991		
New York	1983			
North Carolina	1979		Yes	Highway (1967), Trails (1973), Agriculture (1991)
North Dakota	No LAW			Federal program (1935), Highway (1983)
Ohio	1979			
Oklahoma	1999	1999		
Oregon	1983	1983	Yes	River (1973)
Pennsylvania	2001	2001	Yes	Agriculture (1988)
Rhode Island	1976			
South Carolina	1974	1991	Yes	River (1974), Historical (1976)
South Dakota	1984	1984	Yes	
Tennessee	1981		Yes	Scenic (1971)
Texas	1983	1983		Highway (1999)
Utah	1985			Highway (1975)
Vermont	1987			
Virginia	1988	1988	Yes	
Washington	1976		Yes	
West Virginia	1995	1995		
Wisconsin	1981	1981	Yes	
Wyoming	2005	2005		

Because of the variation in the state conservation easement laws, in the late 1970s, the American Bar Association submitted a letter to the National Conference on Uniform State Laws recommending the creation of a “Uniform Conservation and Preservation Agreements Act” that could be adopted by states in order to provide more legal consistency. The letter of request noted the growing number of easements, the benefits of less-than-fee ownership, the need for enforceability for IRS tax reductions, and the myriad of state statutes already in effect (King and Fairfax 2006). The act that was eventually adopted by the conference in 1981 is called the Uniform Conservation Easement Act. The act was later adopted in part or whole by twenty-seven states.

Where non-UCEA statutes vary in their complexity of acceptable easement purposes, the UCEA allows conservation easements 1) to retain or protect natural, scenic, or open-space values of real property; 2) to ensure the availability of real property for agricultural, forest, recreational, or open-space uses; 3) to protect natural resources; 4) to maintain or enhance air or water quality; 5) to preserve the historical, architectural, archaeological, or cultural aspects of real property. Some states include more purposes (e.g. wildlife habitat protection, agricultural land preservation), while some are much more vague in terms of acceptable purposes. The UCEA allows easements to be held by government bodies, charitable organizations, charitable corporations, and charitable trusts. Again, the holder allowances vary by state, with the majority of states allowing these same categories, a few allowing only public entities as holders, and one state (New Mexico) not allowing government bodies to hold such easements. Many states require the holding entity to be a tax exempt organization (most specify exemption under IRS

Code section 501(c) (3)). Additionally, most states require that the holding organization's purposes include conservation efforts in land. Interestingly, no statutes currently require holders to demonstrate a financial capacity for monitoring or enforcement.

Where the common law resisted restrictions enforced in perpetuity, most of the statutes specify that easements shall be in perpetuity (unless otherwise specified in the agreement). The UCEA allows third party rights of enforcement to any entity which would be eligible to be a holder, but is not.¹⁶ Many non-UCEA statutes also allow a third party to bring enforcement actions to court. Many statutes direct courts to grant injunctive solutions to easement breaches, but a lack of statutory guidance allows courts flexibility.

The UCEA states that a conservation easement shall be subject to the existing law of easements in terms of its creation, modification, and termination. Modification can occur through one of two doctrines: changed conditions and *cy pres*. Under the doctrine of changed conditions, if exogenous changes occur such that the purpose of the easement can no longer feasibly be carried out, the easement may be terminated or modified. The doctrine of *cy pres* typically deals with the ability of the holder to enforce the agreement. If for example, a local land trust ceases to exist, the court may assign the conservation rights to an alternate eligible holder (such as a public entity). The issue of an easement's termination is comparable to the extinguishment of different servitudes under the common law. Generally, servitudes can be terminated in the following ways: if the holder of the easement purchases the remaining rights and becomes the fee owner, if the holder releases the burden of the servient estate, if the burden is "abandoned" by the

¹⁶ In addition, Pennsylvania also allows holders of mineral interests on the land to have third party enforcement rights (32 P.S. § 5055).

holder, through a government taking using eminent domain, or through an agreement of the dominant and servient owners. Most states allow termination of conservation easements by abandonment, merger, and taking.

Therefore, enabling statutes affords conservation easements different treatment than they would receive under the common law of servitudes. Under the statutes, conservation easements are recognized as real property rights enforceable in perpetuity despite the fact that they may grant negative rights and the benefit flow from these rights is not tied to adjacent land.¹⁷ Dana and Ramsey (1989) claim that pure common law courts would probably not enforce conservation easements, but they offer no case evidence to support this claim. Hollingshead (1997) states that “because of the common law legacy” conservation easements may not be transferable. He notes that the National Park Service had some difficulty in administering scenic easements it had acquired along parkways in Alabama, Mississippi, and Tennessee when successive owners of the land claimed that they had not been informed of restrictions at the time of purchase and therefore were exempt from enforcement of the restrictions. Hollingshead notes that “in some cases, courts issues injunctions compelling property owners to comply with the terms of the conservation easement agreements.” He cites two cases in which the easement terms were upheld by the courts, but cites no cases in which the easements were not enforced. A comment included by the crafters of the Uniform Conservation Easement Act states that one of the Act’s primary objectives is to “remove outmoded

¹⁷ It is possible that organizations wishing to obtain conservation rights to land may purchase some amount of acreage outright adjacent to the land they wish to encumber in order to satisfy the requirement for appurtenancy (as trusts in Wyoming did prior to statute adoption). However, Whyte (1959) pointed out early on that the very attraction of conservation easements is that they allow conservation goals to be achieved without the acquisition of full ownership rights.

common law defenses that could impede the use of easements for conservation and preservation ends.” It is interesting to note that the drafters do not note actual cases of common law impediments, but only state that the goal is to remove aspects of the law which “could” impede the use of conservation easements.

I will describe here the common law rules dealt with specifically in the UCEA, but similar language is found in the majority of the state statutes (Mayo 2000). The first subsection of the UCEA states easements need not be appurtenant, thereby eliminating the ability of a court to not enforce in perpetuity simply because benefits are not tied to adjacent land. The third and fourth subsections address the usual recognition of only a limited number of negative rights under the common law by specifying that conservation easements shall not be unenforceable for the sole reason that they do not fall within these narrow categories. Subsections six and seven address the ideas of privity and estate and touch and concern which relate to the perpetual enforcement of real covenants and equitable servitudes. The notes of the drafters indicate that these subsections were included as a precautionary measure in case a court confused an easement with one of these other servitudes. These legal specifications effectively eliminate all of the common law rules which may conflict with conservation easements.

2.4 Federal Tax Law and Conservation Easements

The history of the federal Internal Revenue Code regarding the donation of conservation easements has been a long one. Charitable donations of real property interests have almost always been eligible for gift, estate, and income tax deduction;

however, prior to 1964, this was not the case for “partial interests” in property (Dunford 1984). A conservation easement, because it essentially divides the ownership of the land such that the donation is only a portion of all of those rights held by the owner, is thus considered such a partial interest. A new ruling in 1964 (Revenue Ruling 64-205) allowed the first income tax deduction for the value of a conservation easement (enforced in perpetuity) which was donated by a landowner to the U.S. government for scenic preservation. In the following year, the IRS formally announced its intent to consider scenic easement donations as charitable deductions in a news release (Small 1979).

However, in 1969, a new tax reform act was passed which caused some deal of uncertainty about the allowances of easements for deduction. The act denied deductions for any contribution of real property less than the full estate (if they were not “in trust”), including donations of land use (or non-use) rights. This seemed to be at odds with the ruling made in 1964, but Hollingshead (1997) makes the claim that this was not the intent of Congress and that the language merely illustrated a lack of Congressional understanding of conservation easements (pp 338). Consequently, the IRS made several rulings that affirmed the deductibility of conservation easements. Nonetheless, Dunford (1984) notes that despite the rulings, the lack of explicit authority from the IRS “contributed to great uncertainty” about the deductibility for conservation easement donations.

The Tax Reform Act of 1976 codified these rulings, stating that an easement donated for conservation or historic preservation purposes, if it met certain conditions of duration, donation, and purpose. These “conservation purposes” were: i) the preservation

of land areas for public outdoor recreation or education, or scenic enjoyment; ii) the preservation of historically important land areas or structures; or iii) the protection of natural environmental systems.¹⁸ The new tax code provision, section 170(f)(3)(b)(iii) allowed up to 30% of a donor's adjustable gross income (AGI) to be deducted per year for a maximum of six years. This Act was set to expire in 1977, but in that year, it was extended with a sunset clause until 1981. In the 1977 Act (Tax Reduction and Simplification Act of 1977), term easements were eliminated and easements were subjected to a strict application of the conservation purposes outlined in the legislation (Dunford 1984).

As deductions were claimed, concern over abuses of the tax law began to be raised, particularly regarding the difficulty of valuing easements and the potential of inflated values (Browne 1982). Therefore, while the Tax Treatment Revision Act of 1980 unified earlier acts it also included additions which reflected these concerns. The new law defined a "qualified conservation contribution" as a "qualified real property interest," again subject to donation to a qualified organization (a governmental unit or publicly supported charity), exclusively for conservation purposes. A "qualified real property interest" could be a "restriction (granted in perpetuity) on the use which may be made of the real property."¹⁹ The list of acceptable conservation purposes was expanded. The first purpose from the 1977 Act did not change; however, the second were modified in the following way: ii) the protection of a relatively natural habitat of fish, wildlife, or plants, or similar ecosystem; iii) the preservation of open space (including farmland and

¹⁸ P.L. 94-455 § 2124(e)(1)

¹⁹ IRC § 170(h)(2)

forestland) where such preservation is—(I) for the scenic enjoyment of the general public; or (II) pursuant to a clearly delineated Federal, State, or local conservation policy, and will yield a significant benefit. Additionally, unlike the previous laws, in the 1980 Act, the retention of mineral rights by the owner were allowed so long as these were developed only through subsurface methods.

Yet another law was passed in 1986 (Tax Reform Act of 1986), which this time addressed estate and gift taxes. As a result of this Act, gift or estate tax deductions could be claimed for the donation of conservation easements and these easements would not have to meet the “conservation purposes” defined for income tax deduction.²⁰ More recently, the Taxpayer Relief Act of 1997 specified that an estate tax deduction of up to forty percent of the encumbered land could be deducted (up to \$500,000) if it met the conservation purposes outlined in section 170(h) and was within 25 miles of a metropolitan area, national park, or wilderness area, or if it was within 10 miles of an urban national forest. However, this last requirement (known as the Location Requirement) was eliminated in the Economic Growth and Tax Relief Act of 2001; however, the 2001 Act also phases out the estate tax and repeals it as of December 31, 2010. If the estate tax is actually repealed at that time, then the estate tax incentives associated with conservation easement donation; however, there is some uncertainty as to whether the estate tax will be repealed in 2010.

The federal tax law regarding income tax deductions was expanded again in 2006, when President Bush signed into law H.R. 4, which contained a provision allowing a

²⁰ IRC § 2023 (c)(3)

deduction of up to 50% of AGI for easement donations (and up to 100% of AGI for farmers and ranchers) and lengthens the period for which deductions may be claimed from 6 years to 16 years.²¹ As it stands, the extended benefits under this measure will end at on December 31, 2007; however, there are provisions in both current House and Senate bills which would make the expanded income tax benefits permanent.²²

While it may seem that the federal government has been nothing but supportive of the deductibility of conservation easements, the position of the Internal Revenue Service has not been so clear from the land trust perspective. McLaughlin (2004) notes that from the first official recognition of the availability of a charitable income tax deduction for the donation of a conservation easement in 1964 to the enactment of § 170(h) in 1980, the federal income, gift, and estate tax deductions available with respect to easement donations remained largely obscure and somewhat uncertain in their application (pp 14)

Small (2000) also discusses this uncertainty felt by the land trust community²³ until the mid-1980s, after the IRS issued several favorable rulings on conservation easement donations. He claims that this uncertainty was largely regarding the language used in the specified conservation purposes which an easement must fulfill in order to qualify.

²¹ Land Trust Alliance. "A Fact Sheet for Tax Planners and Their Clients on HR 4" http://lta.org/publicpolicy/factsheet_tax_planning.htm (accessed 10/20/07).

²² Land Trust Alliance "Advocate's Alert: Tax Incentive Approved by Senate Finance Committee" http://lta.org/publicpolicy/adv_archive/adv_092107.htm (accessed 10/23/07).

²³ It is important to note that the land trust community did have some voice in the shaping of the tax law over the years. primarily national conservation groups, such as The Nature Conservancy and the American Farmland Trust made their opinions known on different parts of the debated tax legislation and some of these opinions (such as allowance for deductibility of easements without the donation of accompanying mineral rights) were incorporated into the laws.

Particularly unsettling were phrases such as “clearly delineated government policy” and “significant public benefit” because such phrases were unprecedented.

The relationship between the federal tax laws applying to tax benefits for easements and the state enabling statutes is not perfectly clear. Squires (2000) writes that the statutory language “clearly reflects the state’s attempt to create the legal device [conservation easement] and so allow landowners to take advantage of federal income and estate tax deductions” (pp 77). This implies that the presence of a statute within a state increases the likelihood of a donated conservation within the state meeting the requirements for federal tax benefits. However, Small (2000) presents a slightly different perspective on the state statutes. He writes that “as far as the organized bar is concerned, almost no one knows anything about state legislation,” but that in spite of this, the mere existence of the legislation has had an impact on land trust activity because some land professionals have cautioned against conservation easement donations in states without statutes (pp 65). It is possible that the presence of a statute in a state provides an important indicator of what is called “clearly delineated government policy” in section 170(h); however, the IRS has conducted audits of conservation easement donations in states with statutes, so there is not strong evidence for this idea.

3. ECONOMIC FRAMEWORK FOR CONSERVATION EASEMENT STATUTES

The goal of this chapter is to develop a preliminary model for understanding the institutional change that occurred in conservation easement law. I begin this chapter by discussing work that has been done on conservation easements and land trusts and I provide an overview of some of the key literature on the economics of law, property rights, and transaction costs in order to develop a framework for modeling a market for conservation easements and changes in conservation law. I then model landowner allocation of land with competing valued uses and determine the First-Best outcome based on relative values. I then examine the deviation in land allocation as a result of changing land values and different markets. I explore the effects of these changes on the incentives of different parties (land trusts and mining companies) to lobby for legal change. From these models I derive hypotheses about the actions of different groups and the market conditions under which statute adoption would be expected to occur.

3.1 Legal Literature on Conservation Easements and Land Trusts

To date, there has been no work focused on conservation easement statutes and the reason for their adoption. There is however, a body of literature on conservation easements and the land trusts that hold them. Legal scholars were the first to explore various aspects of this private conservation tool and economists have more recently begun to contribute to an understanding of these subjects. Earlier legal articles on conservation focus on their potential as voluntary, private tools for conservation and

historic preservation.²⁴ Later articles focus on the finer points of easements, their relation to trust law, and the need for accountability. Most notable for their relevance to this study are the works of Dana and Ramsey (1989) and Gustanski and Squires (2000) which focus on the common law enforcement of conservation easements. Both of these works lend support to the idea that the common law did not provide an effective mechanism through which to enforce the negative rights claimed under conservation easements and the latter explicitly claims that the enabling statutes were adopted to correct this failing.

Dana and Ramsey first provide a general discussion of conservation easements and land trusts and their place within conservation; they then discuss the legal ramifications of conservation easement enforcement under the common law. They claim that private sector conservation efforts have increased because of shrinking state and federal budgets for land acquisition and that growth in land trusts is a result of “increased population and urbanization, a growing concern for environmental matters, a rising standard of living with a corresponding increase in leisure time, and the failure of the public sector to meet a variety of resource conservation demands.” Dana and Ramsey assert that although land trusts have the option of conserving land through outright purchase, trusts prefer to acquire conservation easements because outright purchase has high acquisition and maintenance costs, whereas conservation easements are often donated or can be purchased for less than the fee simple estate. Additionally, they note that conservation acreage acquisition is easier with conservation easements because

²⁴ Whyte (1959) expounds on the benefits of using easements to protect land; this report was thought to have played a large role in the popularization of conservation easements.

landowners are much more willing to transfer a portion of their rights than they are to sell all of their property interests.

Using a theoretical analysis of the common law of servitudes and the features of modern easements,²⁵ Dana and Ramsey (1989) conclude that, “Under a pure common law regime, courts would likely find conservation easements partially or wholly unenforceable.” They conclude that impediments to conservation easements under the common law, “highlights the need for specific legislative intervention.” They note that the Uniform Conservation Easement Act of 1981 directly removes common law impediments to enforcement in perpetuity and that many other state statutes (not modeled after the UCEA) serve similar purposes.

They also caution that, considering the important legal debate concerning dead hand control,²⁶ some judges may still use the vagueness of the common law to dismantle conservation easements in the presence of a statute. The appeal of enabling statutes, they argue, is that the courts are not able to completely deny the validity of all conservation easements. It seems contradictory that Dana and Ramsey first argue that statutory change is necessary (and beneficial) for overcoming common law challenges to conservation easement enforcement, but then later caution that even enabling legislation may not prevent judges from ruling against easement enforcement. Although they imply that conservation easements are good tools for land conservation and that the upward trend in their use is a result of increased public demand for private conservation, they also seem to

²⁵ Their theoretical analysis includes incompatibilities such as common law resistance to negative easements in gross discussed in the previous chapter.

²⁶ Some view the ability of landowners to make use of their land in whatever way they see fit (including restricting its use in perpetuity) as the most efficient property rights perspective.

imply that statutes are efficient, not necessarily because they provide a completely predictable legal enforcement environment, but because they force a more thorough consideration by judges.

Many of the contributors to a comprehensive volume on conservation easements edited by Julia Ann Gustanski and Roderick Squires (2000) seem to argue a stronger legal efficiency case for statutes. The most explicit example of this is in the book's fourth chapter, "Introduction to Legal Analysis," in which Squires emphasizes the difficulty of conservation easement enforcement under the common law and claims that the passage of enabling statutes in most states "reflect(s) the consensus reached by the citizens of those states about the importance of protecting particular lands and the importance of using conservation easements to do so." This assertion of the inherent efficiency of statutory adoption of conservation easement statutes because of significant public demand for conservation through easements is echoed throughout the book,²⁷ although no empirical support for such a hypothesis is presented. The majority of the book is devoted to a state by state examination of conservation easement statutes and land trust activity, but the analysis is focused on statute content and its effect on trust activity, not on an explanation of statute adoption.²⁸

²⁷ For example, in their chapter on conservation easements in the First and Second districts, Marchetti and Cosgrove write that all enabling statutes were written to overcome antiquated legal constraints and that "without such statutory authority that modifies the common law, conservation easements as we know them may enjoy only a presumption of validity and enforceability as easements in gross."

²⁸ In fact, in his notes Squires ponders some of the same questions that this thesis examines. He writes, "The timing of the legislation reflects that particular states accept that conservation easements are valid tools to help protect land at that time... The next questions is, Why then?"

3.2 Economic Literature on Conservation Easements and Land Trusts

Within the economic field, two contributions which are most relevant to my examination of conservation easement statutes are works by Parker (2004) and Albers and Ando (2003). Parker explores the tradeoff faced by land trusts in their decisions to preserve land through purchase of full ownership rights or through purchase of conservation rights (through an easement) and how incentives for cost-minimization change in the presence of easement donation. He analyzes the land trust as a firm-like decision-maker, whose product is some environmental amenity and whose primary input is land, or a right to certain use (or non-use) of the land. He proposes that land ownership is comprised of two types of rights: conservation rights and non-conservation rights. Similarly, in his model, two types of products can be produced on a given piece of land, conservation goods (such as habitat protection or enhancement) and non-conservation goods (such as logged wood). The value of the land is equal to the combined expected value of each of the goods produced net the opportunity costs of placing more of the land into production of the alternative type of good and net the costs of production of each type of good.

Parker notes that in this scenario, assuming positive costs of specification, monitoring, and enforcement, the tradeoff faced by the land trust is that of gains from specialization under divided ownership (conservation easement) versus lowered transaction costs under single ownership (fee simple purchase). Thus land trusts should be more likely to acquire conservation easements when transaction costs are low relative to gains from specialization. He notes that if conservation easements are donated and

trusts do not have to face the full accounting costs, their incentives to minimize the cost of conservation may be imperfect and that they may be more likely to accept easements even if for example, gains from specialization are low.

Parker's analysis of land trust choice to conserve is much more formal than that of Dana and Ramsey, yet Dana and Ramsey provide significant insight which seems to be lacking in Parker's model because he ignores acquisition costs.²⁹ Dana and Ramsey point out that the explicit price of a conservation acre is higher if the full estate is purchased, and perhaps more importantly, the cost associated with easement acquisition is lowered by the presence of more suppliers of easements than of fee simple conservation acres. Additionally, although conservation easements are costly to monitor and enforce once acquired, Dana and Ramsey note that management of fee simple property also has a cost component which may rival CE transaction costs. Therefore, the inclusion of acquisition costs in a model of land trust behavior seems appropriate.

Of special relevance to my purposes is Parker's hypothesis that the presence of a conservation easement enabling statute in a state (particularly a UCEA statute) should lower transaction costs associated with easements. Parker uses a cross-section of data on land trust holdings from 2000 in order to empirically test his predictions. He finds that the presence of an enabling statute has no effect on the likelihood that a land trust will have more acreage under CE than fee-simple ownership. He suggests that this may mean that enforcement is not really very different in states with and without statutes. Although Parker accounts for length of trust operation, his separation (trusts created before 1990

²⁹ I use the term "acquisition costs" to mean those costs incurred by a trust in acquiring conservation land; this includes the cost of finding willing suppliers of land for conservation and negotiating transactions.

and after 1990) may not be enough. Land trusts which have been in operation longer might have significant holdings of fee simple land, it would take some time for the percentage of conservation easement acreage to be significant, even if most of their more recent acquisitions were easements. Additionally, by using only data from 2000, Parker does not account for the temporal difference in statute adoption or the lag effects that this might create in conservation easement acquisition. His findings, however, do have interesting implications for claims that statutes were driven by need for better enforcement.

Albers and Ando also examine land trusts, but they focus on the spatial structure and service provision of land trusts across the states, to analyze efficiency in trust variation. They model optimal trust supply given assumptions about the production function for conservation benefits and demand for these benefits. To empirically test their predictions about optimal land trust variation, they use a variety of independent variables meant to capture factors influencing the demand and cost of private conservation, and thus the optimal number of land trusts in each state. One variable which is conspicuously absent in this analysis is whether or not the state has a conservation easement enabling statute. The authors note that they have chosen to craft their cost function based on fee simple acquisition by trusts; however, given the increasing use of conservation easements by trusts, this seems like an unwise decision. Despite this shortcoming, I draw upon many of these same conservation demand and cost variables in my empirical analysis of statutory adoption.

Although legal scholars have addressed issues regarding the relationship between conservation easements and the common law and have offered some explanation for the adoption of enabling legislation, they have offered no empirical support for their claims and have not methodically examined the forces behind statute adoption and how these drivers may have influenced the timing of adoption or the structure of the statutes. Economists have provided valuable insight on land trust behavior and presence through analyses of variation in trust holdings and numbers, but the field has offered no analysis of the law of easements or its variation across states. This thesis develops an economic model of statutory adoption and derives predictions about the nature of legal change. These hypotheses, and those offered by the legal scholars discussed above, are then tested.

3.3 Developing a Theoretical Framework for Conservation Easements and Statutory Adoption

This section draws upon literature on legal change and public choice to provide a background in economic and legal thought on the process of institutional change. This background is important for creating a framework in which to think about the adoption of conservation easement statutes and the factors influencing the legal equilibrium we observe (and have observed in its development in recent decades). I also rely on literature on property rights and transaction costs in developing a model of conservation easement demand and costs as well as interest group incentives for investing in legal change (or status quo).

3.3.1 Law and Economics Literature on Statutory and Common Law

Posner (1973) argues that efficiency of law is divided by the two realms of rule-making. He considers common (judge-made) law to be more efficient than statutory (enacted) law because it was driven by local cost-benefit analysis conducted by independent judges, as opposed to top-down statute law which he believes to be under too much special interest group pressure. Another argument presented for the efficiency of common law is that inefficient rules (law that increases transaction costs) will be repeatedly litigated until they approached efficiency (Rubin 1977 and Priest 1976). Work in the field of public choice by academic pillars such as Buchanan and Tullock (1962) and Becker (1983, 1984) on rent-seeking by interest groups in the context of legislators as legal brokers seems to support the idea of inefficient statute law.

Becker (1983) develops a theory of competitive behavior among interest groups in which these groups produce political pressure which is then institutionally transmitted by voters and legislators into some policy structure. He posits that the competition between interest groups determines the equilibrium configuration of government policies. Each interest group is assumed to be able to produce political pressure through the expenditure of resources and that competition will produce relative efficiencies in the production of influence, which will then determine the political outcome. Becker begins the development of his model by introducing two homogenous groups; if one group benefits from a policy (such as a subsidy) the other group is harmed. According to this model, because income is merely transferred from one group to another and losses are incurred in both the attempt to capture and distribute political favors, society would be

better off without the interest groups. One key result of this model is that as a group's relative efficiency in producing political power increases, the policies favoring this group will increase. If this prediction is applied to the adoption of conservation easement statutes, we would expect that the greater the presence of pro-easement (anti-easement) interest groups, the greater the probability a state will adopt an enabling statute early (late).

Wittman (1995) rejects Becker's idea of interest group pressure and finds interest groups to be an important component of informed voting. He claims that voters seek out interest groups with whom they share values in order to gain information about candidates that will support their preferences. Austen-Smith and Wright (1992) also provide a model in which interest group presence increases the efficiency of law-making. Their paper focuses on the role of lobbying as an information provider for policymakers. The authors assume that interest groups possess information regarding voter preferences ("state of the world") that legislators do not. The authors' model is presented as a game in which two groups with diverging opinions regarding a bill, try to "win" a legislator's vote. The legislator is assumed to be re-election seeking and thus if the legislator had perfect information regarding the preferences of voters, would vote for the policy which would yield the greatest "electoral reward." The statement by an interest group that it possesses information is not immediately credible, but if cost was incurred in acquiring information, this signals credibility to the legislator.

The implications of the model are that a legislator will only be influenced if he believes that the group possesses accurate information regarding the voter preferences. If

the legislator knows the groups has incurred acquisition costs but has not reported information, the legislator will assume the group discovered the preferences of the voters did not match those of the group. The authors propose that any lobbying will lead to more correct voting than in the absence of lobbying.³⁰ These ideas call into question the claim that statutory law was inefficient simply because of the involvement of interest groups in the rule-making process.

Additionally, later research on the common law challenged its independence from interest group influence. Rubin (1982), who originally supported the idea of common law efficiency, reexamined the common law from a different lens—the incentives of litigants. His work seemed to show that common law could be just as influenced by special interests as statutory law and thus did not always move toward efficiency as once thought. Thus within the literature on law and economics, no single perspective of the relative efficiency of common and statutory law dominates.³¹ Work on the decisions of interest groups to allocate resources between the production of legislative pressure and litigation adds yet another layer of complexity to the analysis of institutional change and the implications that the process of legal change may have for efficiency (Rubin, Curran and Curran 1999, De Figueiredo and De Figueiredo 2002).

³⁰ See also Potters and Van Winden.(1992).

³¹ For a perspective on this, consider the following from Arrunada and Andonova (2005),
We contend that both the theoretical and empirical claims on the superiority of common law remain unproven. Legal systems are not efficient in a vacuum, but rather their performance depends on environmental conditions (231).

3.3.1 Law and Economics Literature on Property Rights and Transaction Costs

Barzel (1997) makes an important distinction in defining property rights; there exist economic rights and legal rights. He defines economic rights as “the individual’s ability, in expected terms, to consume the good (or the services of the asset) directly or to consume it indirectly through exchange,” whereas legal rights are those rights “recognized and enforced, in part, by the government” (3-4). It is the first type—economic rights—with which people are concerned. However, economic rights are often facilitated by legal rights; therefore, an efficient legal structure is important for property use and exchange because of its effect on transaction costs. Transaction costs are those costs associated with the transfer and enforcement of rights. Coase (1960) emphasized the importance of the effect of legal rights on efficiency in the presence of transaction costs. In a world in which all could contract costlessly and rights were well defined, the specific delineation of rights would not impact efficiency; however, in a positive transaction cost world, they do.

Because goods often have multiple attributes, some of which are costly to discover and define, a portion of these attributes are surrendered to the public domain, where they are subject to capture. The further delineation of rights (and thus their removal from the public domain) often increases the value of resource (up to the point where marginal cost of delineation is equal to the marginal value of delineation). Barzel notes that, “net gains from exchange can often be increased if the original owners of commodities transfer only subsets of the commodities’ attributes while retaining the rest” (6). This division of rights among owners allows for specialization of use—the idea that

efficiency is achieved when the rights to an attribute are in the hands of those who value it most.

Therefore, an efficient legal regime should ensure that property rights are well-defined and transaction costs are low enough to facilitate exchange and specialization. The evolution of legal property rights is a well-studied subject in law and economics. Demsetz (1967) used a case study of the Montagne Indians in Canada to show how legal property rights adjust to changing economic conditions. His point was that when new economic forces change the value of an asset, new rights are created so that people can capture the new value.³² Barzel asserts that as people's willingness to pay for an attribute increases, the value of better delineated rights to that attribute also increases. Consequently, we would expect that as the value of land attributes such as open space and wildlife habitat increase, efficiency gains could be made by the delineation of legal rights to these attributes, which could then be consumed or exchanged.

Additionally, transaction cost literature focuses on the importance of legal mechanisms for the enforcement of property rights, especially those rights delineated through contractual agreement or exchange. Rubin (2005) discusses this importance in the presence of shirking incentives. He notes that the failure of institutions to defend property owners from opportunism (shirking) bears a cost. The cost of this opportunism, Rubin argues, is not the cost of the cheating itself, nor the cost of victim avoidance, but it is the "lost social value from the otherwise profitable deals that do not transpire" (214).

³² In Demsetz's article, the institutional shift occurred from a common property regime toward a privatized regime; however, many have since noted that the term evolution does not imply a linear, or unidirectional change in rights (see Rose in *New Palgrave Dictionary*).

It follows from Barzel that as the value of these exchanges increases, the cost of opportunism also increases. Therefore, the adaptability of legal institutions to market forces is essential for efficiency. The nature of this legal change (judicial or legislative) may depend on the relative costs of change. The rest of this chapter develops models for exploring the market for rights to conservation and how the current legal framework shapes the incentives of different actors to allocate resources in producing legal change.

3.2 The Conservation Easement Market

3.2.1 Allocation of Land with Multiple Attributes

In order to examine the claim that statutory adoption was driven by efficiency concerns regarding the failure of the common law to accommodate easements (which would allow increased specialization in the production of environmental amenities), following Dnes and Lueck (2004), I develop a simple model of land allocation and control using a single parcel with multiple values. This model compares net land value and optimal allocation under different property rights regimes and illustrates how changing relative values for land uses may alter the efficiency of different regimes and thus drive institutional change.

Consider a parcel of land with L total acres of land and three possible valued attributes: agriculture (a), environmental amenities (e), and development (d), where a , e , and d are measured in acres of land devoted to their production. Consider agriculture and environmental amenities to be jointly produced, but to be reduced by the amount of land

allocated to development, such that $L = a + d = e + d$. In other words, the total acreage of land can be divided into acreage in agriculture (and simultaneously environmental amenities) and acreage in development. To avoid confusion about competing land uses, d is defined as any land use (e.g., houses, different types of agriculture, and so on) that lowers the acreage in the amenity. Use a , in turn, is defined so that it is perfectly correlated with acreage in environmental amenity production.

First-Best Land Allocation

The total value of land is the sum of the total value of production of each of the attributes. Assume that there are different parties associated with each land use: an agriculturalist (e.g., farmer, rancher, forester) who specializes in use a , a conservation organization (e.g., land trust, government agency) that specializes in use e , and a developer who specializes in use d (acting implicitly through a competitive market). Specialized use always generates the highest (expected) value from each attribute and is symbolized by $V_i^i > V_i^j$ and $v_i^i > v_i^j$ for $i, j = a, e, d$ and $i \neq j$, where the subscript indexes the attribute and the superscript indexes the agent who controls (by ownership or contract) the attribute.³³ Denote $V_i(i)$, for $i = a, e, d$ as value (or production) functions for the respective land attributes; similarly let $v_i(i)$, denote the respective marginal value functions. For simplification, assume that the total value of the land is $V = V(a) + V(e) + V_d(L-a)$. The first-best allocation of the land will be $V^* \equiv V(a^*, e^*, d^*)$ which will occur

³³ For example, a farmer can generate the largest value from any given agricultural acreage (i.e., in total value: $V_a^a(a) > V_a^d(a)$ and $V_a^a(a) > V_a^e(a)$)

at L^* where $v_a^a(a^*) + v_e^e(a^*) \equiv v_d^d(L - a^*)$; this implies $a^* = e^*$ and $d^* = L - a^*$. In other words, when each attribute is owned by the party who specializes in its production, the optimal land allocation will occur where the marginal value of agriculture (and environmental amenities) is just equal to the marginal value of development. I will now compare the outcome of the first-best model to outcomes under different property regimes.

Sole Ownership and Amenity Market Failure

The case in which all attributes are under sole ownership and use is illustrated in Figure 3. Here I assume sole ownership by the agriculturalist. This case represents failure in the market for environmental amenities such that there is no way for the agriculturalist to derive value from the environmental amenities he/she produces. In the language of Barzel, the rights to the amenities are in the public domain. In this case, the marginal benefit curve is the lower curve illustrated in the figure, which simply represents the marginal value of a , the farmer chooses to allocate land, L , such that $v(a^*) \equiv v(L - a^*)$. This point is denoted L^F in the figure. If however, a market existed for environmental amenities, the marginal benefit curve would be the sum of the marginal value of attributes a and e , $(v_a^a + v_e^e)$. This would change the allocation choice such that more land would be allocated to agriculture and environmental amenity production and less to development. If the right to the environmental amenity is owned by a trust or agency (specialist in e), this allocation of agriculture and development will yield the first-best outcome. The existence of a social value for environmental amenities coupled with

the lack of an amenity market produces a deadweight loss to society which is equal to

$$\int_{L^F}^{L^*} [(v_a^a + v_e^e) - v_d^a] da$$

, or the area under the higher marginal benefit curve for agriculture from L^F to L^* and above the marginal benefit curve for development. This represents the value lost by placing too much land in development because of the inability of the farmer to capture the marginal benefit of e . From Barzel, the argument for conservation easements is that they delineate rights to a valued attribute, thus reducing the deadweight loss to society. If the delineation of these rights was hindered by the common law and enabled by conservation statutes, then this may be considered an efficient institutional shift.

Proposition 1: (A) As the relative value of amenities increases, the greater will be the deadweight loss associated with amenity market failure and (B) the higher the demand for an alternative rights regime and the higher the probability of statute adoption.

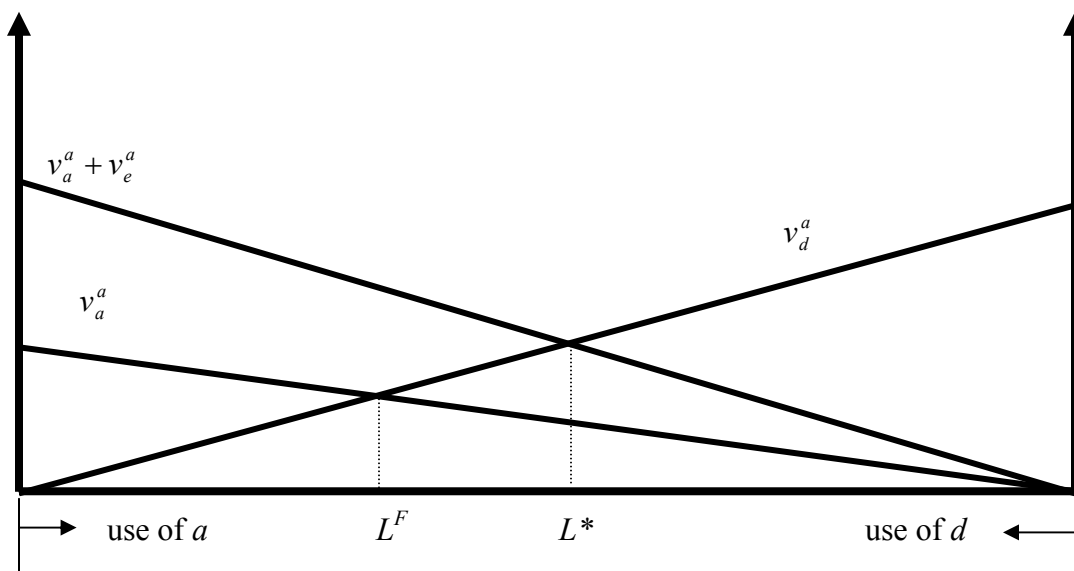


Figure 3: Land Allocation with Sole Ownership and Amenity Market Failure

Landowner Allocation with Shirking Incentives

Rubin highlighted the costs of opportunism for market transactions and how the failure of a legal regime to prevent it may lead to a reduction in productive contracts and exchanges. To illustrate this case with regard to conservation easements, I return to the model of allocation of land with multiple attributes. With a conservation easement, the trust becomes the owner of the amenity attribute (e) while the farmer remains the owner of the agricultural and development attributes (a and d). The easement ‘contract’ specifically restricts development of the land by the fee owner in return for a payment (or tax reduction). The easement contract also establishes a method by which the land use restrictions will be enforced. In a first-best case, the easement defines (and enforces) the land use allocation at (a^*, e^*, d^*) . In this regime, the total value of the land can be divided into the value of the conservation easement and the value of the fee simple parcel, which contains the rights to value from agriculture and development. The holder of the easement becomes the owner of the value of the easement which is

$V^{ce} = \int_0^{L^*} [(v_a^a + v_e^e) - (v_a^a) da]$. Similarly, the value of the restricted or encumbered fee simple

parcel (which combines the agricultural and development attributes) is

$V^{fee} = \int_0^{L^*} v_a^a(a^*) da + \int_{L^*}^L v_d^d(L - a^*) da$. The two separate properties – the fee parcel and the

conservation easement – combine exactly to be the first-best value of the land, so the

value of the entire parcel is simply $V^* = V^{ce} + V^{fee}$. If a trust were to buy a conservation

easement from a farmer, they would pay V^{ce} in a competitive market and enforce (a^*, e^*, d^*) .

However, monitoring and enforcement of easements is costly and the agriculturalist has an incentive to shirk by agreeing to $L^* = L^*(a^*, e^*, d^*)$, and accepting the payment (or tax reduction) of V^{ce} , but actually allocating the land to $a < a^*$ and $d > d^*$. Figure 4 illustrates the agriculturalist's incentives under a conservation easement in which the trust owns the right to L^* . Notice that although the agriculturalist receives V^{ce} , this is either a one time payment or a tax reduction for a limited amount of time, whereas the commitment to L^* is made in perpetuity, such that as the relative value of development increases, the agriculturalist (or his/her successors) receives an increased benefit from shirking. As illustrated in Figure 2, the agriculturalist (who only captures the value under v_a^a) would shirk (L^S) if L^* were not enforced by the trust. As the marginal value of development increases from $v(d)$ to $v'(d)$, the agriculturalist could capture even larger gains from shirking by moving to L^S . Therefore, the trust must make a choice about the optimal allocation of monitoring and enforcement (and will probably pay the agriculturalist less than V^{ce}). I will assume here that the trust's decision to allocate enforcement effort is a function of the certainty of legal remedy. If an enabling statute increases the legal certainty relative to easement enforcement under the common law, then in the presence of shirking incentives, a statute theoretically lowers the cost of enforcement and thus enables the trust to realize the value of the easement.

Proposition 2: (A) As the relative value of amenity- decreasing land uses rise, the greater the landowner's incentive to shirk and (B) the greater the cost of easement enforcement under the common law, and the more valuable an enabling statute.

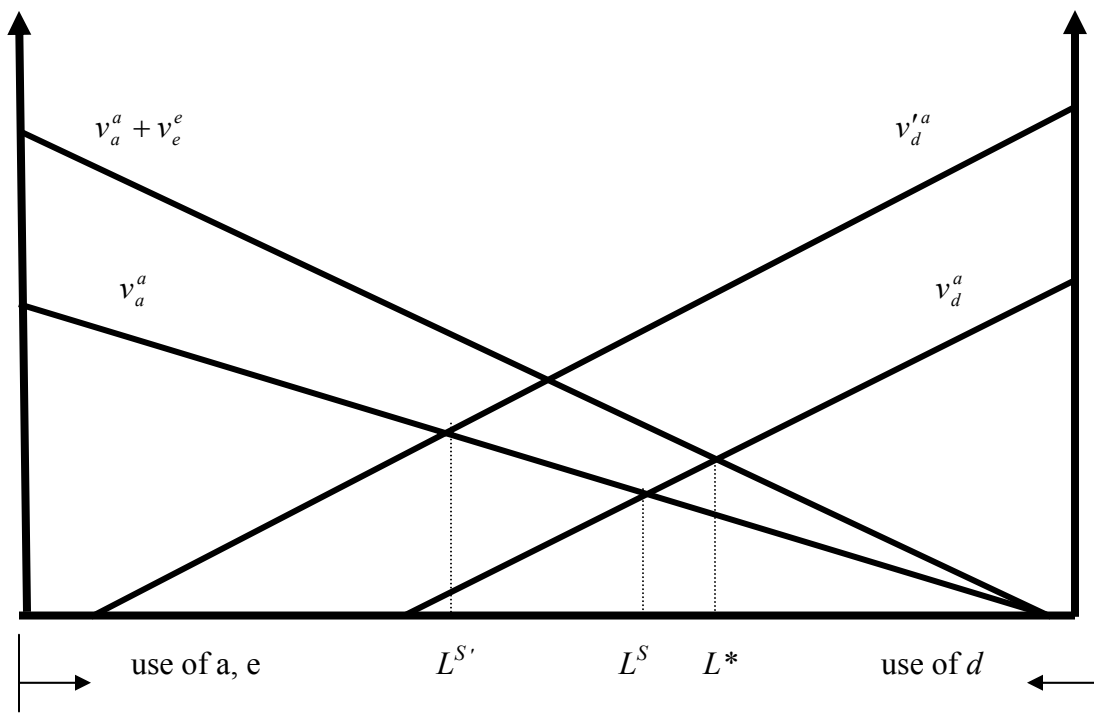


Figure 4: Land Allocation with Shirking Incentives

Landowner Allocation with Tax Incentives

In order to analyze the effects of federal income tax incentives for conservation easement donation on landowner allocation, I will now develop a model of profit maximization with income from non-agricultural activities. Consider a landowner (agriculturalist) who earns an income I from a second job which is unrelated to the income derived from land use. This income is reduced by tax T , which is some function

of tax rate r , which I will assume to be some constant rate for simplicity. The agriculturalist's objective function is as follows:

$$\text{Max } \Pi = v_a^a(a) + v_d^a(L - a) + (I - T)$$

As such, the agriculturalist's decision to allocate land to use a (agriculture and environmental amenities) is independent of his non-land income level. If the possibility of easement donation is incorporated such that at least for several years, the tax rate is reduced by some proportion, then the objective function may be re-written:

$$\text{Max } \Pi = v_a^a(a) + v_d^a(L - a) + [I - T(a)] \quad \text{where } T'(a) < 0$$

Where the total tax amount is now a function of the land allocated to environmental amenities, such that the greater the tax rate, the greater the incentive to allocate land to a (to donate a conservation easement). If the presence of an enabling statute increases the likelihood of tax deductibility for donated easements, then the greater the personal income level of landowners in a state, the greater the demand for enabling statute adoption.

Proposition 3: (A) The greater landowner's taxable income, the greater the landowner incentive to donate conservation rights to land, and (B) the greater the demand for a property rights regime that facilitates the deductibility of conservation easements.

3.2.3 Political Market for Conservation

This section explores the idea that statutory change is the result of a political equilibrium produced by competing interest groups. The section first examines the

incentives of groups which might organize to produce (or resist) a change in conservation law and then analyzes the effect of such pressure on statutory outcome and conservation price.

Organizations whose objectives include the acquisition of land for conservation purposes (scenic views, wildlife habitat, and so forth) may have incentives to lobby for statute adoption for a variety of reasons. One situation in which these organizations would have an obvious incentive to exert such political pressure is when the members of the group are landowners themselves who would directly benefit from the statute in the form of income tax deductions (and decreased property and estate tax in some cases). Even when this is not the case, land trusts³⁴ have incentive to lobby for statute adoption when conservation easement donation allows them to achieve their conservation objectives at a lower cost. The predictions derived above show that a statute may lower the cost of enforcement, thereby allowing the trust to capture the full amenity value of an easement. Also, that the presence of tax incentives may increase landowner allocation of land for amenities, thus increasing the availability of easements for the trust. These expected reductions in transaction costs provide an incentive for land trusts to lobby for the adoption of enabling statutes.

Alternatively, groups engaging in land uses which might be prohibited by conservation easements (mining interests and housing developers) have an incentive to lobby against the adoption of these statutes. For example, mining interests, who often lease land for minerals, have routinely opposed a conservation easement statute in

³⁴ Additionally, land trust leaders may have incentives which are not necessarily the same as those of its general membership and may also be separate from the stated goals of the trust.

Pennsylvania. The presence of conservation easements would likely increase the costs of transacting mineral leases or estates and are thus likely to be opposed by those with an interest in maintaining low costs for these property regimes. Given the predictions of landowner allocation from above, any incentives which increase landowner allocation to amenities reduce allocation to uses such as mineral development. Consequently, if a conservation easement statute is expected to facilitate these incentives for allocation to amenities, mining interests have reason to oppose its adoption.

According to Becker's model, we should observe policy changes which benefit the interest group which is better able to produce political pressure. As the expected land trust gains from statutory adoption increase, I expect increases in land trust demand for change and lobbying for statutes. Similarly, as the expected mining losses from adoption increase, I expect an increase in lobbying against statutes.

Proposition 4: The stronger the presence of pro-conservation easement interests (anti-conservation easement interests) within a state, the higher (lower) the probability of conservation easement statute adoption.

In the next chapter, I will develop an empirical model for examining the hypotheses derived in this section and will test these hypotheses using state level panel data on conservation demand variables and political variables, as well as state case studies.

4. EMPIRICAL ANALYSIS OF CE STATUTE ADOPTION

In this section, I use state-level data on conservation easement statutes for the years 1980 and 1990 as well as four state case studies in order to test some of the implications of the theory developed in the previous chapter. The following predictions were proposed:

- ◆ Proposition 1A: As the relative value of amenities increases, the greater will be the deadweight loss associated with amenity market failure.
- ◆ Proposition 1B: The greater the deadweight loss associated with amenity market failure, the higher the demand for an alternative rights regime and the higher the probability of statute adoption.
- ◆ Proposition 2A: As the relative value of amenity- decreasing land uses rise, the greater the landowner's incentive to shirk.
- ◆ Proposition 2B: The greater the landowner's incentive to shirk, the greater the cost of cost of easement enforcement under the common law and the more valuable an enabling statute.
- ◆ Proposition 3A: The greater the landowner's taxable income, the greater the landowner's incentive to donate conservation rights to land.
- ◆ Proposition 3B: The greater the landowner's incentive to donate conservation rights to land, the greater the demand for a property rights regime that facilitates the deductibility of conservation easements.
- ◆ Proposition 4: The stronger the presence of pro-conservation easement interests (anti-conservation easement interests) within a state, the higher (lower) the probability of statute adoption.

From these theoretical predictions, testable hypotheses can be derived about the characteristics that will make a state likely to choose to adopt a conservation easement

enabling statute. The first prediction suggests that as amenity value increases, demand for legal change will increase (and the state will be more likely to adopt a statute). However, because the measurement of demand for legal change is difficult, I will instead measure demand for the good whose provision will, in theory, be facilitated by the change—private conservation. As discussed in the previous chapter, Dana and Ramsey claim that private conservation demand is increased by the following: increasing population, increasing urbanization, increasing quality of life, increasing environmental concern, and the lack of sufficient public provision of conservation goods. I have collected a set of independent variables which I hope will proxy for these factors as well as other factors which I expect to affect the demand for and costs of private conservation. With the exception of proposition 3B, the second and third propositions are not tested directly, but were used to examine interest group incentives to lobby for (or against) legal change. I test proposition 3B and 4 using a set of independent political variables which proxy for conservation easement supporting groups and opposing groups within a state as well as other factors I expect to influence the political landscape of legal change. My purpose in this empirical analysis is to evaluate the effect of these conservation demand and political variables on the probability of the existence of a conservation easement statute within a state.

4.1 Description of the Data

Ideally, I would like a set of yearly data for all states beginning well before the adoption of conservation easement enabling statutes by any states up until the present;

however, the availability of data has limited my sample. For this thesis, I have assembled a data set which contains variables for the years 1980 and 1990 and includes the 48 contiguous states, forming a sample of 96 observations.³⁵

I have organized the data into several categories which approximate the theoretical parameters of my model. Broadly, the categories are conservation demand variables, political variables, and control variables. Table 3 provides a statistical overview of these variables, as well as a short definition and a correlation matrix is given in Appendix A. The data were collected from a variety of sources including the U.S. Census Bureau, the Bureau of Economic Analysis, The Nature Conservancy, and *Protecting the Land: Conservation Easements Past, Present, and Future* edited by Gustanski and Squires (2000). For a complete list of data sources, please see Appendix A. Below I will discuss each of the variables in these categories in more detail.

³⁵ I have excluded Alaska and Hawaii from the dataset because they are two states which have distinctly different institutional histories relative to the contiguous states.

Table 3: Variable Names and Summary Statistics with Predicted Sign for Probit Model

Variable Name	Definition	Mean	St. Dev.	Min	Max
Dependent Variable					
CE	Dummy=1 if state has CE statute	0.60	0.49	0.00	1.00
Independent Variables					
Conservation Demand Variables					
INCOME	Per capita income (2000 \$) in thousands of \$	20.22	3.83	13.10	32.74
DENSITY	Population per square mile	163.81	231.45	4.67	1,042.18
CITIES	Percent of population in cities over 250,000 people	11.12	11.58	0.00	45.75
POP_CH	Percent change in population from previous decade	12.23	13.22	-8.04	63.79
PUBLIC	Percent of land owned by the state or federal government	15.27	20.01	0.77	86.33
PARKS	Percent of state land in parks	0.85	1.41	0.00	6.28
FARMDROP	Percent decrease in farmland from previous decade	13.14	11.11	0.11	48.44
URBAN_CH	Percent change in urban land from previous decade	266.20	281.10	-51.60	1,562.10
SPECIES	Number of federally listed threatened and endangered species	9.45	10.34	0.00	58.00
FV_LAG	Per acre retail value of farmland in previous decade (2000 \$)	594.42	541.01	41.00	2,701.00
Political Variables					
BORDERWT	Proportion of bordering states with a statute weighted by population	0.62	0.36	0.00	1.00
CIRCUIT	Proportion of states within federal judicial district with statute	0.60	0.33	0.00	1.00
REGION	Proportion of states within U.S. Census geographic region with statute	0.60	0.31	0.00	1.00
DEM	Percent voting for the Democratic candidate in last presidential election	41.83	7.15	20.57	55.80
MINING_INC	Percent of state GDP derived from mining	1.79	3.03	0.03	20.33
MINING_EMP	Percent of state employment derived from mining	1.34	2.14	0.05	13.78
TNC_LAG	Conservation acres held by TNC in previous decade	17,839.49	37,329.07	0.00	242,090.19
TAXES	Net federal income taxes collected per capita in thousands of \$	1.58	0.55	0.74	3.51
Control Variables					
POP	Total Population in one hundred thousands	49.06	51.18	4.54	297.60
COLLEGE	Percent of population with a Bachelor's degree or higher	17.76	3.82	10.40	27.20
AREA	Land Area in thousands of square miles	61.65	46.56	1.04	261.80
YR_DUMMY	Dummy=1 if year is 1991	0.50	0.50	0.00	1.00

*Summary statistics are for 1980 and 1990 data, excluding Alaska and Hawaii (n=96), **For data sources, see Appendix

4.1.1 Conservation Easement Statute Variable

The dependent variable (CE) has been collected as a binary variable, which takes a value of one if a state has a conservation easement in a given year (1980 or 1990) and a value of zero if it does not. This variable was created using data presented in Tables 4.2 and 4.3 in Squires (2000), in which the author lists the year of adoption for each of the states. In the year 1980, 18 states had legislation enabling conservation easements, while 30 did not. By 1990, the number of states with statutes rose to 40, leaving 8 states of the contiguous states without statutes. Therefore, in the combined dataset, there are 58 observations for which the dependent variable takes a value of one and 38 for which it takes a value of zero. Ideally, this value of one or zero would have a consistent meaning across states. Unfortunately, as discussed previously, the statutes vary in content across states; therefore, a dependent variable value of one may not have exactly the same meaning across states. Generally, however, the statutes serve the same basic function by providing a legal definition of the following: what constitutes a conservation easement, qualified holders, duration, and legal remedy for breach of easement.

4.1.2 Conservation Demand Variables

This set of variables proxy forces which I expect to influence public demand for private conservation (and thus for the adoption of conservation easement statutes) within a state. Many of these variables are those which Dana and Ramsey claimed were drivers

of conservation easement use. Within this set are certain variables that I expect to increase conservation demand and others which I expect to decrease demand.³⁶

Conservation is often considered a normal or luxury good, so that as income rises, demand for private conservation should also increase (Albers and Ando 2003). I have collected data from the U.S. Census Bureau on per capita income measured in 2000 dollars (INCOME). One problem with this variable is that it limits the impact of income to within state borders. For example, a state with a low per capita income may border a state with high per capita income and high willingness to pay for conservation. The demand of residents in the high income state may extend to the low income state, and this cross-border influence is not captured in this model.

Additionally, using census data, I have calculated the number of people per square mile (DENSITY) and the percentage of the state's population living in cities over 250,000 people (CITIES), and the population growth rate in the last decade (POP_CHANGE). I have included the CITIES variable because I believe that this may more accurately represent localized pressure; for example, although a state such as Arizona may have low density across the state, developable land around urban centers such as Phoenix face significant development pressure. My expectation is that people living in densely populated areas, or in states which are experiencing rapid growth, will have a higher demand for preserving the remaining open space in the state. This idea is also supported by Dana and Ramsey in their claim that increasing population and urbanization increase private conservation. However, the effect of these variables may be

³⁶ Many of the variables I use are consistent with those used by Albers and Ando (2003) to construct an empirical model of state-level demand for private conservation.

complicated by the fact that these people may also face a higher opportunity cost to preservation by further limiting land available for development. Changing land use, or especially the perceived rate of change of land use may also influence the public value of conservation. Using data on land use from the General Accounting Office, I have calculated two different measures of land use change—percent decrease in land in farms from the previous decade (FARM_DROP) and percent change in urban land (URBAN_CH). I expect that the larger the decrease in farmland and the increase in urban land, the greater the demand for conservation.

I expect that the demand for private conservation will be influenced by the presence of substitutes, especially the provision of conservation (or open space or recreation access, etc) by the government. Specifically, private conservation demand should be increased by what Dana and Ramsey refer to as “the failure of the public sector to meet a variety of resource conservation demands.” I have used two variables to attempt to capture public provision of goods which might be provided by conservation easements—percent of total land in the state that is owned and managed by federal agencies³⁷ (PUBLIC) and percent of total land is managed by the state as parks and recreation areas (PARKS). These measures are problematic because a given parcel of federally owned land may not provide the same conservation goods as a given parcel of protected private land—agencies manage for a variety of goals and similarly, private land is protected for a variety of purposes. Additionally, the U.S. Fish and Wildlife Service report a national trend away from the use of public land and that the majority of hunters

³⁷ This excludes land in Native American reservations.

in the U.S. use either solely private land or both private and public land.³⁸ This may suggest that the relationship between public and privately conserved land may be more complementary than competitive. This may be true given that land trusts have the autonomy to specialize in particular conservation niches that may not have been publicly provided by government land.

I also expect demand for private conservation to be influenced by the quality or particular ecology of land in the state. Unfortunately, conservation land quality is difficult to capture empirically. It is challenging in one sense because multiple types of goods are provided by what I am generally calling conservation—scenic views, wildlife habitat, biodiversity, recreation, and so on. In order to try to capture some sense of land quality for the provision of at least one of these goods, I have compiled data from the U.S. Fish and Wildlife Service on the number of species in a state that are federally listed as threatened or endangered (SPECIES), because I believe this provides some reflection of the amount of unique or rare habitat that people may be more likely to want to protect. This is a far from perfect measure because there are many other factors which may be involved in the number of species listed in a state and furthermore, many of the species listed may be those that people do not care about.

Finally, I expect the price of farmland to be correlated with increased demand for private conservation because the price of farmland is in part a function of development pressure.³⁹ Alternatively, high farmland price also signals the high opportunity cost of

³⁸ U.S. Fish and Wildlife Service. “Private and Public Land Use by Hunters: Addendum to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.” (Report 2001-8). 2005.

³⁹ Vilms (1982) discusses the fact that inflated land values lead to intense pressures for land conversion.

foregone development (and possibly local property tax revenue streams). Because there may be a slight chance that in states with older enabling statutes, protected farmland in the state has driven up the price of unprotected farmland, I have lagged farmland price by ten years.

4.1.3 Political Variables

In order to test the theory that institutional change is driven not only by the market for the change, but also by political forces, I have included variables in this section which I believe will influence the political landscape in which legislation on conservation easements have been adopted. Political constraints on changing law can be viewed as a force affecting the supply of institutional change. The set of variables is meant to proxy the political contagion effect⁴⁰ in which the laws of one may lead to the adoption of similar laws in neighboring states. The first of these is the proportion of bordering states which have conservation easement laws; this fraction is weighted by population because of the expectation that larger states may have greater influence on their neighbors than smaller states (BORDER_WT). The next two variables attempt to capture larger, regional effects. The variable REGION is simply the proportion of states within a geographic region (as defined by the U.S. Census Bureau) that have adopted the statute. The last in this group is the proportion of states within the same federal judicial district that have adopted conservation easement statutes (CIRCUIT). Although conservation easement laws are enacted at the state, and not federal, level, I believe that

⁴⁰ The idea of political contagion—that ideas can spread across areas just as a disease spreads, has received a great deal of empirical attention in relation to international finance markets, particularly monetary crises (Eichengreen, Rose, and Wyplosz 1996; Glick and Rose 1999; Dungey and Martin 2001).

the decision of the federal courts on appeal may influence the decisions of the state courts within that district, and thus the tendency of state enforcement of easements under the common law. Squires (2000) notes that states have a tendency to look at the laws of other states in the same federal circuit as well as the laws of their neighbors (which often coincide). Please see Appendix A for the groups of states falling into these three variable categories.

Within this set of political variables are those which I expect to positively increase the probability of statute adoption and those which I expect to decrease that probability. Because the Democratic Party has become increasingly aligned with environmental causes⁴¹ I have included data on the percent of the population within a state that voted for the Democratic candidate in the most recent presidential election (DEM). I expect that the higher the percentage of democratic voters, the greater the probability of a conservation easement statute.⁴² Another variable which I expect to positively increase the probability of a statute is the number of acres held in conservation by The Nature Conservancy (TNC_LAG), which is one of the nation's largest non-profit conservation organizations. For each year, I have used acreage holdings from the previous ten years so in order to address any problems with endogeneity (for example, for the year 1980, I use acres held in 1970). Ideally, I would like a measure which would capture the advocacy effort and effectiveness of land trusts operating with the state.

Unfortunately, although there is data on the number of local and regional land trusts and

⁴¹ Dunlap (1975) and Buttel and Johnson (1977) find evidence that Democrats support pro-environmental issues more than Republicans.

⁴² While I include a partisan measure within the political variables to consider how a environmentally sympathetic legislature may ease the passage of an enabling statute, this variable could also capture some aspect of public demand for conservation.

their staffs and land holdings by state, this data is not available until later years, and thus might cause endogeneity issues. Although the measure I have chosen to use is not perfect, it serves to capture the presence of The Nature Conservancy within a state and may be indicative of its capacity for political influence.

I have also included data on the net federal personal income taxes collected in each state and I have normalized this by dividing it across population (TAXES). Because of the relationship between conservation easement statutes and federal tax law on charitable deductions of real property interests, I expect that the higher the income collected per capita, the greater the demand for laws that can decrease taxes owed. Additionally, because many land trusts rely on land donation rather than purchase and use potential tax deductibility as an incentive for donation, the higher the tax base, the more likely that land trusts will want the statute in place so that they can entice potential donors. Ideally, I would use a variable which was the percentage of landowners within the falling into the highest income tax bracket; however, I was not able to find such data.

In order to capture the political capacity of interests opposed to conservation easement statutes, I have used two different measures to proxy the political presence of the mining industry within a state. The presence of conservation easements would likely increase the costs of transacting mineral leases or estates and are thus likely to be opposed by those with an interest in maintaining low costs for these property regimes. I used data from the Bureau of Economic Analysis to calculate the percent of state Gross Domestic Product derived from the mining industry (MINING_INC) and also the percent of total employment in the state that comes from the mining industry (MINING_EMP). I

expect both of these measures to decrease the probability of conservation easement statute adoption.

One key component which is missing from my analysis is a measurement of the legal certainty (or uncertainty) of conservation easement enforcement of conservation easements under the common law. Ideally, I would have a binary variable which would take a value of one if the state had a positive legal precedent for enforcement and a zero otherwise. However, as I began to research the legal history of each state in order to try to create such a variable, I realized that I was not comfortable with such an undertaking, not only because of my lack of significant legal qualification, but also because I realized that this would still be a flawed measure. As Barzel (1997) points out, “when parties choose to settle their disputes without resorting to the courts, their actions are influenced by their perceptions of how the courts would have acted in their dispute” (pp 98). This problem is very subjective and may be influenced not only by precedent but by personal information about the opinions of particular judges on perpetual land use restrictions and so on. I try to address this empirical shortcoming later in my case studies on certain states.

4.1.4 Control Variables

I have also included a number of variables to serve as controls for variance among the states. The first is total state population (POP); this variable ranges from 500,000 (Wyoming in 1980) to 298,000 (California in 1990) with a mean of 49,060. The next is area (AREA), which also has a broad range of 1.04 square miles (Rhode Island) to 261.80

square miles (Texas) and a mean of 61.65 square miles. The third variable I control for is the percentage of the state with a bachelor's degree or higher degree (COLLEGE) and the last is a dummy variable that is equal to one for observations in 1990 and equal to zero for 1980 observations (YR_DUMMY). This variable controls for any institutional changes that may have occurred from one decade to the next.

4.2 Means Analysis

In order to provide a preliminary test of the predictions derived in the theoretical section, I have divided the states into two groups: those without a conservation easement enabling statute in place at the time of observation, and those with a statute in order to compare the subgroup means. This simple method of analysis is somewhat limited because it does not isolate the effect of the variable of interest, but nonetheless, it provides some insight about the characteristics of the states with and without statutes and a way to initially test ideas about the factors affecting statute presence. Table 4 shows these means and reports the t-value of a test of difference of means, in which the null hypothesis is that there is no difference in means. The results of this test and the direction of differences in the mean are largely consistent with my expectations.

The model predicts that increased demand for private conservation should increase the likelihood of a conservation easement statute in the state. Therefore, those variables which increase demand should have a higher mean value in those states which have a statute in place. The means test shows support for this prediction. Among the conservation demand variables, per capita income is significantly higher in states with a statute; these states are also significantly more densely populated, have a higher

percentage of urban land, and significantly higher farmland value per acre. One result which is somewhat surprising is that the percent of land in parks and recreation is higher in states with a statute than those without. This may suggest that the relationship between private and public conservation goods is in fact complementary.

The model also predicts that an increased presence of pro-conservation interests and voters in a state (and surrounding a state) will increase the likelihood of a state statute and that the opposite is true with regard to anti-conservation interests. The results of the means test also provide support for these predictions. Within the political variable category, all three measures of political contagion were significantly higher in states with statutes, as were the percent voting Democrat, acreage held by The Nature Conservancy the previous decade, and net personal taxes. On the other hand, the presence of mining in states with the statute was significantly lower in this subgroup, as expected.

Table 4: Means by Statute Group and Significance of Difference of Means

Variable	Group	N	Mean	Group St. Dev.	t-value
Conservation Demand Variables					
Per Capita Income (2000 \$)	No statute	38	17.91	2.58	5.90***
	Statute	58	21.74	3.77	
Density	No statute	38	72.60	82.28	3.92**
	Statute	58	223.57	275.15	
% Land in Parks	No statute	38	0.36	0.50	3.42**
	Statute	58	1.17	1.70	
% Decrease in farmland from last decade	No statute	38	9.23	8.78	3.08**
	Statute	58	15.70	11.79	
% Urban land	No statute	38	2.31	1.99	4.39***
	Statute	58	7.44	8.57	
Farmland value (lagged)	No statute	38	271.66	226.29	6.29**
	Statute	58	805.88	582.78	
Political Variables					
Proportion of bordering population with statute	No statute	38	.49	.35	2.81**
	Statute	58	.70	.35	
Proportion of states in federal judicial circuit with statute	No statute	38	0.32	0.25	8.69***
	Statute	58	0.78	0.25	
Proportion of states in U.S. Census region with statute	No statute	38	.36	.30	7.14**
	Statute	58	.75	.21	
% Voting Democrat	No statute	38	39.47	8.01	2.55**
	Statute	58	43.37	6.12	
% Income from Mining	No statute	38	3.38	4.19	3.80**
	Statute	58	0.74	1.02	
% Employment from Mining	No statute	38	2.48	2.94	3.88**
	Statute	58	0.59	0.79	
TNC acreage held 10 years ago	No statute	38	8,998	39,090	1.9*
	Statute	58	23,632	35,275	
Net Personal Taxes in thousands of \$	No statute	38	1.25	0.34	5.51***
	Statute	58	1.80	0.56	

The t-value is associated with a means test in which the null hypothesis is that the difference of means is equal to zero;

* indicates significance at the 10% level for a 1-tailed test, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

In order to fine tune the means test analysis, I repeated the procedure, but this time used only those states that adopted a statute in the 1980s and compared the 1980 and 1990 variable means for the group to see which variables changed during the adoption period. These results are summarized in Table 5. They too are largely consistent with my expectations. Many of the demand variables were significantly different between the two time periods. Income increased during this time for the adopting states as did the rate of farmland loss, the number of threatened and endangered species, and the value of farmland. The only variable which exhibited an unexpected difference was population change, which decreased for adopting states from 1980 to 1990.

The political variables were all as predicted. The political contagion measures all increased during this time period as did the percent of the population voting Democrat, the number of acres held by The Nature Conservancy, and the per capita income taxes. On the other hand, the percentage of state income derived from the mining industry dropped significantly between 1980 and 1990 for those states adopting conservation easement enabling statutes in that decade. The next section develops a more formal estimation method for examining the variables influencing enabling statute adoption.

Table 5: Means by Year for States that Adopted between 1980 and 1990 and Significance of Difference

Variable	Group	N	Group Mean	Group St. Dev.	t-value
Conservation Demand Variables					
Income	1980	22	17.42	2.19	5.58***
	1990	22	21.71	2.87	
Population Change	1980	22	17.46	16.88	1.87*
	1990	22	9.07	12.60	
Farm Drop	1980	22	7.21	5.62	2.68**
	1990	22	14.22	10.88	
Endangered Species	1980	22	6.82	7.67	2.12**
	1990	22	12.73	10.59	
Farmland value (lagged)	1980	22	220.91	112.86	5.4***
	1990	22	745.95	441.47	
Political Variables					
Weighted Border	1980	22	0.39	0.34	5.54***
	1990	22	0.86	0.22	
Circuit	1980	22	0.22	0.21	11.12***
	1990	22	0.90	0.20	
Region	1980	22	0.28	0.25	9.11***
	1990	22	0.81	0.12	
Dem	1980	22	37.95	8.25	2.69**
	1990	22	43.77	5.89	
Mining Income	1980	22	1.68	1.62	1.96*
	1990	22	0.86	1.08	
TNC acreage held 10 years ago	1980	22	2,260.70	4,680.10	3.46**
	1990	22	27,432.00	33,850.00	
Taxes	1980	22	1.13	0.25	6.95***
	1990	22	1.84	0.41	

The t-value is associated with a means test in which the null hypothesis is that the difference of means is equal to zero;

* indicates significance at the 10% level for a 1-tailed test, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

4.3 Empirical Model

Pooled Probit

In order to more thoroughly test the predictions outlined in the previous section, I use a probit model to estimate the effects of private conservation demand and of special interests on statute presence within a state. The dependent variable in this model (CE) is a binary variable taking values of 1 or 0 (if the state does or does not have a statute, respectively). Because this variable is limited and qualitative by nature, I use a probit model, rather than a linear probability model, in order to restrict my predicted values to the (0, 1) interval (Maddala 1983). The basic probit model is specified as

$$(1) \quad y_i^* = \beta'X_i + \varepsilon_i \quad \varepsilon_i \sim N(0, \sigma^2)$$

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 1 \\ 0 & \text{if } y_i^* \leq 1 \end{cases} \quad i = 1, \dots, n$$

In (1), y_i^* is the unobserved legal response in state i (or the state's propensity to adopt a statute), X_i is a matrix of independent variables including a constant, β is a column vector of unknown coefficients, ε_i is a state specific error term and n is the number of states in the sample. Maximum likelihood estimates are generated using the specification in (1) where the dependent variable is equal to one if the state has a conservation easement enabling statute in place and zero if it has no such statute. The exogenous variables include those conservation demand variables, political variables, and control variables discussed above. A number of different specifications are used in order to test the

robustness of the results. Tables 6 and 7 report the results of five different model specifications.

The first specification (Demand Only) includes all of the demand variables as well as the control variables, to test the strength of the idea that the adoption of the statutes is only affected by public demand for private conservation. The signs on the marginal effects coefficients of density, population change, farmland decrease, change in urban land, and lagged farmland value are all positive as expected. Additionally, the state parks variable is negative as predicted. However, the marginal effect coefficients on income, cities, public land, and endangered species variables are of the opposite sign than predicted. Furthermore, this model is lacking in explanatory power and none of the variables have a significant effect on the probability of statute adoption.

The next specification (Full) includes selected conservation demand variables, political variables, and the control variables. In this new specification, many of the demand variables remain the same sign and are still not significant. Two exceptions are that the income coefficient becomes significant, but is still negative—the opposite of my expectation. Additionally, the farmland decrease variable become negative but is still highly insignificant. Several of the political variables, on the other hand, are both of the predicted sign and are significant. The variable which captures the proportion of states within a federal judicial circuit with a statute is positive and highly significant, as is the tax variable. The coefficient of the marginal effect for the percent of state employment from mining variable is negative and strongly significant. The coefficient on the lagged TNC acreage is positive, as predicted, but is not significant. The variable measuring the

percentage of Democratic voters was not of the expected sign, but was also not significant. In this specification, two of the control variables, land area and college educated population turned out to be both positive and significant in their effect on the probability of statute presence. Overall, this model was much stronger than the Demand Only specification with the adjusted R^2 increasing from .175 to .4 and the log-likelihood decreasing from -38.185 to -22.670.

I tried several specifications with different variables in order to test the strength of the variables and determine the specification with the most explanatory power. The results of these ten specifications (including the Demand Only and Full) models, are reported in Appendix B. I next tried using a stepwise probit model which iteratively adds or drops variables from the model, depending on the minimum level of significance established by the user. At a maximum p-value of .1, using a less restrictive backward model which begins with all variables and then drops variables, beginning with the least significant, the following variables were included in the model: DENSITY, PUBLIC, BORDER_WT, CIRCUIT, REGION, MINING_INC, and AREA (along with the dummy variable). Using a more restrictive forward stepwise model, which begins with only the 1990 dummy variable and iteratively adds variables with a p-value less than .1, the following variables were included: CIRCUIT, COLLEGE, and MINING_EMP. Because some caution against the pure use of stepwise models because they may produce errors in the presence of redundant variables and may inflate coefficients (Judd and McClelland 1990, Derksen and Keselman 1992), I use the stepwise models only to inform my choice of variable inclusion. The three specifications I use are presented in Table 7.

Because all three variables representing the political contagion effect (BORDER_WT, CIRCUIT, REGION) were included in the backwards stepwise probit model, I chose to use the stronger two (CIRCUIT and REGION) in separate specifications. Additionally, because the two mining presence variables were selected, I also include these in separate specifications. All of the other stepwise variables are included in the three specifications. The first specification (Stepwise 1) uses the REGION variable and the MINING_INC variable. In this specification, the coefficient on the density variable is positive and significant, as is that of the region variable. The mining variable is strongly negative, as predicted. The public land variable is positive (the opposite of the predicted sign) and none of the control variables are significant. The second specification (Stepwise 2) is very similar, but in this case, I use the percent of state employment from mining, instead of the mining income variable. This variable is also strongly negative. None of the other variables change sign, but area does become slightly significant and the strength of the overall model increases (adjusted R^2 increases and log-likelihood decreases). The third specification (Stepwise 3) uses the CIRCUIT variable and the MINING_EMP variable. In this specification, the coefficient on the circuit variable is strongly positive and again the mining employment variable is negative and significant. Additionally, the coefficient on the college population variable is strongly positive. Overall, this model is the strongest of the specifications, with an adjusted R^2 of .457, which suggests an even stronger explanatory power than the Full specification.

Table 6: Selected Pooled Probit Results: Demand and Full Models

	Predicted Sign	Demand Only		Full	
		Coefficient	Marginal Effect	Coefficient	Marginal Effect
Independent Variables					
Constant		-3.341* (1.842)		0.556 (4.025)	
Conservation Demand Variables					
Income	+	-0.018 (.120)	-.005 (.035)	-0.822** (.408)	-.258** (.127)
Density	+	0.004 (.004)	.001 (.001)	0.002 (.005)	.0008 (.001)
Percent of pop in cities	+	-0.031 (.022)	-.009 (.006)	-0.021 (.030)	-.007 (.009)
Percent change in population	+	0.021 (.024)	.006 (.007)		
Public land	-	0.004 (.015)	.001 (.004)		
National parks	-	-0.001 (.389)	-.0004 (.113)	-0.105 (.483)	-.033 (.152)
Endangered species	+	-0.019 (.025)	-.005 (.008)	-0.030 (.027)	-.009 (.009)
Percent decrease in farmland	+	0.006 (.027)	.002 (.008)	-0.005 (.035)	-.001 (.010)
Percent change in urban land	+	0.001 (.001)	.0003 (.0004)		
Farmland value (lag)	+	1.325 (1.036)	.386 (.289)	1.688 (1.692)	.530 (.525)
Political Variables					
Circuit	+			4.649** (1.405)	1.460** (.509)
Percent voting Dem	+			-0.016 (.042)	-.005 (.013)
Percent of employment from mining	-			-0.830** (.355)	-.261** (.134)
Conservation acres held by TNC (lag)	+			2.27E-6 (7.70E-6)	7.13E-07 (.290)
Net personal federal income tax	+			6.178** (3.14)	1.941** (.939)
Control Variables					
Population		0.0003 (.009)	.00008 (.003)		
Land Area		0.002 (.008)	.0005 (.002)	0.023** (.009)	.007** (.003)
% of pop with college		0.123 (.078)	.036 (.023)	0.271** (.129)	.085** (.004)
Year dummy		1.143 (.847)	.327 (.243)	-2.110 (1.304)	-.602 (.291)
Goodness of Fit					
Log-likelihood			-38.185		-22.670
McFadden's R-Square			.407		0.648
McFadden's Adjusted R-Square			.175		0.4
Predicted Probability* (Observed probability is .604)			0.785		0.755

*Predicted probability is calculated at the means of the exogenous variables.

Table 7: Selected Pooled Probit Results: Stepwise Models

	Predicted Sign	Stepwise1		Stepwise2		Stepwise3	
		Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Independent Variables							
Constant		-2.699** (1.178)		-2.712** (1.193)		-5.178** (1.704)	
Conservation Demand Variables							
Density	+	.003* (.002)	.001* (.0006)	.003* (.002)	.001* (.0006)	.003 (.002)	.001 (.0006)
Public land	-	.010 (.010)	.004 (.004)	.008 (.010)	.003 (.004)	.004 (.012)	.002 (.004)
Political Variables							
Circuit	+					3.974*** (1.171)	1.420*** (.429)
Region	+	2.875** (1.139)	1.075** (.439)	2.851** (1.159)	1.070** (.447)		
Percent of state income from mining	-	-.316** (.131)	-.118** (.053)				
Percent of employment from mining	-			-.494** (.178)	-.185** (.072)	-.481* (.257)	-.172* (.101)
Control Variables							
Land Area		.009 (.010)	.003 (.002)	.011* (.007)	.004* (.003)	.012 (.008)	.004 (.003)
% of pop with college		.031 (.066)	.012 (.025)	.028 (.067)	.010 (.025)	.161** (.082)	.057** (.029)
Year dummy		.225 (.548)	.084 (.203)	.439 (.564)	.163 (.206)	-.282 (.620)	-.100 (.221)
Goodness of Fit							
Log-likelihood			-32.802		-31.611		-26.991
McFadden's R-Square			.491		.5095		.5812
McFadden's Adjusted R-Square			.367		.385		.457
Predicted Probability (Observed probability is .604)			.641		.637		.681

4.3.1 Summary of Pooled Probit Results

A summary of the marginal effects and significance of the independent variables used in the different specifications is given in Table 8. These include all ten of the models in Appendix B as well as the three stepwise models, for a possible 13 specifications. Although many of the demand variables consistently exhibited the predicted sign, these were (with the exception of density) never significantly the same sign as that predicted. This table illustrates the dominance of the political variables, which were most often of the predicted sign and positive. In the next subsections, an alternative empirical model is explored.

Table 8: Summary of Pooled Probit Results for CE Statute Specifications

Independent Variables	Predicted sign	# of models in which variable was used	Range of marginal effect	# of models with predicted sign	# of models with significant predicted sign	% of models with predicted sign	% of models with significant predicted sign
Conservation Demand Variables							
Per Capita Income (2000 \$)	+	8	-.258 to .045	3	0	37.50	0.00
Density	+	12	-.002 to .004	11	2	91.67	16.67
% of population in cities (250,000+)	+	8	-.007 to -.014	0	0	0.00	0.00
% Change in population (lagged)	+	2	.006	2	0	100.00	0.00
% Public land	-	5	.001 to .004	0	0	0.00	0.00
% Land in parks	-	9	-.089 to .037	5	0	55.56	0.00
Endangered species	+	8	-.009 to .0005	2	0	25.00	0.00
% Decrease in farmland from last decade	+	9	-.005 to .010	7	0	77.78	0.00
% Change in urban land	+	2	.0003 to .0004	2	0	100.00	0.00
Farmland value per acre (previous decade)	+	9	-.195 to .0005	8	0	88.89	0.00
Political Variables							
Population weighted border states	+	2	-.255 to -1.003	0	0	0.00	0.00
Circuit	+	4	1.333 to 1.460	4	4	100.00	100.00
Region	+	4	.704 to 1.075	4	4	100.00	100.00
% Voting Democrat	+	5	-.012 to .002	2	0	40.00	0.00
% State employment from mining	-	7	-.261 to -.150	7	7	100.00	100.00
% State income from mining	-	2	-0.118 to -.104	2	1	100.00	50.00
Conservation acres held by TNC (previous decade)	+	5	-9.46E-7 to 6.98E-7	3	0	60.00	0.00
Net personal income tax collected in thousands of \$	+	5	.242 to 1.941	5	3	100.00	60.00

Nested Probit

The use of a simple probit model does make an implicit assumption about the costs of institutional change. The pooled probit model evaluates the decision of each state to adopt or not adopt in both 1980 and 1990, treating these two decision periods as separate. This implies that in 1990 it is costless for a state which adopted by 1980 to undo the legislation and now make the choice not to have a statute. In reality, there would be significant costs associated with such legal reversion, making it more likely that a state which adopted by 1980, will not be choosing again in 1990. Therefore, I explore the use of a nested probit model which basically splits the probit regression into a two period model.⁴³ The full set of observations is used for the first stage and then only those states which did not adopt by 1980 are considered in the 1990 stage, making the probability of statute presence in a state in 1990 conditional on its presence in 1980. Although realistically, a state can make this choice every year that its legislature meets (making a duration model perhaps the most appropriate choice), I am limited to a two period model by the availability of data on my independent variables. The results of the nested probit model are presented in Table 9. All of the variable coefficients are of the predicted sign, and it is interesting to note that only one variable stands out as being significant in each of the decision periods. In the decision to adopt by 1980, only the coefficient for the region variable is a significant and only the coefficient on the variable for mining presence is significant in the 1990 decision period. In the next subsection, the implications of the results of these models are discussed in detail.

⁴³ For the maximum likelihood of the nested model, please see Appendix C.

Table 9: Results of Nested Probit Model

	Predicted Sign	First Period Decision (adopt by 1980) n=48		Second Period Decision (adopt by 1990) n=30	
		Coefficient	Marginal Effect	Coefficient	Marginal Effect
Exogenous Variables					
Constant		-3.519** (1.306)		-3.278 (4.407)	
Conservation Demand Variables					
Density	+	.004 (.002)	.001 (.0009)	.003 (.004)	.001 (.001)
Public land	-	.002 (.014)	.0007 (.005)	.018 (.019)	.005 (.005)
Political Variables					
Region	+	2.776** (1.307)	.940** (.474)	7.638 (5.624)	2.00 (1.18)
Percent of state income from mining	-	-.201 (.242)	-.068 (.072)	-.598** (.266)	-.157** (.074)
Control Variables					
Land Area		.010 (.007)	.003 (.002)	.010 (.008)	.003 (.002)
% of pop with college		.076 (.106)	.026 (.035)	-.111 (.128)	-.029 (.034)
Goodness of Fit					
Log-likelihood			-18.815		-10.931
McFadden's R-Square			0.408		.3717
McFadden's Adjusted R-Square			0.187		.031

* For this model, I used the variables guided by the stepwise probit estimation.

4.3.2 Conservation Demand Variables

These results suggest that conservation demand is not a significant factor in determining the likelihood of statute presence within a state. Of the variables which I expected to positively influence private conservation demand and thus the probability of statute adoption, only one (DENSITY) was both of the expected sign and significant in any of the specifications. Another demand variable (INCOME) was significant in one of the specifications, but was of the opposite sign than predicted. This result is inconsistent with my prediction that demand for conservation, should increase as per capita income increases. It is difficult to say how meaningful this result is, given that other specifications yielded the expected sign.

Of the variables which proxied for crowding (DENSITY, CITIES, POP_CH), population density and population change had the predicted sign in 100% of the specifications in which they were included, but only one was ever significant. The coefficient and marginal effect of percent of population in cities over 250,000 (CITIES) were never of the predicted sign, but were also never significant. This may suggest that demand for increased protection on remaining open spaces in more crowded states outweighs the increased cost of protection in those states.

The two variables included to provide some measure of substitution for private conservation were also never significant. Percent of land under federal ownership (PUBLIC) was of the opposite sign predicted. Percent of land in state parks and recreation (PARKS) was of the predicted sign in just over 50% of the specifications.

These results may provide support for a complementary relationship between private and public provision of conservation goods.

Endangered species (SPECIES), which I expected to reflect some measure of rarity of wildlife and habitat, was positive in only 25% of the specifications and was not significant. There may be several explanations for this result. It is possible that the number of threatened and endangered species in a state does not accurately strongly coincide with those species most cared about by the public or that endangered species habitat is such a small portion of the state that it does not affect the overall demand for land preservation, or that the presence of more listed species in a state leads to increased public provision of conservation, thus lowering demand for private conservation.

The land use variables (FARMDROP and URBAN_CH) were, almost always the same sign as predicted, but were not significant. Farmland value per acre (FARM_VALUE) was positively signed in 8 of 9 specifications, but was not significant.

One explanation for the absence of the demand variables in explaining the presence of state statutes may be that my conservation demand variables were captured at an inappropriate scale. There may be two scale effects at work in the demand for private conservation—a very localized demand which may not be captured with state level variables, and a more regional demand, also not captured with state level variables. Unfortunately, because the legal change occurs at the state level, this must be my scale of examination.

4.3.3 Political Variables

The results show that the political variables had a much greater effect on the presence of conservation easement statutes in states than the conservation demand variables. Two of the three measures of the political contagion effect (BORDERWT, CIRCUIT, and REGION) were particularly strong. The proportion of contiguous states with a conservation statute, weighted by state population, was not of the expected sign but was also highly insignificant. The other two measures, proportion of states in the same federal judicial circuit with the statute and proportion of states in the same U.S. Census region with the statute were both positive and strongly significant in 100% of the specifications in which they were included. This provides convincing evidence for the idea that state legislatures were influenced by the actions of surrounding states. It is also possible that the presence of statutes in surrounding states lowered the cost of lobbying for pro-conservation easement interests by increasing legislative willingness to adopt. The strength of the “neighbor” measures may also lend support to the idea that a regional scale may be more appropriate for looking at demand for a good like conservation.

The percent of the population that voted for the Democratic candidate in the last presidential election (DEM) was only of the predicted sign in 40% of the specifications in which it was included and it was not significant. This may suggest that general public concern for environmental issues (with which the Democratic party is typically aligned) did not play a large role in the movement to pass conservation easement legislation or may simply suggest that partisan alignment is not a good indicator of environmental concern.

The measure of mining interests in the state, proxied by percent of state employment derived from the mining industry (MINING_EMP), was negative and significant in 100% of the specifications in which it appeared. Percent of state income derived from mining (MINING_INC) was also negative in both of the specifications in which it was included and significant in 1 of these. This lends substantial support to the idea that the mining industry is concerned about the implications of conservation easements for mining activities and that they are against enabling legislation. However, opposition to a statute may not automatically suggest organized resistance to statute creation or adoption, but may also suggest that a greater value is placed on resource extraction than preservation.

The measure meant to proxy for land trust presence in the state (acreage held in conservation by The Nature Conservancy the previous decade), was positive in 60% of the time but was never significant. This may suggest that strength of land trust interests are not a significant factor in the adoption of a statute, or that acreage held by The Nature Conservancy is not a good indicator of land trust strength in a state.

The measure of net personal taxes collected in the state (TAXES) was positive in all of the specifications in which it was included and was significant in three of the five specifications. This lends support to the idea that the greater the tax burden, the greater the pressure to enact legislative mechanisms for reducing that burden.

4.3.4 Control Variables

Population (POP) was included in only two specifications and was positively signed in one and negatively in the other, but was highly insignificant. Land area (AREA) was positive in nearly 80% of the specifications in which it was included and was significant in over 50% of these specifications. This suggests that the greater the land area of a state, the more likely the adoption of a conservation easement statute.

The results also suggest that the more educated the state residents, the more likely that the state will have a conservation easement statute. The measure for education (the percentage of population with a Bachelor's degree) was positively signed in all of the specifications in which it appeared and was significant in two of these. This may suggest a higher conservation demand among those with a college degree or may be a result of the high correlation between higher education, higher income, and higher taxes.

The dummy variable for the year 1990, meant to control for institutional change in the decade from 1980 to 1990, was not consistently signed, nor was its marginal effect significant in any of the specifications. This would suggest that the simple passage of time and any structural changes which took place, and were not included in the other variables, were not significant in determining statutory adoption.

4.3.5 Summary of Empirical Results

The results from the probit model suggest that political factors may have played a more significant role in the adoption of conservation easement enabling statutes across the state than economic factors. While the variables which I expected to increase demand

for conservation were notably insignificant, political factors, particularly the variables representing similar policy in neighboring states and those of mining interests, stood out clearly in the specifications as being significant. I felt that there were two major limitations of these specifications. The first was the possibility of inaccurate variable scale for the estimation of private conservation demand. The second was the absence of legal variables which might shed light upon the role of common law enforcement (or lack of) in the adoption of these statutes. In the next subsection, I use a few key states to try to tease out this type of information, as well as provide more specific examples of the ways in which public demand and interest group strength influence conservation easement legislation.

4.4 State Case Studies

In this section, I review the statutory history of conservation easements in three states: Massachusetts, the first state to adopt such a statute, and Pennsylvania and Wyoming, two states that were very late to adopt. Table 10 provides a comparison between the national average values for key variables and the values of these four states. These case studies will further test the predictions derived from my model of statutory adoption and will examine some of the legal and political nuances not included in the previous empirical section.

Table 10: Comparison of U.S. Mean and Case Study State Values for Key Variables (1980 and 1990)

Variable Name	1980				1990			
	National Average	Massachusetts	Pennsylvania	Wyoming	National Average	Massachusetts	Pennsylvania	Wyoming
Conservation Demand Variables								
Income	17.87	19.76	18.79	21.76	22.58	28.45	24.280	22.043
Density	158.18	731.77	264.74	4.84	169.44	767.40	265.117	4.671
% of population in cities	11.02	9.81	17.80	0.00	11.21	9.55	16.458	0.000
% Public land	14.64	1.59	2.54	48.65	14.20	1.31	2.104	48.788
% Land in parks	0.82	5.04	0.97	0.20	0.88	5.38	0.962	0.192
% Decrease in farmland	8.47	4.00	11.76	1.41	17.80	15.28	23.333	2.286
% Change in urban land	319.79	371.00	386.50	39.70	212.62	16.20	215.900	52.500
% Change in population	15.75	0.84	0.54	41.26	8.71	4.87	0.143	-3.401
Endangered species	6.54	2	3	5	12.35	7.00	8.000	7.000
Farmland value per acre (lagged)	288.58	565	373	41	900.25	1443.00	1273.000	144.000
Political Variables								
Population weighted border	0.38	0.216	0.541	0.470	0.85	1.00	0.959	1.000
Circuit	0.36	0.75	0.67	0.17	0.83	1.00	0.670	0.330
Region	0.36	0.667	0.333	0.250	0.83	1.00	0.667	0.750
% Voting Democrat	39.36	41.75	42.48	27.97	44.30	53.23	47.860	38.010
% Income from mining	2.38	0.33	1.64	20.33	1.20	0.06	0.664	12.193
% Employment from mining	1.63	0.07	0.98	13.78	1.05	0.07	0.576	7.649
TNC acres (lagged)	3,393.39	969	675	0	32,285.59	2,636.75	5,468.25	11,101.25
Taxes	1.20	1.37	1.24	1.69	1.97	2.67	2.132	1.958
Control Variables								
Population	46.78	57.37	118.65	4.70	51.34	60.16	118.816	4.536
College	15.90	20.00	13.60	17.20	19.62	27.20	17.900	18.800
Land Area	61.65	7.84	44.82	97.10	61.65	7.84	44.817	97.100

4.4.1 Pennsylvania and Wyoming: A Study of Special Interest Influence

Pennsylvania and Wyoming were the two most recent adopters of conservation easement enabling statutes (2001 and 2005, respectively), leaving North Dakota as the sole state without such a statute. These two states are very different in many respects. In both 1980 and 1990, Pennsylvania was well above the national average for number of people per square, while Wyoming was far below. The opposite is true for the amount of public land in the state; Wyoming is above the national average while Pennsylvania is significantly below. Pennsylvania's per capita income has been close to the national average, while Wyoming has been slightly higher. The retail value of farmland was slightly higher than average in Pennsylvania and far below average in Wyoming. From these observations, we might expect Pennsylvania to have a higher demand for conservation because of its lack of public land, higher density, and higher development pressure as reflected in farm value. Yet many states which we would expect to have lower demand given their values for these variables adopted conservation easement statutes long before Pennsylvania. Late statute adoption in Wyoming, on the other hand, seems to be more consistent with my model of conservation demand, given the lower development pressure and availability of public land. One thing that both states had in common is organized resistance to conservation easements by mining and other interest groups; in this section, I will examine the extent to which this played a role in the timing of statute adoption.

Pennsylvania

An examination of Pennsylvania's statutory history and land trust activity is important for helping to explain what seems to be a gap in statutory demand and supply. In 1981 Pennsylvania passed the Agricultural Security Act which emphasized the importance of farming and offered compensation to landowners who gave up the right to develop their property.⁴⁴ The legislature describes the need for this act in the following excerpt from the statute:

Agriculture in many parts of the Commonwealth is under urban pressure from expanding metropolitan areas. This urban pressure takes the form of scattered development in wide belts around urban areas, and brings conflicting land uses into juxtaposition, creates high costs for public services, and stimulates land speculation. When this scattered development extends into good farm areas, ordinances inhibiting farming tend to follow, farm taxes rise, and hopes for speculative gains discourage investments in farm improvements. Many of the agricultural lands in the Commonwealth are in jeopardy of being lost for any agricultural purposes. Certain of these lands constitute unique and irreplaceable land resources of Statewide importance. It is the purpose of this act to provide a means by which agricultural land may be protected and enhanced as a viable segment of the Commonwealth's economy and as an economic and environmental resource of major importance.

This act allowed landowners to submit a proposal for the creation of an agricultural area on their property (if it met certain requirements and fell within the proper zoning laws) after which time an extensive review process would take place. The agricultural area

⁴⁴ 3 P.S. §914.1. accessed through Westlaw

would be subject to review every seven years, after which the area may be terminated. After the establishment of land in an agricultural area, the county planning board and a member of the Agricultural Area Advisory Committee may offer to purchase a “development easement” from the landowner.⁴⁵ In 1989, the state developed a more organized effort through the Pennsylvania Agricultural Conservation Easement Purchase Program. This program created the Agricultural Land Preservation Board to oversee the purchase of agricultural easements by the counties or the commonwealth; the program still operates within the framework of the agricultural security areas.⁴⁶ According to Pallone, there are several stipulations in these easements which may compromise their durability; the easement holder (county or commonwealth) may terminate the easement after 25 years if it has lost its “viability” and owners of surface-mineable coal must be compensated if claim is affected by the easement and cellular communication companies must be allowed to lease half an acre of eased land for the placement of towers.⁴⁷

While the above legislation was designed to allow public entities to protect agricultural lands from development pressure; land conservancies in the state were also touting conservation easements as a tool for private land protection. According to Pallone (2000), the first conservation easements in Pennsylvania were created in the early 1970s; she writes that many of these were “tax shelters for politically-connected donors to well-funded conservancies” and were rather weak in terms of real land protection.

⁴⁵ HB143

<http://www.legis.state.pa.us/cfdocs/billinfo/billinfo.cfm?year=1981&sind=0&body=H&type=B&bn=0143> (7/17/07)

⁴⁶ Pennsylvania Department of Agriculture. “About Farmland Preservation.”

<http://www.agriculture.state.pa.us/agriculture/cwp/view.asp?a=3&q=128859> (7/17/07)

⁴⁷ See Pallone (2000) pp 143-146 for discussed of the state’s agricultural easement programs

These easements and all others had no statutory protection, but rather were subject to land use servitudes under the common law. Despite the lack of a statute, in the year 2000 (just one year before the passage of the statute) there were 75 land trusts in operation within the state that held a total of 88,316 acres in conservation easements. However, it may have been the rise of these land trusts and the enforcement problems that they encountered that led to the eventual passage of a conservation easement law.

Pallone writes that enforcement of conservation easements under the common law was highly uncertain. The state does offer one of the most dramatic examples of enforcement on the side of the easement holder. The case of *Natale v. French and Pickering Creeks Conservation Trust, Inc.* was a much publicized case in which the purchaser of land encumbered with a conservation easement (held by the trust) attempted to build a farmhouse on the property when this was expressly forbidden by the easement. When the trust brought the case to court, the court sided with the new owner, stating that the agreement was a servitude by nature and therefore not transferable to the new owner. The trust appealed the decision, but before the case could go to trial, the landowner built the farmhouse. The appellate court reversed the decision of the lower court; after an additional three years, the trust was able to obtain a court order for the destruction of the property. Although the easement was eventually enforced, both parties incurred the costs that accumulated over nine years of litigation in court. Additionally, the common law interpretation of the lower court shows a tendency toward resistance of permanent land use restriction (the goal of most conservation easements). Another land trust, the Wildlands Conservancy, found itself in the same position, dealing with a breach of

easement by a landowner that had purchased the land from the easement donor. The land trust was advised by its legal counsel to pursue negotiations instead of bringing the matter to court. Their counsel advised that although the court had looked favorably on easements in some cases, the lack of statutory protection placed the burden of proof on the trust and made outcome dependent on judicial disposition (Collins 2007).

In 1991, land trusts in the state began to organize and in 1995, the Pennsylvania Land Trust Association (PaLTA) was chartered. This organization began to push for the adoption of the Uniform Conservation Easement Act by the state.⁴⁸ They helped prepare three bills that were introduced into the legislature (in 1991, 1993, and 1998) and subsequently defeated, before finally securing the passage of House Bill 975 in June, 2001.⁴⁹ In 1999, Pallone wrote that, “Despite intense lobbying by PaLTA, efforts to pass bills based on the UCEA have been fruitless because of opposition from coal and utility industry groups (Pallone 2000). In 2001, while the bill was still being debated, the Property Rights Foundation of America, a group vocally opposed conservation easements, included an update on the bill on its website. The group wrote that “coal mining interests have a special clause in the Pennsylvania bill that is designed to protect them...It would be a blow to ordinary private property owners, who do not have the lobbying clout of industry groups, for several major interests to obtain special amendments that seemed to protect them and caused them to drop any opposition that

⁴⁸ Pennsylvania Land Trust Association. “About the Pennsylvania Land Trust Association.” www.conserveland.org/about (7/17/07)

⁴⁹ H.B. 176, Session of 1991, referred to the Committee on Conservation; H.B. 1818, Session of 1993, referred to the Committee on Conservation, and H.B. 2919, Session of 1998, referred to the Committee on Agriculture and Rural Affairs

they might develop to the bill.”⁵⁰ This description seems to suggest that the interests that had opposed earlier versions of enabling legislation, had gained different treatment in this version that made the bill palatable to them.

The statute adopted by the Pennsylvania legislature, known as the Conservation and Preservation Easements Act, does differ significantly from the Uniform Conservation Easements Act in its treatment of third party rights and superior interests. Like the UCEA, Pennsylvania’s statute allows third party enforcement by authorized parties such as interest owners in the real estate, the easement holder, another third party authorized in the easement itself, or a person authorized by the government. However, unlike the UCEA, the statute also grants third party action to the owner of a coal interest in property contiguous to the eased land. Additionally, it includes an entire section on coal and mineral interests. This section states that the act does not restrict any coal mining activities which was permitted (or for which an application was filed) prior to the recording of a conservation easement. Furthermore, a conservation easement that contains a “workable coal seam” cannot be recorded until notice is provided in the easement warning the grantor that coal interests may be impaired by the easement.⁵¹ In a guide to conservation easements in the state prepared by the Heritage Conservancy and the Department of Conservation and Natural Resources, the land trust counsel warns that the definition of workable is ambiguous and may change over time.⁵² Other superior

⁵⁰ Lagrasse, Carol W. June, 2001. “Conservation Easement Bill in Pennsylvania Legislature.” Property Rights Foundation of America, Inc. <http://prfamerica.org/ConsEasementBill-InPA-Legis.html> (7/15/07)

⁵¹ 32 PS § 5051-5059

⁵² Goldstein, Debra Wolf. “Using Conservation Easements to Preserve Open Space: A Guide for Pennsylvania’s Municipalities.”

interests protected include rights of surrounding oil and gas operations and rights of acquisition or lease of land by cellular phone towers.

The late adoption of a conservation easement statute in Pennsylvania is consistent with my predictions for statutory adoption. The high demand for conservation led to the development of many land trusts within the state and the uncertainty of conservation easement enforcement under the common law led these trusts to organize to exert political pressure for institutional change. However, the presence of competing organized special interests altered the political equilibrium, leading to a later adoption that included provisions for the opposing interests. According to PaLTA's website, the act still serves to reduce the uncertainty of enforcement and therefore reduces the legal and financial risk associated with easement acquisition and holding.⁵³

Wyoming

Wyoming, one of a handful of states that experienced negative population growth in the 1980s and a single-digit growth rate in the 1990s, nonetheless has experienced development pressure in significant areas in certain parts of the state. Areas of private land around Yellowstone National Park and the Jackson Hole area are under development pressure because of their high amenity value. Despite slow growth from 1990 and 2000 across the state, during this same time period Teton County experienced a growth rate of 63.3% and the town of Jackson nearly doubled in size. Much of this growth is in-

⁵³ Pennsylvania Land Trust Association. "Guide to the Conservation and Preservation Easements Act."

migration from other areas of the country.⁵⁴ Consequently, a small but active land trust movement developed around these key pressure areas in the Northwest part of the state.

In the year 2000, The Nature Conservancy and two smaller land trusts were operating in the state and holding over 200,000 acres in conservation easements.⁵⁵ These organizations avoided the enforcement uncertainty of common law enforcement experienced by Pennsylvania trusts by purchasing land (typically one acre) adjacent to the eased property to satisfy the requirements for appurtenancy so that easements would be enforceable in perpetuity. Although this system allowed for the legal creation and enforcement of easements, it seems that the fee simple purchase of land by a trust might dissuade a landowner from the sale or donation of an easement. Part of the success of conservation easements has been due to the fact that all residual rights not enumerated in the easement are retained by the fee simple owner (aside from any third party interests, such as minerals) and this is appealing to landowners who may be wary of land trust involvement in land management activities beyond the scope of the conservation agreement. A statute which would enable land trusts to forego the purchase of adjacent land would be beneficial for to land trusts in that it would lower the acquisition costs of easements and influence the supply of willing easement donors/sellers.

According to Anderson et al (2000), several attempts were made by conservationists in the state to pass legislation on conservation easements. At least two bills were unsuccessfully introduced in the state legislature before the passage of the

⁵⁴ “Population Growth in Wyoming, 1990-2000.” *Wyoming Economic Atlas Online*. University of Wyoming, Department of Agriculture and Applied Economics, Division of Economic Analysis <http://agecon.uwyo.edu/econdev/PubStorage/OpenSpacePop90-00.pdf> (7/18/07)

⁵⁵ Land Trust Alliance 2000 Census

Uniform Conservation Easement Act in 2005. Anderson et al, claim that these efforts were largely unsuccessful because of a lack of coordination among pro-conservation interests. Unlike the formation of the PaLTA in Pennsylvania, Wyoming land trusts did not develop any umbrella organization to represent their collective interests, which may have played a role in the bills' failures. It also seems clear that the attempts at passage faced opposition by organized interests and by elected officials concerned with slowing growth and placing long-term restrictions on property.

When a bill was introduced into the Wyoming House in 2003, the Wyoming Farm Bureau actively lobbied against the bill because it believed that conservation easements would "tie up" agriculturally productive land and prevent its use. Possibly to alleviate such fears, the committee considering the bill inserted wording to the effect that conservation easements could not restrict any "generally accepted agricultural practices" unless very specifically enumerated, typed in bold and initialed by the easement grantor. However, the combination of a depressed agricultural economy in the state and soaring real estate prices may have increased the reluctance of landowners to support a tool that they feared might decrease their ability to sell their land if agricultural usage was no longer feasible.

In an online description of the debate on the 2003 bill, the Property Rights Foundation for America noted that the bill was argued against by the majority leader on the grounds that the statute would expressly violate a section of the Wyoming constitution which prohibits "perpetuities." This seems to have been a popular stance as the committee then voted to insert into the bill a line stating, "No conservation easement

created in this state shall violate the rule against perpetuities.” This would have meant that not only would any easements created under the statute not qualify for federal tax exemption if donated, but would have undermined the very purpose of the statute—to overcome obstacles to the perpetual enforcement of easements.

Interestingly, despite the strong presence of mining interests in the state, there is no mention of their opposition to the UCEA bills. One reason for this may be that the bills explicitly addressed the superiority of the mineral estate from the beginning and so the mining lobby was satisfied that their interests were protected. Initially, the failed bills and the successful law all included a section stating that mineral interests could not be hampered by the easement without the approval of the mineral interest holder. This would make it easy for the mining industry to retain their original rights and would not change their costs of resource utilization.

In fact this very superiority of mineral estate has caused some uncertainty about the future of easements because it has called into question the appropriate circumstances under which an easement may be terminated. In May, 2007, the Supreme Court of Wyoming decided a case favoring the termination of a conservation easement by Johnson County, the easement holder. The easement was originally donated to the county in 1993 and the donors received federal income tax exemptions as a result of the donation. There was also a third party which owned the mineral rights on the encumbered land. The property was sold to new owners and after some years, the company which owned the mineral estate informed the owners of its intent to begin coalbed methane drilling on the land. The owners contacted the county and requested that the conservation easement be

terminated because the purposes of the easement may no longer be possible, given the presence of the methane drilling activities. The county agreed and the easement was terminated. Another resident of the county sued on the grounds that the easement should be treated as a gift under charitable law and not be allowed to terminate without the permission of the court. The District Court ruled in favor of the county as did the Wyoming Supreme Court on appeal. This case has major implications for the durability of easements because it suggests that the right of a superior interest, such as mining, can allow the nullification of an easement (McLaughlin 2006). Additionally, it is disconcerting in its potential for abuse by those purchasing encumbered land as they may use this type of precedent to seek termination of easements in order to increase the value of the land, which presumably was originally priced in such a way as to reflect its restrictions.

The slow passage of a conservation easement in Wyoming, although much different from that of Pennsylvania, also lends support to my theoretical predictions. Although the data does not reflect a high degree of development pressure in the state of Wyoming as a whole, the high development pressure in certain key areas of the state helps to explain the attempted passage of a conservation easement statute. Additionally, trusts operating in the state had an incentive to push for adoption in order to decrease acquisition costs and make easements more attractive to potential donors/sellers. The initial failure of these efforts can be explained by the presence of an organized anti-conservation easement lobby (farmers and property rights activists), although it was not a lobby that was explored in my empirical work. On the other hand, the inclusion of

special protective language for mineral interests may suggest the strength of the mining lobby and some recognition of their strength by the bills sponsors. It is interesting to note that this accordance given to a particular interest group may threaten the very enforcement strength of easements that these statutes were designed to protect.

4.4.2 Massachusetts: A Legislative Leader

Massachusetts has a long history of land preservation. Abbot (1982) writes “Awareness of the importance and meaning of the natural world comes easy for Massachusetts, home of William Cullen Bryant, Emerson, Thoreau, and F.L. Olmstead.” It was parkways in Boston designed by Olmstead that the first (known) easements were used to protect. Additionally, Massachusetts claims to be home of the land trust movement because of the formation of the Trustees of Reservations in 1891 by landscape architect, Charles Eliot. This first “land trust” was designed in order to hold lands for the use of enjoyment of the public. In 1969, the state became the first to adopt a conservation easement (the state has chosen to use the term “conservation restriction”) enabling statute.

Seller (1982) develops a less rosy idea of the origins of private conservation activity in the Eastern U.S. He notes that “appreciated land values and attractive tax benefits made charitable gifts of land interests more attractive to those facing large income, gift, and estate tax problems.” He also emphasizes the fact that for many wealthy eastern landowners, land is the product of heritage, not a generator of wealth, so that tax

planners have used land donations to protect cash and wealth-generating assets. He notes that many of the trusts in these states have been the product of individuals or groups of friends dedicated to protecting very local familiar places and resources from change. He notes that in the absence of a unifying organization (as the Land Trust Alliance has now become) trusts relied on a few well known conservation easement proponents⁵⁶ and on each other for knowledge about land acquisition.

Because it was the first of its kind, the Massachusetts statute is relatively different than those of other states. The Massachusetts Restriction Statute separately defines conservation, preservation, agricultural preservation, watershed, and affordable housing restrictions. The statute reads that a restriction is a right which shall fall under the statute “whether or not stated in the form of a restriction, easement, covenant, or condition” thus eliminating any confusion about the specific servitude requirements under which the instrument might fall. Marchetti and Cosgrove (2000) claim that the complexity of the act (in combination with the state’s Marketable Title Act) makes Massachusetts “one of the most challenging venues for private conservation.” However, it seems that this same complexity also ensures the public benefit of easements as well as their perpetual enforcement.

The state is unique in its approval process for the creation and termination of conservation restrictions. In order for a restriction deal to close, the restriction must be approved by the Executive Office of Environmental Affairs (EOEA) to ensure that the

⁵⁶ Sellers notes that Whyte’s (1959) *Securing Open Space for America* and Brenneman’s (1967) *Private Approaches to the Preservation of Open Land* were standard references and that Browne’s contributions to *Case Studies in Land Conservation* and his active advisory role all played parts in the early growth of the land trust movement in the East.

restriction provides “public benefit.” Additionally, if the holder is a non-profit entity, municipal approval must also be secured. The same procedure must be followed if the parties wish to terminate an easement. If the easement is held by a government entity, a public hearing and legislative approval are required for the release of the easement. Additionally, if public monies were used to purchase a restriction, if the current residual owner wishes to terminate the easement, he or she must buy back the rights at far market value. According to the EOEI Secretary, the bureau’s approval “affords certain protections for easements in gross and in perpetuity.”⁵⁷ Although not statutorily specified, in its Massachusetts Conservation Restriction Handbook, the Executive Office of Environmental Affairs claims that enforcement of either public or private restrictions falls within the authority of the state’s Attorney General.

It would seem that this set of procedures would leave little room for the IRS to question whether qualifications of perpetuity and public benefit had been met. In fact, the Massachusetts statute seems to be the only statute about which this claim can be made. This is particularly interesting considering that the Massachusetts statute was adopted before section 170(h). A dense state since the growth of Boston in the 19th century, during the 1950s and mid 1960s just before the statute’s passage, Massachusetts was experiencing a loss of farmland at a higher rate than the national average.⁵⁸ Unfortunately, unlike the more recently passed statutes passed in Pennsylvania and Wyoming, there is little available on any legislative debates that might have occurred

⁵⁷ Massachusetts Executive Office of Energy and Environmental Affairs. “Massachusetts Conservation Restrictions.” <http://www.mass.gov/envir/dcs/restrictions/default.htm> (accessed 10/15/2007)

⁵⁸ Calculated using historical farmland data from the USDA Economic Research Service.

within the time of adoption. However, as a densely populated state experiencing farmland loss which already had an active conservation history, it is not surprising that Massachusetts was an early adopter.

5. SUMMARY AND CONCLUSIONS

The adoption of conservation easement enabling statutes, which define conservation easements as real property interests, by forty-nine states represents a significant change in conservation law, which theoretically has implications for the demand and cost of private land protection. The monumental growth in the use of conservation easements makes an examination of this legal change significant. While many within the legal field have claimed that the adoption of conservation easement enabling laws resulted from increased demand for easement use in an inefficient legal environment, no thorough effort has been made to examine the adoption of these statutes.

Dana and Ramsey (1989) and Squires (2000) argue that without enabling statutes, conservation easements would be unenforceable under strict common law interpretation. They believe that public demand for private conservation efforts led the states to recognize the importance of legislative support for expanded legal protection of conservation easements. However, the fact that some states had significant land trust activity and many conservation easements prior to enabling statute adoption is not accounted for. Additionally, the relationship between state laws and federal tax laws governing easement donation has been largely ignored. While there is a growing body of economic literature on conservation easements and land trusts, little attention has been given to state enabling laws. Parker (2004) finds that the presence of an enabling statute within a state does not significantly influence a land trust's decision to choose conservation easements over outright land purchases, challenging the claim that these statutes were necessary for expanded conservation easement use by land trusts.

The primary objective of this thesis has been to examine the driving forces behind the adoption of enabling statutes and reasons states chose to adopt at different times. Chapter 2 began with an examination of conservation easement characteristics and their place in the common law of servitudes. While conservation easements are meant to restrict certain land uses in perpetuity in order to provide public benefit, the common law of servitudes largely discourages perpetual land restrictions except by landowning neighbors who receive benefits from such restrictions. I found theoretical support for the idea that the statutes eliminate the courts' ability to not enforce conservation easements simply because they fall outside the scope of traditional servitude law. Conservation easement enabling statutes, particularly those similar to the Uniform Conservation Easement Act, eliminate many rules of servitude law that discourage perpetual negative rights. Although land trusts in some states negotiated contracts to satisfy the common law requirements, it is possible that this placed an unnecessarily costly burden on the trusts and may have discouraged potential donors.

I next examined the federal tax law regarding the deductibility of donations of real property and found some support for the idea that statute presence changed perceptions of legal certainty of deductibility and thus encouraged easement donations. Legal historians familiar with the evolution of the tax law regarding donations of less than fee interests all note that the nearly two decades in which the tax laws were debated and changed marked a period of uncertainty for the private conservation community. The introduction of new language in the tax laws made land trust counsels hesitant about the qualifications necessary for landowners to deduct the value of donated conservation

easements from their adjusted gross income. Therefore, explicit legislative support may have eased some of these fears and encouraged easement use.

In Chapter 4, I developed a model of landowner allocation of land with multiple attributes, in order to examine different incentives for change in easement law. I began by illustrating how in a first-best outcome, specialized ownership of each land attribute results in an allocation of land at which the marginal values of competing land uses are equal. I then extend this model to examine how allocation results differ under amenity market failure, landowner incentive to shirk from conservation easements, and with potential income tax benefits from increased allocation to amenity production. I then draw on the results of Becker's (1983) theory of interest group competition to examine demand for legal change given variation in interest group strength. My model predicts that the probability of statute presence in a state is increased by the following: increasing deadweight losses associated with amenity market failure (unmet public demand for conservation easements), increased shirking incentives and enforcement costs the under common law, increased taxable income, and strong pro-conservation easement interest group presence in a state.

Chapter 5 tested the hypotheses derived from the conservation easement literature and from my theoretical model using state-level data meant to proxy for conservation demand, and political factors. I began with a discussion of the data and its limitations. In order to provide a preliminary test of my predictions, I conducted two simple differences of means tests. The first tested the significance of the difference of the means of states with statutes and states without statutes. The second tested only the difference of means

for those states which adopted between 1980 and 1990 and tested the difference of means in the time periods before and after adoption. I found that those variables I expected to be associated with increased conservation demand had higher means in those states with statutes and in the time period after statute adoption, lending support to the idea that public demand increases the likelihood of statute adoption. Additionally, those political variables which I expected to facilitate statute adoption were higher in states with statutes and higher in the later time period for adopting states.

I next used two different probit models to examine the magnitude and significance of these demand and political variables on the probability of a statute adoption. These results lent much more support to the political drivers of adoption. Variables capturing the adoption choice of nearby states were positive and significant in these models and the tax base variable was positive and sometimes significant. The variables capturing anti-conservation interest group (mining industry) presence were consistently negative and significant. On the other hand, almost all demand variables were found to be insignificant determinants of statute adoption. There were, however, two significant limitations to this aspect of my analysis. The first was my inability to quantify common law enforcement of conservation easements within each state. The second was a result of the scale at which I collected data to reflect demand and costs of private conservation; while the analysis was of state level demand, both more localized and more regional variables might better captured demand.

Because of these limitations, I also conducted more qualitative research on adoption in three key states: Massachusetts, the first state to adopt an enabling statute,

and Pennsylvania and Wyoming, the last two states to adopt. These case studies enriched and expanded my quantitative analysis. I found that although these three states were very different, they largely supported my hypotheses. Massachusetts has a long history of private conservation efforts as well as a population and a legislature which have supported the passage of other conservation laws. Pennsylvania also had high demand for private conservation, particularly of farmland and so the state developed an active land trust community. However, the passage of a conservation easement was continually delayed by mining and utility interests. It was not until these interests were given certain statutory allowances that an enabling law was successfully passed. A study of Wyoming illustrated how state-level variables may not adequately reflect conservation easement demand within a state. Land trust activity within the state was confined to two primary areas within the state and the inability of these trusts to organize for political action coupled with significant resistance by certain interests within the state led to a much later statute adoption.

Recall that this thesis set out to explain the primary forces behind statute adoption and to explain the variation in the timing of adoption across the states. Although my thesis did not definitively prove that common law impediments created a real amenity market failure by preventing beneficial delineation and transfer of rights, I found no evidence to reject the idea that land trusts exert unnecessary caution in transacting in a state without a statute because they perceive high legal uncertainty. Consequently, an efficient evolution hypothesis cannot be rejected. The mixed results of my empirical analysis of private conservation demand are not enough to verify or reject a Dana and

Ramsey explanation of statute adoption. I did find significant quantitative and qualitative support for a Becker-like result of competing interest group determination of statute adoption. This may suggest an interest group preference for seeking legal change through legislative rather than judicial means. The model also showed significant support for the idea that a state's choice to adopt is driven by the choices of surrounding states. However, it remains unclear whether the strength of these neighboring variables reflects a political contagion effect, a regional demand for conservation, or lowered lobbying cost for pro-conservation interest groups.

This thesis leaves some puzzles which may be better explained by further research. One of these puzzles is the variation in statutory language across states and whether these language differences have any effect on the perception of legal certainty for different parties. Although this issue was not directly examined in my thesis, the Wyoming case study in particular seems to raise important questions about the consequences of the legal equilibrium arising from interest group competition and bargaining. Future research examining the legal enforcement effects of conservation easement statutes may further elucidate the role of these statutes in the perpetual enforcement of conservation easements. Additionally, because the IRS has begun to more aggressively audit conservation easement deductions, an empirical study on the relationship between percent of qualifying easements and state statutes may provide important information on their relationship to the federal tax code.

Many aspects of this thesis could be improved upon and expanded. Although simple, the theoretical model of landowner allocation could be used to examine the

effects of different property regimes, such as ownership by a trust with an agricultural lease. Additionally, my empirical work on conservation demand and costs raises interesting issues about the appropriate scale(s) at which variables should be captured. Much work could be improving such measures. Lastly, and perhaps most importantly, my thesis exposed the difficulty of examining and quantifying state-level judicial patterns in common law interpretation and their effect on perceptions of legal uncertainty. A method for examining the legal status quo would improve the ability of economists to study the efficiency of institutional change.

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APPENDICES

APPENDIX A: DATA

Table A1: Data Sources

Dependent Variable	Definition	Source
CE	Dummy=1 if state has CE statute	Modified from Squires 2000 Tables 4.2 and 4.3
Independent Variables		
Conservation Demand Variables		
INCOME	Per capita income (2000 \$) in thousands of \$	U.S. Census Bureau
DENSITY	Population per square mile	Calculated (DENSITY=POPULATION/AREA)
CITIES	Percent of population in cities over 250,000 people	U.S. Census Bureau
POP_CH	Percent change in population from previous decade	U.S. Census Bureau
PUBLIC	Percent of land owned by the state or federal government	Statistical Abstract of the U.S.
PARKS	Percent of state land in parks	Statistical Abstract of the U.S.
FARMDROP	Percent decrease in farmland from previous decade	USDA Economic Research Service
URBAN_CH	Percent change in urban land from previous decade	USDA Economic Research Service
SPECIES	Number of federally listed threatened and endangered species	Compiled using USFWS Threatened and Endangered Species database System
FV_LAG	Per acre retail value of farmland in previous decade	USDA Economic Research Service
Political Variables		
BORDERWT	Proportion of bordering states with a statute weighted by population	created
CIRCUIT	Proportion of states within federal judicial district with statute	created using www.uscourts.gov
REGION	Proportion of states within U.S. Census geographic region with statute	created using http://www.census.gov/geo/www/us_regdiv.pdf
DEM	Percent voting for the Democratic candidate in last presidential election	Office of the Clerk, "Statistics of the Presidential and Congressional Election"
MINING_INC	Percent of state GDP derived from mining	Bureau of Economic Analysis
MINING_EMP	Percent of state employment derived from mining	Bureau of Economic Analysis
TNC_LAG	Conservation acres held by TNC in previous decade	The Nature Conservancy
TAXES	Net federal income taxes collected per capita in thousands of \$	Bureau of Economic Analysis
Control Variables		
POP	Total Population in one hundred thousands	U.S. Census Bureau
COLLEGE	Percent of population with a Bachelor's degree or higher	Statistical Abstract of the U.S.
AREA	Land Area in thousands of square miles	U.S. Census Bureau
YR_DUMMY	Dummy=1 if year is 1990	created

Table A2: State Statute Codes

State	Current Statute Citation
Alabama	Code 35-18-1 et seq.
Alaska	Stat. 34.17.010 et seq.
Arizona	Rev. Stat. 33-271 et seq.
Arkansas	Code Ann. 15-20-401 et seq.
California	Civil Code 815 et seq.
Colorado	Rev Stat. 30.5
Connecticut	Gen. Stat. Ann. 47.42a et seq.
Delaware	Code 7 6901 et seq.
Florida	Stat. Ann. 40 sec. 740.06
Georgia	Official Code Ann. 44-10-1 et seq.
Hawaii	Rev. Stat. 98-1 et seq.
Idaho	Code 55-2101 et seq.
Illinois	Comp. Stat.c. 30 sec. 401 et seq.
Indiana	Code 32-5-2.6-1 et seq.
Iowa	Code 475A.1 et seq.
Kansas	Stat. Ann. 58-3810 et seq.
Kentucky	Rev. Stat. 382.800 et seq.
Louisiana	Rev. Stat. 1271 et seq.
Maine	Rev. Stat. Ann. 476 et seq.
Maryland	Ann. Code Real Property2-118
Massachusetts	Ann. Laws c. 184, sec. 31 et seq.
Michigan	Comp. Laws 399.251 et seq.
Minnesota	Stat. Ann. 84C.01 et seq.
Mississippi	Code 89-19-1 et seq.
Missouri	Rev. Stat. Ann. 477.45 et seq.
Montana	Code 76-6-101 et seq.
Nebraska	Rev. Stat. 76-6-101 et seq.
Nevada	Rev. Stat. 111.390 et seq.
New Hampshire	Rev. Stat. Ann. 477.45 et seq.
New Jersey	Stat.13:8B-1 et seq.
New Mexico	Stat. Ann. 47-12-1 et seq.
New York	Environ. Cons. Laws 49-0301 et seq.
North Carolina	Con. Stat. 106-735 et seq.
North Dakota	
Ohio	Rev. Code 5301.67 et seq.
Oklahoma	60 Okl.St.Ann. 49.1 et seq.
Oregon	Rev. Stat. 271-719 et seq.
Pennsylvania	Con. Stat. Ann. 32 P.S. 5051 et seq.
Rhode Island	Gen. Laws 34-39-1 et seq.
South Carolina	Code 27-8-10 et seq.
South Dakota	Codified Laws 1-19B-56 et seq.
Tennessee	Code 11-15-101 et seq.
Texas	Natural Resources Code 183.001 et seq.
Utah	Code 57-18-1 et seq.
Vermont	Stat. 34 sec. 821 et seq.
Virginia	Code 10.1-1009 et seq.
Washington	Rev. Code Ann. 64.04.130 et seq.
West Virginia	Rev. Code 20.12.1 et seq.
Wisconsin	Stat. Ann. 700.40
Wyoming	W.S.1977 34-1-201 et seq.

Table A3: U.S. Census Regions

U.S. Census Region	State
Pacific	Alaska California Hawaii Oregon Washington
Mountain	Arizona Colorado Idaho Montana New Mexico Nevada Utah Wyoming
West North Central	Kansas Iowa Minnesota Missouri Nebraska North Dakota South Dakota
West South Central	Arkansas Louisiana Oklahoma Texas
East North Central	Illinois Indiana Ohio Michigan Wisconsin
East South Central	Alabama Kentucky Mississippi Tennessee
Middle Atlantic	New York New Jersey Pennsylvania
New England	Connecticut Massachusetts Maine New Hampshire Rhode Island Vermont
South Atlantic	Delaware Florida Georgia Maryland North Carolina South Carolina Virginia West Virginia

Table A4: U.S. Federal Court Circuits

Federal Circuit	States
1	Maine Massachusetts New Hampshire Rhode Island
2	Connecticut New York Vermont
3	Delaware New Jersey Pennsylvania
4	Maryland North Carolina South Carolina Virginia West Virginia
5	Louisiana Mississippi Texas
6	Kentucky Michigan Ohio Tennessee
7	Illinois Indiana Wisconsin
8	Arkansas Missouri Iowa Minnesota North Dakota South Dakota Nebraska
9	Alaska Arizona California Hawaii Idaho Montana Nevada Oregon Washington
10	Colorado Utah Wyoming New Mexico Kansas Oklahoma
11	Alabama Florida Georgia

Table A5: Summary Statistics for 1980, 1990 and 1980-1990

Variable Name	1980 (n=48)		1990 (n=48)		Combined years (n=96)	
	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev
CE	0.38	0.49	0.83	0.38	0.60	0.49
CIRCUIT	0.36	0.25	0.83	0.22	0.60	0.33
POP	46.78	47.46	51.34	55.06	49.06	51.18
AREA	61.65	46.81	61.65	46.81	61.65	46.56
DENSITY	158.18	226.15	169.44	238.89	163.81	231.45
PUBLIC	15.47	20.18	15.08	20.05	15.27	20.01
PARKS	0.82	1.41	0.88	1.43	0.85	1.41
FARMDROP	8.47	6.26	17.80	12.89	13.14	11.11
CITIES	11.02	11.64	11.21	11.65	11.12	11.58
INCOME	17.87	2.42	22.58	3.52	20.22	3.83
MINING_INC	2.38	3.64	1.20	2.13	1.79	3.03
MANUF_INC	17.01	6.63	13.32	5.00	15.17	6.13
MINING_EMP	1.63	2.59	1.05	1.55	1.34	2.14
COLLEGE	15.90	2.87	19.62	3.77	17.76	3.82
DEM	39.36	7.88	44.30	5.37	41.83	7.15
URBAN_LAND	5.00	6.85	5.82	7.60	5.41	7.21
URBAN_CH	319.79	304.84	212.62	246.82	266.20	281.10
TNC_LAG	3,393.39	6,613.60	32,285.59	48,441.39	17,839.49	37,329.07
SPECIES	6.54	7.89	12.35	11.68	9.45	10.34
TAXES	1.20	0.26	1.97	0.49	1.58	0.55
BORDERWT	0.38	0.32	0.85	0.21	0.62	0.36
REGION	0.36	0.26	0.83	0.12	0.60	0.31
POP_CH	15.75	14.42	8.71	10.97	12.23	13.22
FV_LAG	288.58	217.80	900.25	594.24	594.42	541.01

*Alaska and Hawaii are not included

Table A6: Correlation Matrix of Exogenous Variables

	ce	income	density	cities	pop_ch	public	parks	species	farmdrop	urban_ch	farm_value	borderwt	circuit	region
ce	1													
income	0.4915	1												
density	0.3206	0.4826	1											
cities	-0.0586	0.1719	-0.0668	1										
pop_ch	-0.1087	-0.0805	-0.2679	0.1447	1									
public	-0.0453	0.0063	-0.3306	0.0364	0.6523	1								
parks	0.2828	0.4844	0.8113	-0.1567	-0.1978	-0.2453	1							
species	0.0974	0.1479	-0.1482	0.4183	0.2731	0.2115	-0.169	1						
farmdrop	0.2864	0.2532	0.1049	-0.1392	-0.0938	-0.2523	0.1636	0.1958	1					
urban_ch	-0.0073	-0.0506	-0.0431	0.502	0.3182	-0.0428	-0.086	0.5686	0.0228	1				
farm_value	0.4854	0.7226	0.6575	-0.1071	-0.3414	-0.3334	0.5378	0.07	0.3498	-0.1051	1			
borderwt	0.2786	0.3678	-0.0127	-0.1553	-0.0862	0.083	-0.0574	0.1664	0.3639	-0.2071	0.3603	1		
circuit	0.6672	0.4931	0.2293	-0.0738	-0.2177	-0.1063	0.1853	0.2267	0.4171	-0.0922	0.5405	0.6572	1	
region	0.6197	0.5969	0.222	-0.1227	-0.2275	-0.077	0.2268	0.1571	0.4641	-0.1621	0.5724	0.6493	0.7641	1
dem	0.268	0.2422	0.2759	0.0625	-0.4633	-0.4427	0.1628	0.0304	0.2042	0.0451	0.4019	0.2398	0.4456	0.3826
mining_inc	-0.4282	-0.2311	-0.2611	-0.0351	0.2111	0.2411	-0.1971	-0.0411	-0.1971	-0.0388	-0.3504	-0.1824	-0.3299	-0.3399
mining_emp	-0.4341	-0.2166	-0.2865	0.0115	0.1933	0.2156	-0.2228	-0.0287	-0.1883	-0.0224	-0.3369	-0.1578	-0.3247	-0.3215
tnc_lag	0.1927	0.2131	-0.083	0.1951	0.0082	0.061	-0.0893	0.3597	0.234	0.1359	0.0468	0.2038	0.233	0.3045
taxes	0.4932	0.971	0.433	0.144	-0.0791	-0.0213	0.4415	0.1884	0.313	-0.0473	0.7432	0.4226	0.5362	0.6282
pop	0.1652	0.323	0.1975	0.5685	-0.0351	-0.1109	0.0969	0.5067	0.1004	0.6862	0.2158	-0.072	0.1072	0.0769
area	-0.1394	-0.1057	-0.4869	0.4536	0.3706	0.458	-0.4502	0.3997	-0.3706	0.4749	-0.4127	-0.1434	-0.2152	-0.2519
college	0.4331	0.7809	0.3471	0.1428	0.0176	0.1255	0.4441	0.0782	0.2079	-0.083	0.4698	0.2334	0.3144	0.5137
_dummy	0.4686	0.6189	0.0244	0.0081	-0.2677	-0.011	0.0183	0.2826	0.422	-0.1916	0.5683	0.6648	0.711	0.7601
	dem	mining_inc	mining_emp	tnc_lag	taxes	pop	area	college	_dummy					
dem	1													
mining_inc	-0.2305	1												
mining_emp	-0.213	0.982	1											
tnc_lag	0.1497	-0.0966	-0.064	1										
taxes	0.265	-0.1893	-0.1628	0.2219	1									
pop	0.1919	-0.1827	-0.1775	0.2723	0.2706	1								
area	-0.2389	0.261	0.3001	0.2799	-0.0999	0.2962	1							
college	0.0706	-0.2215	-0.207	0.289	0.7338	0.1389	0.0224	1						
_dummy	0.3468	-0.1953	-0.1359	0.389	0.7014	0.0448	0	0.49	1					

APPENDIX B: POOLED PROBIT SPECIFICATIONS

Table B1: Probit Parameter Estimates and Marginal Effects (1980-1990)

Exogenous Variables	(1)		(2)	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Constant	-3.163** (1.441)		-2.770* (1.555)	
Conservation Demand Variables				
Income	0.134 (.084)	0.045 (.028)	0.065 (.097)	.020 (.031)
Density	0.002 (.002)	0.0007 (.0008)	0.003 (.003)	.001 (.0008)
Percent of pop in cities	-0.019 (.017)	-0.006 (.006)	-0.023 (.020)	-.007 (.006)
Percent change in population			0.019 (.020)	.006 (.006)
Public land			0.007 (.013)	.002 (.004)
National parks	0.068 (.323)	0.023 (.108)	0.119 (.352)	.037 (.110)
Endangered species	0.005 (.020)	0.002 (.007)	-0.024 (.024)	-.008 (.008)
Percent decrease in farmland	0.009 (.020)	0.003 (.007)	0.007 (.022)	.002 (.007)
Percent change in urban land			0.001 (.0009)	.0004 (.0003)
Farmland value (lag)	0.629 (.800)	0.211 (.195)	1.006 (.914)	.316 (.282)
Political Variables				
Circuit				
Region				
Percent voting Dem				
Percent of state income from mining				
Percent of employment from mining				
Conservation acres held by TNC (lag)				
Net personal federal income tax				
Control Variables				
Population				
Land Area				
% of pop with college				
Year dummy	0.595 (.545)	0.198 (.180)	1.310* (.697)	.397 (.192)
Goodness of Fit				
Log-likelihood		-42.376		-39.670
McFadden's R-Square		0.342		.384
McFadden's Adjusted R-Square		0.203		.198
Predicted Probability (Observed probability is .604)		.721		0.754

Standard errors are reported in parenthesis.

* indicates significance at the 10% level for a 1-tailed test, ** indicates significance at the 5% level, and *** indicates significance at the 1% level

Table B1 (continued)

Exogenous Variables	(3)		(4)	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Constant	-3.966* (1.638)		-3.341* (1.842)	
Conservation Demand Variables				
Income	0.044 (.102)	.013 (.031)	-0.018 (.120)	-.005 (.035)
Density	0.004 (.004)	.001 (.001)	0.004 (.004)	.001 (.001)
Percent of pop in cities	-0.028 (.020)	-.008 (.006)	-0.031 (.022)	-.009 (.006)
Percent change in population			0.021 (.024)	.006 (.007)
Public land			0.004 (.015)	.001 (.004)
National parks	-.002 (.380)	-.0005 (.116)	-0.001 (.389)	-.0004 (.113)
Endangered species	0.002 (.022)	.0005 (.007)	-0.019 (.025)	-.005 (.008)
Percent decrease in farmland	0.017 (.024)	.005 (.008)	0.006 (.027)	.002 (.008)
Percent change in urban land			0.001 (.001)	.0003 (.0004)
Farmland value (lag)	1.238 (.971)	.376 (.279)	1.325 (1.036)	.386 (.289)
Political Variables				
Circuit				
Region				
Percent voting Dem				
Percent of state income from mining				
Percent of employment from mining				
Conservation acres held by TNC (lag)				
Net personal federal income tax				
Control Variables				
Population	-0.001 (.007)	-.0004 (.002)	0.0003 (.009)	.00008 (.003)
Land Area	0.007 (.007)	.002 (.002)	0.002 (.008)	.0005 (.002)
% of pop with college	0.114 (.075)	.035 (.023)	0.123 (.078)	.036 (.023)
Year dummy	0.348 (.666)	.106 (.206)	1.143 (.847)	.327 (.243)
Goodness of Fit				
Log-likelihood		-40.008		-38.185
McFadden's R-Square		0.3792		.407
McFadden's Adjusted R-Square		0.193		.175
Predicted Probability (Observed probability is .604)		0.769		0.785

Table B1 (continued)

Exogenous Variables	(5)		(6)	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Constant	0.579 (3.26)		0.556 (4.025)	
Conservation Demand Variables				
Income	-0.469 (.311)	-.156 (.104)	-0.822** (.408)	-.258** (.127)
Density	0.004 (.004)	.001 (.001)	0.002 (.005)	.0008 (.001)
Percent of pop in cities	-0.042 (.026)	-.014 (.008)	-0.021 (.030)	-.007 (.009)
Percent change in population				
Public land				
National parks	0.013 (.440)	.004 (.147)	-0.105 (.483)	-.033 (.152)
Endangered species	-0.019 (.026)	-.006 (.009)	-0.030 (.027)	-.009 (.009)
Percent decrease in farmland	0.030 (.032)	.010 (.011)	-0.005 (.035)	-.001 (.010)
Percent change in urban land				
Farmland value (lag)	0.459 (1.059)	.153 (.352)	1.688 (1.692)	.530 (.525)
Political Variables				
Weighted border states	-0.764 (.762)	-.255 (.256)		
Circuit			4.649** (1.405)	1.460** (.509)
Region				
Percent voting Dem	0.007 (.034)	.002 (.011)	-0.016 (.042)	-.005 (.013)
Percent of state income from mining				
Percent of employment from mining	-0.779** (.283)	-.260** (.114)	-0.830** (.355)	-.261** (.134)
Conservation acres held by TNC (lag)	-4.50E-7 (6.58E-6)	-1.50E-07 (2.20E-6)	2.27E-6 (7.70E-6)	7.13E-07 (.290)
Net personal federal income tax	3.976* (2.125)	1.325* (.070)	6.178** (3.14)	1.941** (.939)
Control Variables				
Population				
Land Area	0.017** (.008)	.006** (.003)	0.023** (.009)	.007** (.003)
% of pop with college	0.132 (.111)	.044 (.037)	0.271** (.129)	.085** (.004)
Year dummy	0.749 (.977)	.246 (.316)	-2.110 (1.304)	-.602 (.291)
Goodness of Fit				
Log-likelihood		-30.553		-22.670
McFadden's R-Square		0.526		0.648
McFadden's Adjusted R-Square		0.278		0.4
Predicted Probability (Observed probability is .604)*		0.726		0.755

Table B1 (continued)

Exogenous Variables	(7)		(8)	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Constant	0.892 (3.38)		-6.207** (2.592)	
Conservation Demand Variables				
Income	-0.543* (.327)	-.187 (.110)		
Density	0.004 (.004)	.001 (.001)	0.001 (.003)	.0004 (.001)
Percent of pop in cities	-0.026 (.026)	-.009 (.008)	-0.027 (.025)	-.009 (.009)
Percent change in population Public land				
National parks	-0.125 (.406)	-.043 (.140)	0.005 (.394)	.002 (.002)
Endangered species	-0.021 (.026)	-.007 (.009)	-0.023 (.028)	-.008 (.009)
Percent decrease in farmland	0.008 (.029)	.003 (.010)	0.018 (.030)	.006 (.010)
Percent change in urban land				
Farmland value (lag)	0.981 (1.228)	.337 (.415)	0.881 (1.258)	.297 (.415)
Political Variables				
Weighted border states				
Circuit			3.950** (1.171)	1.333** (.433)
Region	3.007** (1.415)	1.034** (.513)		
Percent voting Dem	-0.012 (.040)	-.004 (.014)	0.004 (.038)	.002 (.013)
Percent of state income from mining				
Percent of employment from mining	-0.686** (.268)	-.236** (.105)	-0.470 (.264)	-.159* (.102)
Conservation acres held by TNC (lag)	-2.75E-6 (6.09E-6)	-9.46E-07 (2.11E-6)	2.08E-6 (7.31E-6)	7.03E-07 (2.45E-6)
Net personal federal income tax	4.049* (2.289)	1.392* (.761)	0.716 (.997)	.242 (.332)
Control Variables				
Population				
Land Area	0.022** (.008)	.008** (.003)	0.019** (.009)	.006** (.003)
% of pop with college	0.114 (.110)	.039 (.037)	0.152 (.094)	.051 (.031)
Year dummy	-0.488 (1.025)	-.167 (.343)	-1.190 (1.029)	-.386 (.300)
Goodness of Fit				
Log-likelihood		-28.339		-25.408
McFadden's R-Square		0.56		0.611
McFadden's Adjusted R-Square		0.312		0.379
Predicted Probability (Observed probability is .604)*		0.707		0.719

Table B1 (continued)

Exogenous Variables	(9)		(10)	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Constant	-6.295** (2.591)		2.903 (4.000)	
Conservation Demand Variables				
Income			-.516 (.421)	-.142 (.102)
Density	0.001 (.003)	.0004 (.001)	-.0003 (.006)	-.002 (.04)
Percent of pop in cities	-0.027 (.026)	-.009 (.009)		
Percent change in population				
Public land				
National parks	-0.002 (.392)	-.0008 (.131)	-.324 (.348)	-.089 (.098)
Endangered species	-0.019 (.027)	-.006 (.009)		
Percent decrease in farmland	0.018 (.029)	.006 (.010)	-.017 (.027)	-.005 (.007)
Percent change in urban land				
Farmland value (lag)	0.0009 (.001)	.0003 (.0004)	-.707 (1.198)	-.195 (.336)
Political Variables				
Weighted border states			-3.642** (1.349)	-1.003** (.405)
Circuit	4.083*** (1.160)	1.368*** (.433)	5.115** (1.527)	1.408** (.431)
Region			2.559* (1.377)	.704* (.398)
Percent voting Dem	0.003 (.039)	.001 (.013)	-.044 (.039)	-.012 (.001)
Percent of state income from mining	-0.310 (.191)	-.104 (.073)		
Percent of employment from mining			-.544** (.268)	-.150** (.086)
Conservation acres held by TNC (lag)	1.68E-6 (7.13E-6)	5.61E-07 (2.37E-6)	2.53E-6 (7.59E-6)	6.98E-7 (2.06E-6)
Net personal federal income tax	0.680 (.994)	.228 (.329)	5.95 (3.90)	1.638 (.886)
Control Variables				
Population				
Land Area	0.017** (.008)	.006** (.003)		
% of pop with college	0.165* (.009)	.055* (.031)		
Year dummy	-1.448 (1.004)	-.459 (.278)	-.515 (1.339)	-.141 (.352)
Goodness of Fit				
Log-likelihood		-25.052		-22.541
McFadden's R-Square		0.606		.650
McFadden's Adjusted R-Square		0.373		.417
Predicted Probability (Observed probability is .604)*		0.723		.805

**APPENDIX C:
MAXIMUM LIKELIHOOD ESTIMATION OF NESTED LOGIT MODEL**

Nested Probit

First stage (1980):

$$y_{1i}^* = x_{1i}\beta_{1i} + \varepsilon_{1i} \quad \varepsilon_{1i} \sim N(0, \sigma^2)$$

$$y_{1i} = \begin{cases} 1 & \text{if } y_{1i}^* > 1 \\ 0 & \text{if } y_{1i}^* \leq 1 \end{cases} \quad i = 1, \dots, 48$$

Second stage (1990):

$$y_{2i}^* = x_{2i}\beta_{2i} + \varepsilon_{2i} \quad \varepsilon_{2i} \sim N(0, \sigma^2)$$

$$y_{2i} = \begin{cases} 1 & \text{if } y_{2i}^* > 1 \\ 0 & \text{if } y_{2i}^* \leq 1 \end{cases} \quad i = 1, \dots, 30$$

$$\text{ML: } \sum_1^{48} \ln \text{prob}(y_{1i} = 1) + \sum_1^{22} \ln \text{prob}(y_{2i} = 1 | y_{1i} = 0) \cdot \text{prob}(y_{1i} = 0) +$$

$$\sum_1^8 \ln \text{prob}(y_{2i} = 0 | y_{1i} = 0) \cdot \text{prob}(y_{1i} = 0)$$

$$\text{ML} = \text{prob}(y_{2i} = 1 \cdot \text{and} \cdot y_{1i} = 0) = \text{prob}(\varepsilon_{1i} < -x_{1i}\beta_{1i}, \varepsilon_{2i} < x_{2i}\beta_{2i}, -\rho)$$