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# Tax Incentives and the Price of Conservation

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## **Tax Incentives and the Price of Conservation\***

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**Abstract:** We study the role of tax incentives in promoting a fast growing and novel type of conservation: voluntary, permanent restrictions on private land use through conservation easements. Originating in the US but expanding internationally, easements are a leading example of decentralized conservation. In the US, easements represent the largest charitable gift on a per-donation basis, but skeptics wonder if their tax preference merely subsidizes wealthy landowners rather than inducing conservation. We incorporate federal and state income tax codes into a calculator to quantify the after-tax donation price and demonstrate its sensitivity to landowner income and state and federal policies. Using a 1987-2012 panel, we measure the response of state-level easements to the price. Our large elasticity estimates, spanning -2.0 to -5.1, indicate that tax incentives induce conservation and do not merely subsidize it. We find no evidence that generous tax benefits have induced lower-quality donations or *ad hoc* patterns of land conservation.

**Key words:** private provision of public goods, tax incentives, charitable donations, land use, incentive-based conservation, conservation easements, land trusts

**JEL Codes:** H41, H31, L31, Q24

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## I. Introduction

The charitable donation incentive embedded in the income tax codes of many countries is controversial and the extent to which it impacts charitable giving is the subject of debate. According to proponents of the deduction, it provides much-needed motivation for people to give to nonprofits providing public goods in areas of environment, health, and the arts. Critics, however, oppose the substantial subsidies it gives to wealthy donors and doubt that tax considerations actually drive charitable giving.

Economists offer empirical findings relevant to the debate, estimating the responsiveness of giving to changes in the after-tax “price” of donating, often specified as one minus the marginal income tax rate. Although empirical conclusions vary, most studies suggest that donors are quite responsive to tax benefits, with price elasticities usually varying from around -0.5 to -2.0.<sup>1</sup> Elasticities are important because, when they are large, tax policy induces the private provision of public goods at less than a dollar-for-dollar cost, perhaps by leveraging the “warm glow” incentive to donate (Andreoni 1990, Saez 2004, Kotchen 2006).

In this paper, we study a unique and prominent class of charitable donation – the conservation easement – for which tax preference is controversial and becoming more common (Bray 2010, Eagle 2011). Conservation easements are a private and voluntary form of land use zoning. They are legally binding agreements through which landowners give up rights to subdivide and develop rural land but retain rights to farm and manage the land’s natural resources.<sup>2</sup> Through its support of easements, U.S. federal and state tax codes encourage “dead hand control” of land because they require restrictions to be permanent and, unlike other forms of donation, not subject to reversal (Mahoney 2002, McLaughlin 2005). Supporters of conservation easements view the policies as necessary for protecting valuable natural resources on private land, but critics assert that special tax treatment favors wealthy

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<sup>1</sup> A large number of studies estimate the “price” elasticity of giving, measured in dollars, to temporary and persistent changes in the tax code. Peloza and Steel (2005) summarize the range of elasticities in a meta-analysis, which covers 69 studies. The mean elasticity across these studies is -1.44. Studies estimating responses to persistent changes in the tax code using panel data include Randolph (1995) (estimating an elasticity of about -0.5), Auten *et al.* (2002), (a range from -0.4 to -1.26), Bakija *et al.* (2003) (an elasticity of about -2.0), and Bakija and Heim (2011) (an elasticity of about -1). More recent estimates are smaller and highlight ongoing debate about estimation techniques (see Hungerman and Wilhelm 2016, Backus and Grant 2016). Elasticity estimates are important, because charitable tax policy is considered “treasury efficient” when elasticities are greater than one (Steinberg 1990).

<sup>2</sup> Conservation easements typically regulate mining, forestry, and agricultural practices. For in-depth legal descriptions, see Korngold (1984) and Dana and Ramsey (1989). For descriptions of the range of easement terms, see Boyd *et al.* (2000), Parker (2004), and Rissman *et al.* (2007). Conservation easements were pioneered in the U.S. but their use has been expanding internationally (Korngold 2010). Most prominently, easements are now in widespread use in Canada (Lawley and Towe 2014, Lawley and Yang 2015).

landowners and may not induce conservation. Critics also note that tax advantaging easements runs counter to Internal Revenue Service policy that otherwise denies deductions for gifts of partial interests in property due to concerns about accurately valuing such interests (Halperin 2011). The exception for conservation easements is made in spite of concerns about the ability and will of easement holders - small, geographically dispersed non-profit organizations known as land trusts - to enforce perpetual easements over the long term.

Our study is timely and important for several reasons. First, on a per-donation basis, conservation easement donations in the US now dwarf in value every other form of charitable giving: works of art, real estate, and money.<sup>3</sup> Second, while easements represent the fastest growing form of land conservation in the United States (see Table 1)—and they are expanding internationally—the impact of tax incentives on growth has not yet been quantified in a comprehensive way.<sup>4</sup> Third, since 2006, federal tax incentives for easement donations have been temporarily high and, since 2000, many states have created generous tax credits for easements. Fourth, the permanence of easements means that patterns of land conservation induced by even temporary changes in tax incentives will have an enduring effect on future land use. Fifth, some have worried that tax-driven easement donations lead to the wrong lands being conserved, because land trusts may respond to *ad hoc* donation opportunities rather than adhering to planning processes (Pidot 2005, Parker 2005, and Wolf 2012). More generally, the decentralized approach to conservation has been criticized for its lack of transparency: the public does not know how much it has paid for easements (through foregone tax revenues) nor does it know what it has received in return (Merlenlender *et al.* 2004, Pidot 2005, and Bray 2010).

Our contribution to the understanding of conservation easements and the tax code can be summarized along two dimensions. First, we quantify the generosity of tax incentives for different landowners in different U.S. states by constructing a conservation income tax

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<sup>3</sup> During the 2000s, the average value of a donated conservation easement was \$491,000 compared to \$163,000 for real estate and land, \$45,000 for stocks and other financial gifts, \$37,000 for intellectual property, and \$7,000 for art and collectibles (Eagle 2011). In aggregate, easements represented 3.4 percent of noncash charitable contributions over 2003-2012 (\$13.7 billion out of \$408 billion). See [www.irs.gov/uac/SOI-Tax-Stats-Special-Studies-on-Individual-Tax-Return-Data#noncash](http://www.irs.gov/uac/SOI-Tax-Stats-Special-Studies-on-Individual-Tax-Return-Data#noncash).

<sup>4</sup> Easements are regionally important in some states but not in others. Easements currently span about one percent of all private land in the U.S., but they cover approximately ten percent of private land in some states (Maine and Vermont) and approximately five percent in others (New Hampshire, Maryland, and Colorado). These statistics are based on author calculations using state-level data on land ownership and easement stocks from the Nature Conservancy and the Land Trust Alliance.

calculator, spanning 1987 to 2012.<sup>5</sup> Conditional on taxpayer-specific information – e.g., income and the value of an easement donation – the calculator generates an estimate of the after-tax “price of conservation.” This price incorporates the relevant aspects of the tax code and is smaller than one minus the taxpayer’s marginal rate because we assume the donated development rights would otherwise generate taxable income. Hence, the tax code provides an extra incentive to donate assets such as land, which need to be sold to consume market goods, as compared to cash.

The calculator reveals sharp variation in the price of conservation over time and across states due to changes in tax policy specifically directed toward easements, and due to changes in federal and state income tax rates and rules about charitable deductions in general. For example, for a landowner with annual income of \$200,000 and an easement donation valued at \$500,000, the price of conservation ranges from a low of \$0.16 per donated dollar (Colorado in 2008) to a high of \$0.56 (in the seven states lacking an income tax in 2003). The calculator also quantifies the sensitivity of this price to landowner income. The highest price of conservation is only \$0.32 if the landowner’s income is \$1 million rather than \$200,000 in the scenario above. We presume that after-tax prices are salient, as the term is used by Chetty et al. (2009) and Chetty and Saez (2009), because information about tax implications is readily available to would-be donors considering large donations of property.

Our second contribution lies in measuring the responsiveness of easement donations to the after-tax price just described. We develop state-level panel data sets, spanning 1987-2012, from a national database of conservation easement holdings by land trusts. Our empirical analysis reveals large responses of easement holdings to changes in the donation price. Characterized as long-run elasticities, our estimates range from around -2.0 to -5.1, based on the percentage change in land trust easement holdings that corresponds to a one percentage change in the donation price. The estimated elasticities are large and support the previously untested assertion that tax incentives have driven land trust conservation.<sup>6</sup> For example, they

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<sup>5</sup> Our calculator is the first that we are aware of to quantify tax savings from easement donations over a long panel, but Sundberg and Dye (2006) estimate tax prices for easement donations based on several cross-sectional scenarios. Other scholars have developed calculators that estimate the price of charitable giving in general (see Bakija 2009, Bakija and Heim 2011, Feenberg and Coutts 1993). The general calculators are not customized to consider tax code features unique to easement donations, which are considered donations of real property with special rules and provisions.

<sup>6</sup> Two recent unpublished studies examine the effects of tax incentives on land conservation, both viewing state tax incentives as homogeneous and binary treatments. Soppelsa (2015) uses matching methods to relate tax treatment to the stock of protected land in the Eastern U.S. Consistent with our results, she finds that counties in treated states have a higher flow of land parcels into protected status. Suter et al. (2014) also treat tax incentives as binary treatment and investigate the effect of such treatment on land trusts, as opposed to donors. They find

imply that federal tax code changes in 2006, which lowered the price of conservation by 7.5 percent, stimulated an increase of 38.7 percent in the annual flow of easement acres.

We also investigate the impact of tax incentives on the precision and quality of lands conserved. We find suggestive evidence that land trusts will accept donations that they would not choose to purchase. However, we find no evidence that easement donations induced by lower after-tax prices of conservation are inferior in quality to other easement donations.

We begin the analysis in the next section by developing a theory of a landowner's decision to donate an easement. We discuss the empirical counterparts to the theoretical tax regimes in section 3, where we also describe the tax calculator. We describe the data on land trust holdings in section 4, and present empirical estimates of tax elasticities in section 5. In section 6 we simulate the impacts of specific tax policies and test for the effects of tax policy on the precision and quality of land trust conservation.

## **II. A Theory of the Supply of Open Space and the Price of Conservation**

The decision by a landowner to donate a conservation easement constitutes a decision to reallocate the landowner's asset portfolio—between developable and permanently conserved classes—in order to secure a preferred consumption stream. The adjustment in the asset portfolio results in a change in the supply of open space amenities, which are managed by the land trust that accepts the easement. Some land trusts play a more active role on the demand side. They aggregate demands for open space from their monetary donors, they compete for funding from government agencies, and they solve the collective action problems of providing public and club goods (see Cornes 1996, Sundberg 2006) that are to a large extent non-excludable and non-rival. The monetary donations trusts collect from their members are used to fund the purchase of both capital assets (title to land and conservation easements) and variable inputs in the provision of open space amenities.

To understand the effects of tax policy on land conservation, we focus on the supply side described above. We first develop a static theory of the decision problem of landowners that focuses on the tax-influenced price of land conservation. We then develop a dynamic algebraic representation of the price of conservation, which is the conceptual counterpart to the quantitative output of our tax calculator.

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that trusts in states with tax credits are more likely to specialize in holding all-donated easement portfolios of protected land, with no purchased easements. Sundberg (2011) uses a binary variable to identify states with tax credit programs, and he finds increases in easements in those states during the mid 2000s.

## II.A. The Price of Conservation in a Static Setting

Consider an agricultural landowner, depicted in figure 1, who derives utility from market consumption  $W$  (for wealth) and from land conservation  $C$ .<sup>7</sup> The landowner's single asset consists of a parcel of land that generates an annual stream of farm income equal to  $I$ , which has a capitalized value of  $I/r$ . The market value of the land is  $I/r + P$ , where  $P$  represents the value of development rights. The landowner has a once-and-for-all opportunity to restrict development on a portion of the land by placing on that portion a perpetual conservation easement. The conserved portion is either retained and farmed or sold to someone who is allowed only to farm the parcel. The complementary portion of land, which is not restricted, is sold for its full market value.

We take the quantity of  $C$  consumed by the landowner to be the market value of the development rights extinguished by the easement. The value of the developable land sold plus the present value of farm income on the remainder represents the wealth available to purchase market goods and services. In a world without taxes, the budget constraint for the landowner is:

$$(1) W + C = P + I/r, \quad C \leq P.$$

The inequality in (1) indicates that conservation is available only up to  $P$ , the value of the parcel's development rights.

This concept of conservation implies that while landowner utility increases with both conservation and consumption of market goods and services, conservation is measured as the dollar value of development rights extinguished. Assuming that  $P$  increases with the likelihood of development, this means that extinguishing development rights on an acre yields higher utility in locales where development is most imminent.<sup>8</sup> As indicated in the diagram, in Regime 1 without taxes the tradeoff of wealth for conservation is one-for-one. The implicit price of conservation in terms of foregone market consumption is  $P_C = 1$ .

Regime 2 introduces a proportional tax on income at the rate  $\tau$ . Taxable income is generated either by the sale of land or by farm earnings. Conservation is shielded from tax because it represents potential market income permanently withheld from sale. Under the

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<sup>7</sup> Conservation here stands for any use of land that does not require development and building, e.g. agriculture and forestry.

<sup>8</sup> A parcel that will never come under development pressure cannot be conserved in this framework. The development rights to the parcel have no market value, reflecting the fact that no action need be taken to keep the parcel in its current undeveloped use. In contrast, an agricultural parcel at the rural-urban interface will have high-value development rights, reflecting the likelihood of development absent intervention.



tax, the budget constraint facing the landowner becomes:

$$(2) W + C = P + I/r - \tau(P + I/r - C), \quad C \leq P.$$

Equation (2) can be rewritten as:

$$(3) W + (1 - \tau)C = (1 - \tau)(P + I/r), \quad C \leq P.$$

Equation (3) displays the income effect of the tax on the right-hand side and the change in the relative price of conservation on the left. Now,  $P_C = (1 - \tau)$ . Figure 1 is drawn with  $\tau = 0.3$ , implying that  $P_C = 0.7$ . The indifference curve reflecting landowner preferences is omitted in the second panel and in what follows in order to focus on changes in the budget constraint and the price of conservation.

Regime 3 introduces the deductibility of charitable contributions. The U.S. federal income tax code and most state income tax codes consider donations of conservation easements to be charitable deductions, thus deductible with certain limitations.<sup>9</sup> This constitutes a tax advantage beyond the shielding of  $C$  consumption from tax seen in Regime 2. The budget constraint in Regime 3 is:

$$(4) W + C = P + I/r - \tau(P + I/r - C - C), \quad C \leq P$$

or

$$(5) W + (1 - 2\tau)C = (1 - \tau)(P + I/r), \quad C \leq P.$$

In the figure and in equation (5) there are no limits on the deductibility of charitable

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<sup>9</sup> In the theory here and the empirical counterpart below, we focus on income taxes and do not consider the potential capital gains tax benefits from donating easements. As discussed in Sundberg and Dye (2006), taxation of the sale of appreciated property can be affected by the donation of easements. If one sells property unencumbered by an easement one typically owes capital gains tax (currently at a 15% rate) on the difference between the property's sale price and the owner's adjusted basis (initial purchase price plus subsequent improvements.) If, before selling, one restricts development on the property through an easement, the reduced sales price – with basis apportioned according to the fraction of the sale price to the unencumbered price – reduces the owner's exposure to capital gains tax. Because of this, the capital gains tax can provide an incentive to donate in addition to those provided by the income tax.

We abstract from capital gains considerations for three reasons. The first is our desire to focus on land conservation incentives provided by the federal and state income tax codes. Of particular interest are state income tax credits for easements, which are passed with the intent of increasing easement donations. In fact, the empirical variation in our measure of donation incentives is driven in large part by these state-level income tax credits. Second, capital gains are often delayed many years, which tends to reduce the importance of their incentives in the disposition of development rights. Third, while the income tax implications of donating depend only on a potential donor's income and easement value, the capital gains implications depend on highly situation-dependent circumstances of liquidity and estate planning. For example, certain estate planning strategies eliminate the capital gains tax incentive to donate due to stepped up basis. Heirs of appreciated property are typically allowed a step up in basis to the fair market value of the property at the time of inheritance; heirs then pay no capital gains tax upon selling the property immediately after inheritance. A landowner who follows this strategy of leaving appreciated land to their heirs has effectively by-passed the capital gains tax and, therefore, eliminated the capital gains tax benefits that might otherwise flow from the placement of a conservation easement on the land.

contributions from taxable income. (The current federal tax code, and our empirical tax calculator, recognizes the limitation that charitable contribution deductions cannot exceed 30% of adjusted gross income.) In Regime 3, the price of conservation can be seen to decrease again to  $P_C = (1 - 2\tau)$ . Note this price is smaller than one minus the marginal rate because we assume the donated asset,  $P$ , would otherwise generate taxable income through immediate sale to a developer. This is an important difference between our price of a donation and much of the literature, which considers the price of donating cash that has presumably already been taxed when it was generated by labor or capital.

Lastly, Regime 4 introduces a conservation tax credit, which mimics the credit programs that a number of states have adopted: donating an easement creates a credit payable against taxes in the amount of  $\delta C$ . The landowner's budget constraint becomes:

$$(6) W + C = P + I/r - \tau(P + I/r - C - C) + \delta C, \quad C \leq P$$

or

$$(7) W + (1 - 2\tau - \delta)C = (1 - \tau)(P + I/r), \quad C \leq P.$$

In regime 4,  $P_C = (1 - 2\tau - \delta)$ . With  $\tau = 0.30$  and  $\delta = 0.25$ , the implied price of conservation is  $P_C = (1 - 2 \times 0.30 - 0.25) = 0.15$ , as illustrated in the figure. With high enough marginal tax rates and tax credit rates, the price of conservation can become negative, indicating that a landowner will encumber his land with easements even with no preference for land conservation—the kink in regime 4 is optimal for any landowner for whom utility is non-decreasing in  $C$  and  $W$ .

Empirical predictions of the effects of tax code changes follow from the implied changes in the price of conservation and income. Consider the separate effects of changes in  $\tau$  and  $\delta$ . An increase in  $\tau$  rotates the budget line counter-clockwise as shown in the move from regime 1 to regime 2 in figure 1. The increase in the tax rate will affect  $C$  positively through the decrease in  $P_C$  and negatively to the extent that the income elasticity of demand for  $C$  is positive. While these effects are partially offsetting, an increase in only the marginal rate in a progressive tax code would primarily have a price effect and could be expected to increase  $C$  consumption, hence, conservation easement donations. An increase in  $\delta$ , while also reducing the price of conservation, has no effect on potential market income ( $P + I/r$ ): a counterclockwise rotation of the budget constraint as shown in the move from regime 3 to regime 4, with the fixed point of the rotation being on the vertical axis. Thus an increase in  $\delta$  would have an unambiguous positive effect on  $C$  through both price and income effects.

The comparative statics and relative sizes of the price and income effects can be understood by writing the budget constraint (7) for the general case of regime 4 as:

$$(8) \quad W + P_C C = M,$$

where  $P_C = (1 - 2\tau - \delta)$  and  $M = (1 - \tau)(P + I/r)$ .

The proportionate change in the price of conservation due to a change in  $\tau$  is:

$$(9) \quad \partial \ln P_C / \partial \tau = -2 / (1 - 2\tau - \delta) ,$$

and the proportionate change in potential market income is:

$$(10) \quad \partial \ln M / \partial \tau = -1 / (1 - \tau) .$$

Even in this flat tax case, the proportionate decline in  $P_C$  caused by an increase in  $\tau$  is larger than the proportionate decline in  $M$ . In the illustrated case with  $\tau = 0.30$  and  $\delta = 0.25$ , an increase of one percentage point in the tax rate (from 0.30 to 0.31) would result in a 13.3% decline in  $P_C$  but only a 1.43% decline in  $M$ . Only if the demand for  $C$  were much more income elastic than price elastic would the net effect of an increase in  $\tau$  be to reduce  $C$ .<sup>10</sup> The more likely effect is that an increase in the proportional tax rate would increase  $C$ , hence, increase easement donations.

Again from (8), the proportionate change in the price of conservation due to a change in  $\delta$  is:

$$(11) \quad \partial \ln P_C / \partial \delta = -1 / (1 - 2\tau - \delta) ,$$

but the proportionate change in potential market income is:

$$(12) \quad \partial \ln M / \partial \delta = 0 .$$

Therefore, an increase in the rate of tax credit unambiguously increases the donations of easements, assuming that the Marshallian own-price elasticity of demand for  $C$  is negative.

## **II.B. A Dynamic Price of Conservation**

Donating an easement implies a commitment to a permanent reduction in the landowner's income and a temporary tax benefit that accrues only until the deductions and tax credits are exhausted. An empirically useful theory must account for this fact.

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<sup>10</sup> Specifically, the income elasticity of demand for  $C$  would have to be positive and more than  $13.3/1.43 = 9.3$  times as large as the Marshallian price elasticity of demand in order for the net effect on  $C$  to be negative.

Consider an infinitely-lived landowner who is considering donating an easement on all of his land. If he chooses not to donate the easement, he sells all his land in time 0 and his income thereafter is the annualized return on the unrestricted market value of the land:

$r(P + I/r) = rP + I$ , where  $r$  is the market rate of return on investment. The landowner's after-tax income under the proportional tax system is  $rP + I - \tau(rP + I)$ .

If the landowner makes a donation in the amount  $C$ , then his perpetual gross income becomes  $r(P - C) + I$ . Assuming that he can fully deduct the donation from taxes in year 0, the year of the donation, then his after tax income in that year is  $r(P - C) + I - \tau[r(P - C) + I - C]$ . Because the deduction is fully absorbed by his year-0 income, his after-tax income in later years reflects the reduced income implied by the donation, but without the tax benefit. After tax income in years 1 and beyond falls to  $r(P - C) + I - \tau[r(P - C) + I]$ .

To calculate the price of conservation in this dynamic setting, we compare the present value of the dollar value of market consumption ( $W$  in the static model) under the with- and without-donation scenarios. To do so, and to motivate the development of our tax calculator, which takes into account the dynamic complexities of progressive federal and state tax codes, we introduce the following notation. Replace the tax term  $\tau(rP + I)$  with the more general term  $T_0^{wo}$ , which stands for taxes owed on without-donation income ( $rP + I$ ) with 0 deductions. Similarly let  $T_C^w$  represent the taxes owed on with-donation income ( $r(P - C) + I$ ) in a year in which  $C$  is deducted from taxable income. And let  $T_0^w$  represent taxes owed on with-donation income in years after the easement-related deductions have been exhausted when deductions from taxable income are 0.

Using this notation, the streams of after tax income for the landowner under the with- and without-donation scenarios are:

	<u><i>Income without donation</i></u>	<u><i>Income with donation</i></u>	<u><i>Difference</i></u>
$t = 0$	$rP + I - T_0^{wo}$	$r(P - C) + I - T_C^w$	$rC - (T_0^{wo} - T_C^w)$
$t = 1, \dots, \infty$	$rP + I - T_0^{wo}$	$r(P - C) + I - T_0^w$	$rC - (T_0^{wo} - T_0^w)$

The difference in present value between the two after-tax income streams is the present value of the “Difference” column above:

$$(13) PV^{wo} - PV^w = C - \left[ \frac{T_0^{wo} - T_C^w}{1+r} + \frac{1}{1+r} \left( \frac{T_0^{wo} - T_0^w}{r} \right) \right]$$

*= foregone wealth – PV of tax saving .*

The present value calculation assumes that all flows are received at the ends of the periods and that the PV is calculated at the beginning of period 0, when the decision is made.

Denote the bracketed term on the right-hand side of (13), the PV of tax savings, as  $\Delta T$ . In the following section we describe how we calculate the price of conservation as:

$$(14) P_C \equiv \frac{C - \Delta T}{C} = 1 - \frac{\Delta T}{C},$$

where the components of  $\Delta T$ —the three counterfactual tax calculations  $T_0^{wo}$ ,  $T_C^w$ , and  $T_0^w$ —are generated from our detailed federal and state tax calculator.

### III. The Conservation Income Tax Calculator

In this section, we quantify the income tax incentive to donate conservation easements using our income tax calculator, which spans 1987-2012. Here we review the incentives provided by both federal and state tax codes, describe our construction of the tax calculator, and present results on the price of conservation.

#### III.A. Overview of Income Tax Incentives

Federal income tax deductions for easements received statutory authorization in 1976.<sup>11</sup> The tax advantage of a contribution depends on the filer's marginal tax rate, which varies with income in the federal progressive tax structure and has also varied over time due to changes in tax law. In our calculations, higher marginal tax rates ( $\tau$ ) will lower the price of conservation. Further, the magnitude of tax advantage from charitable contributions is, in many instances, limited by a taxpayer's Adjusted Gross Income (AGI) and affected by rules that govern the carryover of unused tax deductions into subsequent tax years. Prior to 2006, federal law capped the deduction amount a landowner could claim at 30 percent of his or her AGI each year for six years.

Federal legislation passed in 2006 increased income tax benefits for easements donated in 2006 through 2012. The new law raised the deduction landowners can take from 30 percent of their AGI in any year to 50 percent, and to 100 percent for qualifying farmers and ranchers. The law also extended the carry-forward period for a donor from five to fifteen

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<sup>11</sup> Under § 170(h) of the internal revenue code (IRC), donated easements are required to preserve land for one of the following general purposes: outdoor recreation, wildlife habitat, scenic enjoyment, agricultural use, or historic importance. Importantly, the deduction is only permitted if the conservation easement is granted in perpetuity.

years. As we see below, these changes in the federal tax code have lowered the price of conservation for a subset of taxpayer AGI scenarios.

Income tax incentives at the state level have varied significantly across states and across time. Due to the deductibility of state income taxes from federal returns (and the deductibility of federal taxes from some state returns), the federal and state donation incentives interact.

At a snapshot in time, in 2012, figure 2 categorizes state income taxing structures to match the theoretical regimes described in figure 1. There are seven states that did not tax income. These states correspond to regime 1. There are 11 states that taxed income, but did not allow the itemization of charitable deductions, including conservation easements. These states correspond to regime 2. There are 22 states that taxed income and allowed charitable deductions, corresponding to regime 3. There are 11 states that offered tax credits to donors of conservation easements, meaning that  $\delta > 0$  in our theoretical setup. These 11 tax credit states correspond with regime 4 in figure 1.<sup>12</sup> As figure 2 indicates, all of tax credit programs, except North Carolina, began after 2000. North Carolina's program began in 1983, prior to our sample period and was terminated in 2014. Note that the federal system corresponds to regime 3 and is overlayed on top of the state systems.

The state tax credit programs (see appendix A) allow a taxpayer to take a percentage of the value of an easement and use it as a dollar-for-dollar credit toward payment of state income taxes. Some of these tax credit programs allow both a deduction and a tax credit for the easement donation. The tax credit programs provide for tax credits of between 25% and 100% of an easement's value, with various overall limits on the deductions. The terms of tax credit programs vary considerably across states and over time, as do the rules pertaining to their carryover into future tax years. In four states (Colorado, New Mexico, South Carolina, and Virginia) the tax credits are transferable, meaning that an AGI-constrained donor can sell credits to a non-donating taxpayer who is not so constrained. This effectively eliminates the limitations imposed by percent-of-AGI rules written into the tax credit laws, and lowers the price of conservation relative to a situation in which the percent-of-AGI rules and carryforward limits are binding constraints.

### **III.B. Constructing the Tax Calculator**

Accounting for the net tax advantage from a donation requires a unified calculation of federal and state income taxes, both with and without the donation. To do so, we have created

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<sup>12</sup> State tax credit programs exist, or have existed, in 14 states, but only 11 offered income tax incentives.

a tax calculator that relies on historical data on the state and federal income tax systems from 1987 to 2012. The calculator, written in Matlab, takes as input the real Adjusted Gross Income of a hypothetical taxpayer and the value of the taxpayer's conservation easement donation. It calculates the federal and state tax bills for the taxpayer, taking into account the federal deductibility of state taxes and any state tax credit available. Here we provide an overview and, in the appendix, we give more specific detail.<sup>13</sup>

For federal taxes, the calculator reads in tax brackets, tax rates, personal exemptions, and standard deductions for 1987-2012 as provided by the Tax Foundation.<sup>14</sup> The calculations assume the taxpayer is married filing jointly, takes the standard deduction, and claims two personal exemptions. In the easement donation case, deductions from income are extended beyond the standard deduction by the appraised value of the easement.

To account for changes in the value of the dollar, the assumed AGI of the taxpayer and the value of the donation are adjusted to 2012 constant-dollar terms. Limits on deductions and carryover rules make the tax calculator dynamic and turn the tax benefit calculation into a present value calculation. For example, charitable donation deductions were limited to 30 percent of AGI in tax years 1987-2005. In those years, if the value of deductions exceeded 30 percent of AGI, the unused deduction could be carried into the next tax year. The calculator assumes that the taxpayer makes no additional easement donation in the following year but does use the carried over deduction to reduce taxable income. This process is followed in subsequent years until either the entire deduction is used, or until the time limit on carryover is reached. Prior to 2005, deductions could be carried over for up to five years. In 2006, the carryover wall was increased to 15 years. Tax benefits that accrue in future years are discounted back to the current year at an annual rate of 5 percent.

Although the discussion above begins with the federal tax calculation, the sequence in our calculator begins with the state tax liability for the given AGI taxpayer, both with and without the assumed donation. The state taxes owed under the two scenarios are then deducted from income taxable at the federal level. Note that this unified treatment deducts the current year's state taxes paid from the current year's federal taxable income, at variance with the fact that

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<sup>13</sup> We do not recommend that our tax calculator be used as a substitute for a more detailed program like TurboTax as it ignores some features of the tax code—features that we think are relatively unimportant in consideration of the tax incentives to donate. To the extent that the tax code features we ignore would change by equal amounts the with- and without-donation tax bill, our calculation of the tax advantage to donation is unaffected by our abstraction from the actual code. The following paragraphs, and appendix, are intended to allow the reader to independently assess the extent to which we have captured the tax code features that influence the tax advantage to donation.

<sup>14</sup> <http://www.taxfoundation.org/publications/show/151.html>

when calculating one's current federal tax bill, one deducts state taxes withheld and paid in the previous year. This treatment allows us to avoid making assumptions about withholding strategies and prior-year tax status issues. We regard this treatment as neutral with respect to the with- and without-donation tax comparison.

To account for state tax systems, we have transformed data on each of the 50 states over 1987-2012 into a schedule of tax brackets and tax rates using the annual "All States Tax Handbook" published variously in different years by Prentice Hall and by the Research Institute of America. We rely on the same handbooks as a data source for documenting whether or not the state recognized itemized charitable deductions in a given year. In those states and years that levied an income tax and allowed deduction of charitable contributions, we assume the percentage-of-AGI limitations and the carryover limits at the state level were the same as those at the federal level.<sup>15</sup>

Aside from the four categories of states illustrated in figure 2, the tax calculator tracks other, more subtle, differences. The nuanced tax systems that we account for are: (1) states in which state income tax is a fixed fraction of a filer's federal tax, (2) states that tax wage and dividend income at different rates, (3) states in which personal exemptions are taken in the form of tax credits, (4) states that have easement tax credit programs that allow filers to take both the charitable donation and the tax credit, (5) and tax credit states that allow either a deduction or a credit, but not both (filers are assumed to take the credit). States also switch categories over time—notably those states that institute easement tax credit programs—and the tax calculator tracks those changes.

For those states that draw a distinction between wages on the one hand, and interest and dividend income on the other, the calculator arbitrarily assumes that half of AGI is wage income. Finally, the calculator assumes that easement donors in the four states that allow the sale of tax credits sell their credits for 85 cents on the dollar, a figure consistent with observation on the selling prices of transferable credits.

### **III.C. Calculator Output**

We represent the tax incentives to donate through an after-tax Price of Conservation Index, defined in section 2, equation (14) as follows:

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<sup>15</sup> Some states allow the deduction of federal taxes from state taxable income (eight states in 2012); however, the tax calculator makes the simplifying assumption that federal taxes are not allowed as deductions from state taxable income.



$$P_C \equiv \frac{C - \Delta T}{C} = 1 - \frac{\Delta T}{C},$$

where

$\Delta T$  = PV of tax liability without a donation – PV of tax liability with a donation, taking as given the taxpayers AGI and the appraised value of the easement donation,  $C$ . The variable  $P_C$  measures the dynamic after-tax price per dollar of easement donation.

Figure 3 illustrates the price of conservation for the seven states lacking income taxes (see figure 2), for four different taxpayers: ones with AGIs of \$100,000, \$200,000, \$350,000, and \$1 million.<sup>16</sup> Because the states have no income tax, the tax benefits from an easement donation flow entirely from the federal code.

To focus first on the role of marginal tax rates, we assume the donation value in panel A is only \$1,000 so that the taxpayer never runs into the limitations imposed by the percent-of-AGI limits. A donation of \$1,000 is below 30% of AGI for even the lowest-AGI taxpayer. For a small enough donation, the price of conservation becomes an algebraic transformation of the relevant marginal tax rate. Setting  $C = \$1,000$  in the expression above yields:

$$\begin{aligned} P_C &\equiv \frac{C - \Delta T}{C} = 1 - \frac{\Delta T}{C} = 1 - \left( \tau + \frac{\tau}{1+r} \right) \\ &= 1 - 2 \times \text{federal marginal tax rate if } r = 0. \end{aligned}$$

The expression differs from the price of conservation in regime 3 (see figure 1) due to the receipt of tax benefits over time, which results in a discounted term.<sup>17</sup>

Panel A of figure 3 shows the calculator output. Focusing first on the end of the sample period, the year 2012, we see the price of conservation declines with the taxpayer's AGI. The highest line shows the after-tax price per dollar of donation to be \$0.512 cents for the taxpayer with an AGI of \$100,000. The marginal rate for this taxpayer was 25 percent, and the calculation is  $P_C = 1 - 0.25 - 0.25/1.05 = 0.512$ . By contrast, the taxpayer with an AGI of \$1 million paid a marginal rate of 35 percent, so her price of conservation in 2012 was  $P_C = 1 - 0.35 - 0.35/1.05 = \$0.317$ .<sup>18</sup>

<sup>16</sup> The website of the IRS categorizes easement and real estate donations by AGI categories. Of the 15,580 returns that donated real estate and easements, show that 40% came from taxpayers with AGI < \$100,000, 23% from taxpayers with AGI between \$100,000 and \$200,000, 21% from taxpayers with AGI between \$200,000 and \$500,000, 6% from taxpayers with AGI between \$500,000 and \$1,000,000 and 10% from taxpayers with AGI > \$1 million. See [www.irs.gov/uac/SOI-Tax-Stats-Special-Studies-on-Individual-Tax-Return-Data#noncash](http://www.irs.gov/uac/SOI-Tax-Stats-Special-Studies-on-Individual-Tax-Return-Data#noncash).

<sup>17</sup> The price of conservation is calculated based on tax rates and tax rules during the year of the contribution. Taxpayers are assumed to expect current rates and rules to reign in the future. Our empirical analysis in the next sections considers the possibility that taxpayers are able to anticipate future changes in the tax code.

<sup>18</sup> The increases in the price of conservation across all AGI categories from 2001-2003 are due to tax rate cuts during the George W. Bush administration. The sharp rise and then decline in the price of conservation at the

Panels B and C shows the calculator output for taxpayers in the same set of states, but who are now making a donation appraised at  $C = \$500,000$  and  $\$1$  million respectively.<sup>19</sup> The price of conservation in these cases is more complicated than above, due to the AGI limitations on deductions and the carry forward limits. Comparing panels B and C with panel A shows that the price of conservation tends to increase with donation value, especially for the lower income donors. Prior to 2006, the price of conservation increased with donation size primarily because of the 5-year carry forward limit. Because of the AGI limits and the carry forward constraints, the taxpayer with  $AGI = \$100,000$  could deduct only  $0.30 \times \$100,000 = \$30,000$  each year for six years, leading to a total deduction of  $\$180,000$ . Moreover, the  $\$30,000$  deductions made in years 1-6 yield declining financial benefits due to the 5 percent discount rate, from the perspective of a would-be donor considering a donation in the current time period. The price of conservation falls for the lower income donors in 2006 primarily because the carry-forward period was extended from 5 to 15 years. The AGI limitation was also increased for qualifying farms and forests from 30 to 100 percent. Hence, a qualifying landowner with  $AGI = \$100,000$  would fully exploit the  $\$500,000$  donation in 5 years, resulting in a decrease in the price of conservation from 0.69 to 0.64.<sup>20</sup>

Appendix B includes graphs of the price of conservation in each of the 50 states and Figure 4 summarizes that output by comparing the mean price across states with the four tax regimes. We focus on a landowner with an AGI of  $\$200,000$  and assume he owns a qualifying farm or forest. We allow the donation size to vary as before, from  $\$1,000$  to  $\$500,000$  to  $\$1$  million. There are three take away points from figure 4. First, the price of conservation predictably falls as we move from regime 1 (no state income tax), to regime 2 (no charitable deduction allowed), to regime 3 (deduction allowed but no credit), to regime 4

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higher AGIs during 1987-1993 reflect changes in tax rates and brackets initiated by the Tax Reform Act of 1986, and the Omnibus Budget Reconciliation Acts of 1990 and 1993. The 1986 legislation lowered the top marginal rate from 38.5 percent to 28 percent but introduced a “rate bubble” of 33 percent for a range of incomes spanning approximately  $\$140,000$  to  $\$290,000$  in 2012 CPI adjusted dollars. This bubble explains why our  $\$200,000$  AGI taxpayer faced a lower price of conservation during 1987-1991. The 1990 Omnibus legislation increased the top tax rate to 31 percent in 1991 and eliminated the bubble, and the 1993 Omnibus legislation increased the top marginal tax rate to 39.6 percent in 1993, which explains the decline in the price of conservation for high AGI taxpayers after 1993.

<sup>19</sup> The contribution values compare with the mean donated easement value of  $\$475,416$  during 2003-2012 based on IRS data reported at [www.irs.gov/uac/SOI-Tax-Stats-Special-Studies-on-Individual-Tax-Return-Data#noncash](http://www.irs.gov/uac/SOI-Tax-Stats-Special-Studies-on-Individual-Tax-Return-Data#noncash).

<sup>20</sup> The landowner benefits from the carryforward extension but can be harmed by the requirement that he must donate the full  $\$100,000$  each year. He could be better off if he was allowed to spread the  $\$500,000$  donation over more years, allowing him to eliminate his tax liability for a longer time span. We thank Guido van der Hoeven for helpful discussions on this point.

(tax credit states). Second, most of the time series variation is driven by changes in the federal code and by the introduction of tax credits in some states. For the tax credit states, the mean price begins to fall in 2000 and there is a gradual decline through 2012. The gradual decline is mostly due to additional states adding tax credits over time. The mean price does monotonically fall within tax credit states, however, because some credit programs fluctuated in generosity over time as states experimented with different rules and constraints. Examples of experimenting states include California, Colorado, and Virginia (see appendices A and B). The third take away point is that some subtle time series variation occurs within states in regimes 2 and 3 due to changes state income tax rates and brackets. These changes are difficult to decipher in figure 4, but appendix B illustrates changes over time in some regime 2 and 3 states, including Montana, North Dakota, and Rhode Island. We exploit all of this state level time-series variation in our econometric analysis of easement donations.

#### **IV. Data on Conservation Easement Holdings**

We have created state-level panel data sets indicating the number and acres of easement acquisitions by land trusts over 1987-2012. The acres measure is arguably more useful than a dollars-donated measure because acres more closely approximate the open space ‘output’ of land trusts. Hence, our analysis differs from other studies of the response of charitable giving to tax policy in that we more directly measure the relationship between tax policy and public good provision. One advantage of our approach is that acres held is a more verifiable result of tax policy, when compared to dollars donated (see Fack and Landais 2016). We note that the ability to study the dollar value of easement donations is limited by the lack of detailed panel data such as we have assembled on acres. We do think that working with what IRS administrative dollar-value data are available would be a fruitful avenue for future research.

The ideal annual state-level panel data set for our purposes would span all land trust holdings of conservation easements and it would indicate which parcels were donated and which were purchased. We do not have this ideal data set. We have, however, constructed three annual state-level panels that come close to the ideal in different respects. Table 2 summarizes the strengths and weaknesses of each data set.

The first data set—the *TNC* data set—is national in coverage and includes all easement acquisitions made by the Nature Conservancy. The Nature Conservancy (TNC) is the country’s largest trust, holding approximately 23 percent of land trust conservation easements in 2010. TNC provided us with data on their holdings of easements and owned land at the county level, on an annual basis, from 1987 to 2012. In addition to being national in

coverage, the strength of the TNC dataset is that it indicates which easement parcels were donated and which were purchased. The weakness is that it represents the actions of one land trust rather than all land trusts.

The second data set—the *NCED* data—is from the National Conservation Easement Database. According to the NCED website, it is

“the first national database of conservation easement information, compiling records from land trusts and public agencies throughout the United States.... This effort helps agencies, land trusts, and other organizations plan more strategically, identify opportunities for collaboration, advance public accountability, and raise the profile of what’s happening on-the-ground in the name of conservation.”<sup>21</sup>

The strength of the NCED dataset is that it includes information on the location of easement holdings and the year of acquisition across the entire country. The weakness is that the data coverage of easement holdings is presently incomplete. Some land trusts have not yet sent spatial GIS files to the NCED and not all of the data sent to the NCED have been mapped.<sup>22</sup> In a robustness check, we show that our estimates are similar when we weight the regression results by the proportional completeness of easement coverage for each state, which we estimate to range from a low of 1 percent to a high of over 95 percent in several states based on comparisons of NCED easement acreage in 2010 with acreage reported in the Land Trust Alliance census of all land trusts that year as described below.

The variation in estimated completeness, at the state-level, is not correlated with our state-level variables of interest. In 2010, the correlation between completeness of NCED coverage and our price of conservation is only 0.09, based on the AGI and value of donation assumptions we use in the calculation of the price. The correlation between the NCED coverage and the stock of easements held by land trusts in 2010, according to the Land Trust Alliance census during that year, is only -0.004. These low correlations assuage concerns that our estimates based on the NCED data are biased by incomplete coverage.

There is a third data set—the *LTA* dataset—that we do not employ in the panel regressions but do use in our assessment of the precision and quality of land trust conservation. The Land Trust Alliance (LTA) is a trade organization for land trusts, with over 1,500 members. On an irregular basis, every several years, LTA surveys its members. While

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<sup>21</sup> <http://conservationeasement.us/about>

<sup>22</sup> According to the NCED website, easements that are known yet not in NCED because: 1) they have not been digitized, 2) they were withheld from NCED, or 3) the NCED team is still working with the easement holders to collect the information.

the questions asked have evolved over successive surveys, LTA has since 1984 asked their member how many acres of land they hold in conservation easements, and how many they hold in fee simple. The LTA provided us with the results of their eight surveys since 1984.<sup>23</sup> The weakness of this data set is that we cannot construct an annual panel from it. Consequently we do not employ LTA data in our primary regressions because we are interested in the dynamic effects of tax code changes and cannot infer those effects from the irregular LTA panel.

We know that the majority of conservation easements acquired by land trusts were donated to them, but we can exploit information on the month of acquisition in the NCED data set to further identify which easements were likely donated. The month of acquisition is a useful indicator because easement donations (and charitable donations in general) tend to occur disproportionately in December, at the end of the tax year. Evidence of this is found in the TNC data, which indicate the month of acquisition and whether the easement was donated or purchased. Figure 5 shows the distribution of TNC easement acquisitions during 1987 to 2012. After dropping the 257 easements that were coded as “partial gifts”, there remain 1,238 TNC easements that were full donations and 590 that were full purchases. Of the full easement donations to TNC, 58 percent were acquired in December. By comparison, only 20 percent of the easements purchased by TNC were acquired in December. Overall, 45 percent of TNC’s easements were acquired in December.<sup>24</sup>

Although we cannot observe whether easements in the NCED dataset were purchased or donated, the database indicates the month of acquisition. Of the 8,723 NCED easements acquired during 1987-2012 with month of acquisition data, we note that 43 percent were acquired in December.<sup>25</sup> In the next section, we separately estimate the response of December easements to the price of conservation.

Figure 6 shows the count and acreage of easements acquired over time in each of the two datasets. The figure indicates that NCED contains more easements and more easement acreage. There are 13,346 NCED easements in the data compared to 2,080 in the TNC data. The NCED easements cover 5.47 million acres compared to 3.17 million acres in the TNC data. The average size of a TNC easement is 1,524 acres compared to 410 acres for the NCED land trusts. This difference highlights the fact that TNC tends to operate at a larger

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<sup>23</sup> The LTA surveys yield information on trust holdings in 1984, 1990, 1994, 1997, 2000, 2003, 2005 and 2010.

<sup>24</sup> Thought of another way, 86 percent of TNC’s easements acquired in December were donated. By contrast, 53 percent of TNC’s easements acquired in other months were donated.

<sup>25</sup> Thirty-five percent of the easements in the NCED dataset indicate the year but not month of acquisition.

scale than the relatively small, local land trusts that hold the majority of the NCED easements.

Table 3 shows summary statistics for the panel data sets and it highlights two statistical issues that we confront in our empirical analysis. First, there are several state-year combinations for which the outcome variables are zero in the TNC and NCED data sets. Second, there are clearly large outliers in acres acquired – for example, the 610,814 acre maximum in the NCED data sets reflects an enormous forestry easement acquisition in Maine, during 2001. The 244,753 acre maximum in the TNC data set reflects a large ranchland easement acquisition by the TNC, in New Mexico during 2004 (Parker and Thurman 2011). In part to mitigate the influence of outliers such as these, we log the acreage data in our empirical analysis. Another benefit of logging the acreage is that this gives us a way to standardize the acreage data across states that vary considerably in area and hence have different ultimate constraints on easement acquisitions. Logging the data, however, raises questions about how to handle the observations with values of zero. We deal with this issue by employing the inverse hyperbolic sine transformation. Except for values very close to zero, the inverse hyperbolic sine is approximately equal to  $\log(2y)$  so it can be interpreted in the same way as a standard logarithmic dependent variable. The inverse hyperbolic sine provides the benefit of being defined at zero, allowing us to retain the information contained in the  $y = 0$  observations (Burbidge *et al.* 1988, MacKinnon and Magee 1990).

## **V. Empirical Analysis of Tax Incentives**

To motivate the potential importance of state variation in the tax code in explaining private conservation, we begin by presenting graphical evidence. Next, we estimate panel regression models.

### **V.A. Graphical Evidence**

Figure 7 compares the annual flow of easement acquisitions in the TNC and NCED data sets across tax credit and non-tax credit states. Panels A and B compare the mean counts and panels C and D compare the mean acreage. To normalize for differences in the land area of states, we have divided acreage flows by the number of privately owned acres.<sup>26</sup> The vertical line is at 1999, the year before states (other than North Carolina) began introducing new tax credit programs.

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<sup>26</sup> The “private acres” denominator is the sum of acreage held by the federal government plus state owned parks and recreation land. We treat the denominator here as time invariant and use the stock of government land holdings in 2000 for the calculations.

In panels A and B, there is visual evidence that the introduction of tax credits triggered an increase in the count of easements acquired by land trusts. Prior to 1999, the trajectories in easement donations were similar across the two categories of states. Beginning in 2000, however, the flow of easements expanded in the tax credit states and the gap in means between the two types of states widened.

The relative pre-tax credit and post-tax credit trends are less clear in panels C and D, which show acreage flows. The spike in 1994 is due to a large ranchland transaction in New Mexico, a tax credit state that launched its program in 2004. The spike in 2001 and 2002 is due, in part, to a large forestry conservation easement in Maine, which does not have a tax credit program. If one ignores these two prominent spikes, then Panels C and D show that the mean acreage was trending similarly across the two types of states until around 2000, after which there was relative growth in acreage in the states with tax credits.

All of the panels in figure 7 show a prominent spike in easement acquisitions in 2007, across both tax credit and non-tax credit states. We note that 2007 is the first full year in which taxpayers could take advantage of the extension of the carryforward period from five to fifteen years. (The enhanced tax benefit was passed in August 2006 and retroactively available to donations made earlier in 2006). The observed spike in 2007 suggests that donors responded in 2007 rather than 2006.

Figure 7 suggests two other possible dynamic responses to changes in the price of conservation. First, in some panels there appears to be a decline in easements in the year prior to a decrease in the price of conservation. This suggests that potential donors may have temporarily withheld their easement donations in anticipation of forthcoming donations prices. Panel A and especially panel B also suggests that the flow of easement acquisitions may have responded to short-run changes in the price of conservation—rather than long-run decreases in the level—given the expanding and then shrinking gap between the flow of easements in tax credit and non-tax credit states during 2000-2012. We explore these dynamic issues below in the regression analysis. We also explore the response of easement acquisitions to changes in the price of conservation induced by state income tax rate and bracket changes, which are less easy to visualize graphically when compared to tax credit induced variation.

## **V.B. Econometric Model**

Our basic strategy is to estimate an equation of the form:

$$(15) \quad Ihs(easements)_{it} = \alpha_i + \phi_t + \omega_i t + \beta_1 \Delta \ln P_{i,t+1} + \beta_2 \ln P_{it} + \beta_3 \Delta \ln P_{it} + X_{it} \eta + \varepsilon_{it}.$$

Here  $i$  refers state and  $t$  refers to year. The notation “ $Ihs$ ” refers to the inverse hyperbolic sine. The notation  $P$  is the “price of conservation” index.

We allow each state to have its own time invariant intercept ( $\alpha_i$ ) to control for geographic, topographical, cultural, and institutional differences across states that are relatively constant across time. We also allow for time-shocks that might affect rates of easement donations across all states ( $\phi_t$ ). Such factors include changes in the federal estate tax code, national recessions, and informational shocks about the ecological value of land conservation. In some specifications, we include state-specific linear time trends ( $\omega_i t$ ) to control for possible trends in easement flows prior to income tax code changes.

We employ the price index generated from a donation of \$500,000 from the owner of a qualifying farm or forest with an AGI of \$100,000 (all in 2012 dollars). We choose this combination because it induces the best econometric fit among the combinations displayed in figures 3 and 4, based on comparisons of adjusted R-squared from estimates of equation (15). The assumed value of \$500,000 is close to the mean value of actual easement donations during 2003-2012, which was \$475,416.<sup>27</sup> The AGI value of \$100,000 may seem low, but IRS summary data shows that 81 percent of all U.S. farm returns were from filers with AGI less than \$100,000 and 94 percent were from filers with AGI less than \$200,000.<sup>28</sup> The same IRS data indicates that 63 percent of easement donations came from taxpayers with AGI of less than \$200,000 in 2012. As a robustness check, we also employ a price index that is a weighted average of observed easement donation scenarios as described below.

The  $\beta_2$  coefficient is of key interest. It measures the persistent response in the flow of easement donations to a persistent change in the price of conservation. We expect  $\beta_2 < 0$ . Because the price of conservation is logged, and the dependent variables are transformed by the inverse hyperbolic sine function,  $\beta_2$  is a long-run “price” elasticity.

The other coefficients attempt to measure dynamic responses in a parsimonious way, as illustrated in figure 8. Following Bakija and Heim (2011), we control for the possibility that donors respond to expected changes in the price of conservation in the year preceding the

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<sup>27</sup>See [www.irs.gov/uac/SOI-Tax-Stats-Special-Studies-on-Individual-Tax-Return-Data#noncash](http://www.irs.gov/uac/SOI-Tax-Stats-Special-Studies-on-Individual-Tax-Return-Data#noncash).

<sup>28</sup> These data are from 2007, and are reported in table 1 of Cain (2011), available at [www.irs.gov/pub/irs-soi/11inbystatesprbul.pdf](http://www.irs.gov/pub/irs-soi/11inbystatesprbul.pdf).



change. Hence,  $\beta_1$  measures the anticipatory response of easement donations to a future change in the price. We expect  $\beta_1 > 0$  if donors can anticipate future changes and withhold (or move forward) donations when the donation price is expected to decrease (increase) in the next period. The coefficient  $\beta_3$  measures any additional first-period response to a change in the price of conservation beyond the long-run effect. Hence, the period- $t$  effect of a change in the tax code is  $\beta_2 + \beta_3$ , which is a one-time increase in the stock of easements. If potential donors think a favorable change in the tax code may be temporary, or if land trusts especially recruit donations in the immediate aftermath, then we should observe  $\beta_3 < 0$  as donors act quickly to exploit the change in donation price.

The variables in  $X$  include state-year level controls for a land price index, population, farm income, forest income, total per capita income, and government acquisitions of conservation easements through purchasing programs. Table A1 in the appendix provides summary statistics, definitions, and data sources.

### V.C. Main Results

Table 4 shows our first set of regression estimates. The dependent variable is the count of easement acquisitions. Columns 1-6 employ TNC data and columns 7-10 employ NCED data. All estimates include the set of covariates, and columns 4-6 and 9-10 add state specific linear trends. These are our preferred estimates because including time trends improves the goodness of fit of all regression models. The standard errors in all estimates are clustered at the state level to control for possible serial correlation in the error structure within states (Bertrand *et al.* 2004). In these estimates we omit the tax bubble years of 1987-1991 because the estimates during those years are much more sensitive to the choice of donation and AGI combinations. Hence, our estimates focus on the 1992-2012 panel of 21 years.<sup>29</sup>

We begin by interpreting the  $\hat{\beta}_2$  coefficients, the response of easement flows to a change in the price of conservation. Starting with column 5, which is our favored estimate of the TNC data, there is a persistent negative relationship between the price of conservation and the flow of all conservation easements, donated and purchased, to TNC. The estimate is a

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<sup>29</sup> While the goodness of fit is best for the AGI= \$100,000, donation = \$500,000 scenario for 1992-2012, the fit is better for a higher income scenario during the bubble tax years of 1987-1991. This may be because conservation easement donations were relatively more concentrated among higher income donors in the early years of land trusts, compared to today. Rather than using different AGI scenarios for different years, we employ a simpler procedure and hold constant the AGI and donation size scenario over time.

statically precise and economically large elasticity of -1.50. For comparison, the dependent variable in column 6 is the count of easements purchased by TNC. The estimate in this column serves as a placebo test. We do not expect purchases to be directly influenced by a state's tax price of conservation if in fact the price is causally related to easement flows rather than non-tax influences that also drive easement donations to land trusts. The placebo regression in column 6 show that persistent changes in the tax code are unrelated to TNC purchases because  $\hat{\beta}_2$  is effectively zero. This null finding raises confidence that the columns 4-5 coefficients are not simply driven by unobserved, demand-side drivers of easement acquisitions.

The  $\hat{\beta}_2$  long run elasticity estimates are larger in our favored estimate of the NCED data, which is given in column 9 at -2.02. This is our favored estimate because it employs all of the NCED data and includes state-specific time trends. Comparing the NCED  $\hat{\beta}_2$  estimates against those of TNC, we see that the long run response of easement counts to tax policy is greater for the smaller, local land trusts that comprise the NCED data set. This finding suggests the smaller trusts are more dependent on donations, which is consistent with the observation that TNC has a large budget for purchases whereas many smaller trusts do not.

Turning now to the dynamic effects of tax policy, consider the estimates of  $\hat{\beta}_1$  and  $\hat{\beta}_3$ . There is no evidence of a significant anticipatory effect as  $\hat{\beta}_1$  is imprecisely estimated and not distinguishable from zero in all of the donation columns. There is, however, evidence of a stronger response to the price of conservation in the first-period following a tax code change. In columns 5 and 9,  $\hat{\beta}_3$  is negative and statistically significant indicating the flow of donated easements surged in the first year of a tax price decline. This surge may indicate that landowners consider tax benefits to be potentially temporary, and therefore move quickly to exploit them. The positive estimate of  $\hat{\beta}_3$  in column 6 is interesting. This means that TNC purchased fewer easements in the first year of a decline in the tax price of easements. This result suggests that a new tax credit, or a lower tax rate, may crowd out easement purchases, at least temporarily.

Turning briefly to the coefficient estimates on the controls in table 4, which are not our focus, we note the following patterns. First, the land price index is negatively related to easement donations in some specifications. This finding is consistent with our tax price estimates because higher development values increase our estimated price of conservation.

Second, farm and forest income are positively related to easement flows in some specifications. These findings are consistent with our tax price estimates because higher income from farming or forestry decreases our estimated price of conservation. While the other covariates are not significantly different from zero, we emphasize that their inclusion or omission from the regressions has very little impact on the  $\hat{\beta}_1$ ,  $\hat{\beta}_2$ , and  $\hat{\beta}_3$  coefficients of interest.

Table 5 shows regressions estimates of easement acres, rather than counts. The specifications and right-hand side controls are identical to those in table 4 and the price of conservation coefficients are again elasticities. In general the patterns in table 5 mimic those in table 4 but there is a key difference. The long run elasticities of  $\hat{\beta}_2$  for donated easement acres tend to be much larger in magnitude than those for donated counts but these acreage elasticities are also less precisely estimated.

We turn first to the TNC coefficients in table 5, focusing on column 5. The  $\hat{\beta}_2$  coefficient is negative and economically large but imprecisely estimated, with a t-statistic of 1.15. The  $\hat{\beta}_3$  coefficient and the sum of  $\hat{\beta}_2$  and  $\hat{\beta}_3$  are significant, however. Taken together, these results mean that a decrease in the tax price induces a surge in acreage donated to TNC in the first year following the tax change. In the longer run, however, the lower tax price does not continue to influence the flow of acreage donated to TNC. How does this result reconcile with the statistically significant column 5 estimate of  $\hat{\beta}_2 = -1.50$  in table 4? One possibility is that prospective TNC donors of large easements are more immediately responsive to changes in tax prices than are prospective TNC donors of small easements. This may be because large easement donors have more to lose if they don't act quickly to exploit tax benefits that could be temporary.<sup>30</sup> Alternatively, the imprecise estimates of  $\hat{\beta}_2$  may be caused by outliers in acreage donations as discussed below.

Turning to the NCED tax price estimates in columns 9, we note the long run  $\hat{\beta}_2$  elasticity is large, at -5.15 in column 9 compared to a statistically insignificant elasticity of -1.15 for TNC acres in column 5. This means the long-run flow of easement acreage to small, local land trusts is more sensitive to tax prices when compared to the long-run flow to TNC.

The first-period response ( $\hat{\beta}_2 + \hat{\beta}_3$ ) is larger for TNC: at -7.58 versus -5.96. The fact that

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<sup>30</sup> The incentive to act quickly could be especially strong for large donors because many of the tax credit programs cap the aggregate value of claimed credits at the state-year level, perhaps inducing a race among large donors to become eligible before the cap is exceeded.

TNC easements tend to be larger than NCED easements may help explain this difference, assuming that large landowners are more anxious to quickly exploit decreases in easement donation prices.

To summarize the findings in Table 4 and 5, we find large, negative elasticities with respect to persistent changes in the tax price of conservation. For the NCED data, which include a comprehensive set of land trusts, our favored estimates is -2.02 for easement counts and -5.15 for easement acreage. These estimates quantify how the long-run *flow* of easements responds to a percentage change in the tax price of donations. Because easements are perpetual, the long-run *stock* is also important. For the NCED data, our favored elasticity estimate indicates that the long-run stock of acres would increase in addition to the flow response, by the percentage change in the price  $\times 5.96$ .

The elasticity estimates summarized above are conditional on covariates and state specific time trends and they are robust to placebo tests of easement purchases by TNC. Although the placebo and time trends results help to justify a causal interpretation of  $\hat{\beta}_1$ ,  $\hat{\beta}_2$ , and  $\hat{\beta}_3$  in the donated columns of tables 4 and 5, we perform more robustness checks below.

#### **V.D. Threats to Identification and Robustness**

There are several reasons why our estimates above might not identify average causal effects of the tax code. First, there is measurement error in the NCED data due to incomplete reporting, and this error possibly is correlated with the price of conservation over time within a state. To address this possibility, we weight the baseline regression results by our estimates of the proportion of all land trust easements reflected by the NCED data, at the state level. Panel B of table 6 reports the results and shows the findings for the favored specifications (columns 3 and 7) are similar with and without these weights.

Second, responses to the tax code may be systematically larger in states that have more private land. We assess this potential heterogeneity by comparing the baseline results to results from a model that places greater weight on geographically larger states, following guidance on weighting from Solon et al. (2015). Panel C of table 6 shows the results are comparable, suggesting the assumption of homogenous response is reasonable.<sup>31</sup>

Third, the measured responses to the tax code may be sensitive to outlier observations,

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<sup>31</sup> Auxiliary regressions, not shown, indicate that tax price responses are less homogenous across states of varying sizes when the dependent variable is the acreage of easements, rather than the inverse hyperbolic sine of acreage. This makes sense because, with the transformed dependent variable, the unweighted specifications only assume that percentage changes in easement flows, rather than level changes, are homogeneous across states.

particularly when the dependent variable is acres rather than counts. To address this issue, we run ‘winsorized regressions’ using a procedure first developed in Yale and Forsythe (1976). The procedure identifies the  $x$  percent of outlier observations based on residual size and adjusts those observations by subtracting the difference between the outlying observation’s residual and the residual of the  $100-x/2^{\text{th}}$  percentile observation (for right-tail residual outliers) and the  $x/2^{\text{th}}$  percentile observation (for left-tail outliers). In panels D and E we adjust 5 and 10 percent of observations in this way and run the baseline model with the winsorized data. The resulting coefficient estimates are slightly smaller than the baseline but generally similar in magnitude and statistical significance. This is evidence that the elasticity estimates are not driven by outlier observations.

Fourth, it may be the case that easement donations were trending differently in tax credit and non-tax credit states prior to the enactment of credits. For example, if easement donations were already on a faster trajectory in tax credit states prior to 2000, then our  $\hat{\beta}_2$  coefficients could be biased away from zero. Evidence that this was not the case is found in figures 6 and in the fact that adding state specific linear time trends to the regressions in table 4 and 5 did not generally move the  $\hat{\beta}_2$  coefficients towards zero in the donation specifications.

To further probe the role of pre-existing time trends, we create a ‘false timing’ placebo test. For the tax credit states, we move the tax price forward two time periods so that our placebo variables falsely imply a premature onset of tax credit programs. Next, we eliminate the state-year observations during which the tax programs were actually in place. The resulting tests, shown in panel F of table 6, indicate there was not a response of easement donations to future tax policy in the two years preceding the onset of the actual tax credit programs. This finding adds to our confidence that actual tax policy, rather than pre-existing trends, explain the sharp increase in easement donations during the tax credit years.

Another threat to identification is the omission of time-varying, state specific estate tax controls. At the federal and state level, estate taxes can affect the after-tax price of conservation easement donations in particular (see Sundberg and Dye 2006) and of charitable bequests in general (see Bakija *et al.* 2003, Joulfaian 2000). Hence, the omission of state estate tax measures could bias our coefficients on income tax prices if within-state time variation in estate tax policy is correlated with within-state time variation in income tax policy. We do not have long panel data on state-level estate and inheritance tax rules, but we do know which states followed federal estate tax rules and which states had stand-alone estate taxes. This is significant because states following federal rules phased out their estate tax

along with the federal government over 2002-2005. States with stand-alone estate taxes did not, and some states introduced new estate taxes between 2005 and 2012.<sup>32</sup> Based on this information, we create a simple time-varying indicator variable. The variable is equal to one for state-year combinations for which a state had an estate tax. Otherwise, the variable is equal to zero. As panel G of table 6 shows, adding the estate tax control has no impact on the baseline coefficients of interest suggesting there is little correlation between estate tax changes and changes in our income tax price of conservation.<sup>33</sup> We conclude that the omission of estate tax prices is not biasing our overall estimates.<sup>34</sup>

A different threat to identification has a less obvious technical solution. It is possible that states implementing tax credit programs were more predisposed to easement growth than were states that did not, even absent tax policy changes. Perhaps states that implemented tax credit programs had more active land trust lobbyists, for example. The potential endogeneity problem here is that successful land trust lobbyists are also plausibly better at recruiting and soliciting easement donations.

To address this possible source of endogeneity we construct a set of ‘counterfactual’ states that ‘almost’ implemented easement tax credit programs prior to 2012. This list of states is provided in Pentz (2007). She provides a detailed assessment of state conservation tax credits. According to Pentz (2007), five states: Idaho, Nebraska, West Virginia, Kentucky, and Minnesota were either working to create programs or had actually attempted to pass conservation tax credit legislation during our period of analysis. Based on her account, these five states may comprise a better set of counterfactual states than the entire sample of the 40 non-tax credit states. Panel H shows regression estimates that employ a subsample of sixteen states: the eleven tax credit states and the five counterfactual states listed above. Importantly, the  $\hat{\beta}_2$  elasticity coefficients tend to be larger in absolute value

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<sup>32</sup> The information comes from [www.taxadmin.org/fta/rate/estatetax.html](http://www.taxadmin.org/fta/rate/estatetax.html).

<sup>33</sup> In the panel D column 7 specification, the coefficient on the estate tax measure is 0.103 and statistically significant at  $p < 0.1$ , suggesting the indicator is associated with a 10 percent increase in easement flows. The coefficients on the estate tax variable in the other columns tend to be positive but imprecisely estimated, suggesting the role of estate tax is more complicated than characterized by our simple indicator variable.

<sup>34</sup> There are also property tax benefits from donating a conservation easement (see Sundberg 2014). There exists the possibility that the estimates of income tax responses reported here may be biased if county-level changes in property taxes correlate with state-level changes in our price of conservation, which is based on income tax incentives. We do not attempt to create a state-level index of property tax benefits here because there is significant heterogeneity in taxing decisions across counties within states, and because most owners of agricultural land can receive property tax benefits from current use assessments without making an easement donation.

than those estimated in the baseline. The coefficient estimates in panel H are also a bit more precisely estimated, which is surprising because the sample size is small, with only 16 states.

Panel I shows the regression estimates when we rely on only “variation in the timing of treatment” to identify the income tax price coefficients.<sup>35</sup> The panel F sample comprises only the 11 tax credit states. The logic here is to assume the tax credit states constitutes a valid set of counterfactual states for each other, but that the timing of the onset of tax credit programs (and the timing of changes within the programs) are random. Hence, the identification of the coefficients in this subsample is exclusively from variation in the arguably random timing of policy changes. As panel I shows, using this approach does not change our key conclusions relative to the baseline estimates that employ full sample.

Panel J displays the final robustness check in table 6. Observations from states and years with tax credits in force are taken out of the sample, as are the years before tax credits take effect. Variation in the price of conservation in the resulting sample come from variations in the tax code that are *not* solely aimed at conservation. The resulting estimates of  $\beta_2$ , the long run elasticity, are statistically insignificant in table 6. We interpret this to mean that the powerful statistical identification comes more from the tax credit changes than from year-to-year variation in marginal tax rates. This may be because tax credits are more ‘salient’ than changes in marginal rates, thereby inducing a clearer response (Chetty et al. 2009).

To summarize, the findings are robust to a suite of robustness checks in table 6. Although we cannot rule out every possible source of endogeneity, the most straightforward interpretation of the  $\hat{\beta}_2$  and  $\hat{\beta}_3$  estimates is that they represent the average causal effect of income tax policy on conservation easement donations.

The results in tables 4-6 are based on a tax price that we calculate from a scenario with an AGI of \$100,000, and a donation of \$500,000. We choose this scenario because it yields the highest adjusted R-squared in the acreage regressions. An alternative approach is to employ a price that is a weighted average of actual AGI and easement value scenarios. The implementation challenge is that we have data on actual scenarios for only four years, 2003 to 2006, from IRS data collected by Eagle (2011).

The 2003-2006 IRS data indicate the number of easement donations across the entire U.S. within each of eight AGI categories summarized in Table A2 of the appendix. The categories are \$200,000; \$200,000 to \$500,000; \$500,000 to \$1 million; \$1 million to \$1.5 million; \$1.5

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<sup>35</sup> Variation in timing approaches, or VAT, are commonly used in labor and education policy applications (see, e.g., Hoynes and Schanzenbach 2009, and Almond *et al.* 2011).

million to \$2 million; \$2 million to \$5 million; \$5 million to \$10 million; and more than \$10 million. The data also indicate the average donation value ('C') for each income category. From this information, we construct two price indexes that are weighted averages of the donation price for each of the eight scenarios, assuming midpoint AGI values within each income bin (see table A2).<sup>36</sup> For a 'Count-Weighted Price', the weights are the proportion of easements donated within each income bin. For a 'Value-Weighted Price', the weights are the proportion of dollar value of donated easements within each income bin.

Figure 9 summarizes the weighted price indices and compares them with our baseline scenario. The appendix also shows the 'Count-Weighted Price' for each state. It is clear the price of conservation is lowest for the 'Value-Weighted Price', because it puts more weight on high income scenarios. For all three price indices, there is clear divergence in the mean price in tax credit states beginning in the year 2000.

Table 7 compares tax price elasticities generated from the different price indices. A comparison of panel A (the baseline 'best-predictor' price) with panels C and E (the weighted prices) indicate that easement donations were more responsive to the best-predictor price for the full sample of  $t=21$  years,  $i=50$  states. In the acreage regressions, there are not statistically significant  $\hat{\beta}_2$  or  $\hat{\beta}_3$  coefficients when using the weighted prices. When we constrain the sample to span only 2000 to 2012, however, the results are different. In the shorter sample period, the acreage elasticity measures of  $\hat{\beta}_2$  are large and statistically significant in 5 of 8 specifications that employ weighted prices.

There are three takeaway points. First, the price for the average actual donor over 2003-2006 was lower than the price for our baseline scenario that maximizes goodness of fit. Second, the smaller, weighted price indices are better predictors of donations since 2000 but worse predictors over the entire sample. This evidence suggests that the set of potential donors may have trended towards those with higher incomes.

## VI. Aggregate Acreage Outcomes and the Quality of Easement Donations

In the introduction, we note that preferential tax treatment towards easements has been criticized for its lack of transparency: the public does not know what it has gained in terms of protected land, nor does it know how much it has paid for easements (through foregone tax revenues) (Merlenlender *et al.* 2004, Pidot 2005, and Bray 2010). Further, some have

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<sup>36</sup> The midpoints are, respectively, \$100,000; \$350,000; \$750,000; \$1.25 million; \$1.75 million; \$3.5 million; \$7.5 million; and \$10 million.



wondered if tax-driven easement donations lead to the wrong lands being conserved, because land trusts may respond to *ad hoc* donation opportunities rather than adhering to planning processes (see Pidot 2005, Parker 2005, Wolf 2012).

We provide here simulations of the aggregate effects in states that adopted tax credits based on our baseline short and long run elasticity estimates of -5.9 and -5.1: the percentage response of the flow of easement donations to a one percentage change in after-tax price of conservation. And we ask whether the quality of land preserved—as defined by individual land trusts—is influenced by tax incentives.

Table 8 shows the simulated changes due to the introduction of the tax credit programs actually instituted by states. In Colorado, for example, the new tax credit program lowered the price of conservation for our representative landowner (AGI = \$100,000, easement donation = \$500,000) by 30 percent, relative to the price in the year preceding the program. Our elasticity estimates imply a short run acreage increase of 200 percent and a long-run increase of 168 percent. Calculations for other states follow the same procedure. Note that all calculations are based on the change in price induced by the initial tax credit program; most of the programs were modified in subsequent years in ways that significantly changed the price of conservation (see appendices 2 and 3).

Table 8 also simulates the changes induced by the federal tax code changes in 2006. For our representative landowner, assumed to be a qualifying farmer, the changes lowered the price of conservation by 7.5 percent and stimulated a long-run acreage increase of 38.7 percent. This simulation illustrates how a modest change in the tax code can stimulate a large increase in annual acreage flows, and hence an even larger eventual increase in the stock of permanently restricted land.

With respect to the quality of easement conservation induced by tax incentives, it is important to recognize that the tax incentive to donate easements is just that—an incentive to donate easements—and not necessarily to donate ecologically or aesthetically valuable open-space amenities. Just as in the incentive contracting literature (e.g., Baker 2008) the agent (a landowner in our case) is paid to contribute towards an output that can be measured (the acreage of easements), which is not exactly what the principal (the public) is seeking. It is, perhaps, “the folly of rewarding for A while hoping for B.”

This implies that land trusts, which intermediate between landowners and consumers of land-based amenities, determine the effect of tax policy on conservation quality. If land trusts accept all easement offerings, regardless of quality, and stronger tax incentives induce donation offerings of marginal quality, then increased tax incentives will disproportionately

increase the flow of low quality easements. If land trusts are selective and focus their limited resources on high-quality easements, however, then increased tax incentives could disproportionately decrease the flow of low-quality easements, by allowing trusts to choose quality offerings from a larger set of prospective donors.

A detailed analysis of the impact of tax incentives on the quality of easement acquisitions is beyond the scope of our study, but we shed some empirical light here. To do so, we exploit data from Land Trust Alliance (LTA) survey questions about conservation outcomes in their 2005 “census of land trusts.” Trusts were asked to categorize the source of their easement holdings: purchased, donated, or bargain sale (a mix of the other two.) Of the subset of trusts who answered the question, the mean percentage of easements acquired by donation was 79.5%; 13.6% on average were purchased; and 6.9% were acquired through bargain sales (see table 8). Evidence that acquisition methods reported in the LTA survey reflect tax policy is found in Table A2 of the appendix. There we find that trusts operating in states with lower prices of conservation hold a greater number of donated easements (consistent with the findings of Sutter et al. 2014) and there is no relationship between purchased easements and the price of conservation.

Table 9 also reports a measure of conservation quality. Trusts were asked to report the percentage of their easement acreage in areas identified by the trust as conservation priority areas. According to the sample average, 75.3% of trust-held easements were located in areas deemed to be priority areas. The answer to this question gives a quantitative measure of the conservation importance of a trust’s holdings, allowing trusts to self-identify what is important to their principals.

Table 10 uses cross-section regressions at the trust level to connect this measure of quality to the method by which easements are acquired, and to link this to the after-tax price of conservation. The first column of table 10 regresses the percent of a trust’s holdings in priority areas on the percent of easements donated, and on the percent acquired by bargain sale, while controlling for the size of the trust. The residual category—purchased easements—is omitted. The donation percentage variable is statistically significant suggesting that every one percentage point increase in a trust’s holdings coming from donations (at the expense of purchases, given that bargain sales is held constant) results in a 0.172 reduction in the percentage of land held in a conservation priority area. The effect of shifting one percentage point from purchases to bargain sales has a smaller measured effect: -0.086, an estimate roughly 1.3 times the size of its standard error. The ordering of coefficient makes sense and supports the interpretation that donated easements are inferior easements, according to the

trust's definition of the term. The positive coefficient on the number of easements held suggests that larger land trusts are better at attracting land in priority areas. Similar results are found in the second column of table 10, which weighs the estimates by the size of land trusts.

Columns 1 and 2 of table 10 provide evidence that donated easements are inferior to purchased easements. They do not tell us if the particular easements induced by generous tax benefits differ in quality from other donated easements. To probe this issue, we first divide the price of conservation relevant to a trust's prospective donors into quartiles, ranked by the price averaged over 2000 to 2005 from lowest to highest. Next, we create indicator variables for each quartile, which we interact with the percentage of a trust's easements acquired via donation. (For trusts operating in multiple states, the price of conservation is averaged across states). By comparing the coefficients across these interaction terms, we can assess the sensitivity of the relationship between donated and priority-area easements to the generosity of the tax code.

If trusts in states with low prices of conservation accepted unusually low-quality easements, we should see a larger effect of the "percentage donated" on "percent of easement in priority areas" in those states. If anything, we see the opposite. Column 3 shows statistically significant negative effects of donations on easement quality in all four quartiles (donated easements are inferior to purchased easements), but no more so for trusts in states with the strongest tax incentive (the lowest prices of conservation.) The point estimate of the effect is the largest in the quartile with the weakest tax incentives. Further evidence comes from column 4, in which land trusts are weighted by their acreage held. Column 4 shows insignificant effects of donations on quality for trusts in the lowest three lowest quartiles of the price of conservation. The statistically significant column 4 coefficient of -0.300 for the fourth quartile suggests that donated easements are inferior to purchased easements only in those states whose donors face a high price of conservation. This provides suggestive evidence that tax incentives increase the quality of easement donations, insofar as "quality" is defined by land trusts through their priority areas.<sup>37</sup>

## **VII. Conclusion and Implications**

Governments have long acted to protect land from development on a city's urban-rural interface, sometimes through direct acquisition (national, state, and local parks) and in other

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<sup>37</sup> We recognize that "quality" is complex and multi-dimensional, and that it may not be fully characterized by priority areas. For more on measuring the quality of easement donations, see Lawley and Yang (2015).

instances through land use regulation (see Turner *et al.* 2014 and Glaeser and Kahn 2004). But less centralized, incentive-based conservation approaches are becoming more common across the globe.<sup>38</sup> The U.S. system of preferential tax treatment towards conservation easements held by local land trusts is a leading example of decentralized conservation. In it, the government's main role is to set tax policy and then let voluntary actors, under limited regulation, determine the quantity and patterns of permanent conservation.

Our analysis informs policy debate about this decentralized method of conservation in two ways. First, some critics worry that generous tax policies toward easements merely subsidize wealthy landowners, and do not change land use decisions. Our tax calculator quantifies the incentives across different income categories and shows that high-income landowners do accrue substantially higher tax benefits from donating when compared to land-rich but cash-poor landowners. But our large elasticity estimates, ranging from -2.0 to -5.1, are inconsistent with the view that tax incentives simply subsidize rich landowners without changing their behaviour. On the contrary, the elasticity estimates indicate that tax policies lowering the price of donating easements induce large increases in the annual flow of permanently conserved tracts of land. We conclude that tax incentives are a key driver of easement and land trust growth across and within U.S. states.

Second, other critics worry that tax-induced conservation leads to *ad hoc* patterns of land use restrictions instead of more valuable coordinated networks of protected land. Our analysis reveals mixed evidence about this concern. On one hand, we find that trusts accept easement donations outside of conservation priority areas that they would not purchase.<sup>39</sup> On the other hand, there is no evidence that increasing tax incentives leads to a greater proportion of easements outside of priority areas.

Our analysis raises questions about the limits of decentralized and private conservation and how its performance compares with centralized approaches. Although a full comparative analysis is outside the scope of the current study, these questions strike us as important, especially because direct government conservation may crowd out (or crowd in) decentralized private conservation (Albers *et al.* 2008, Parker and Thurman 2011). We also do not compare the land conservation effects from tax-privileging one instrument (the conservation easement) with more traditional approaches (e.g, outright ownership); this is

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<sup>38</sup> Many governments are now paying landowners to voluntarily refrain from making land use changes through incentive based programs (Salzman 2005, Jack *et al.* 2009, Alix-Garcia *et al.* 2016, Gjersten *et al.* 2015).

<sup>39</sup> It is an empirical question if conservation networks accrued through the land trust system of relying on tax donations differ from centrally planned networks that may be chosen by a public or private organization with a large budget for purchasing land, see Costello and Polasky (2004) and Newburn *et al.* (2006).

another dimension of crowd-out or crowd-in that we hope future research addresses.<sup>40</sup> Moreover, we do not investigate incentives to cheat (Kleven *et al.* 2011), in our case by exaggerating easement values. Evidence elsewhere indicates that lax oversight over tax fraud can affect claims of charitable giving in other settings (Fack and Landais 2016). In our setting, increasing Internal Revenue Service oversight over fraudulent conservation easement appraisals in recent years may have decreased the responsiveness of easement donations to stronger tax incentives. We leave this important issue for future research.

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<sup>40</sup> In separate analysis, not shown here but available upon request, we find evidence that the total flow of acreage - conservation easements plus fee-simple lands - acquired by the Nature Conservancy decreases with increases in the after-tax price of conservation. This result suggests that, at least for TNC, easements and fee-simple acres are complements rather than substitutes suggesting crowding-in rather than crowding-out.

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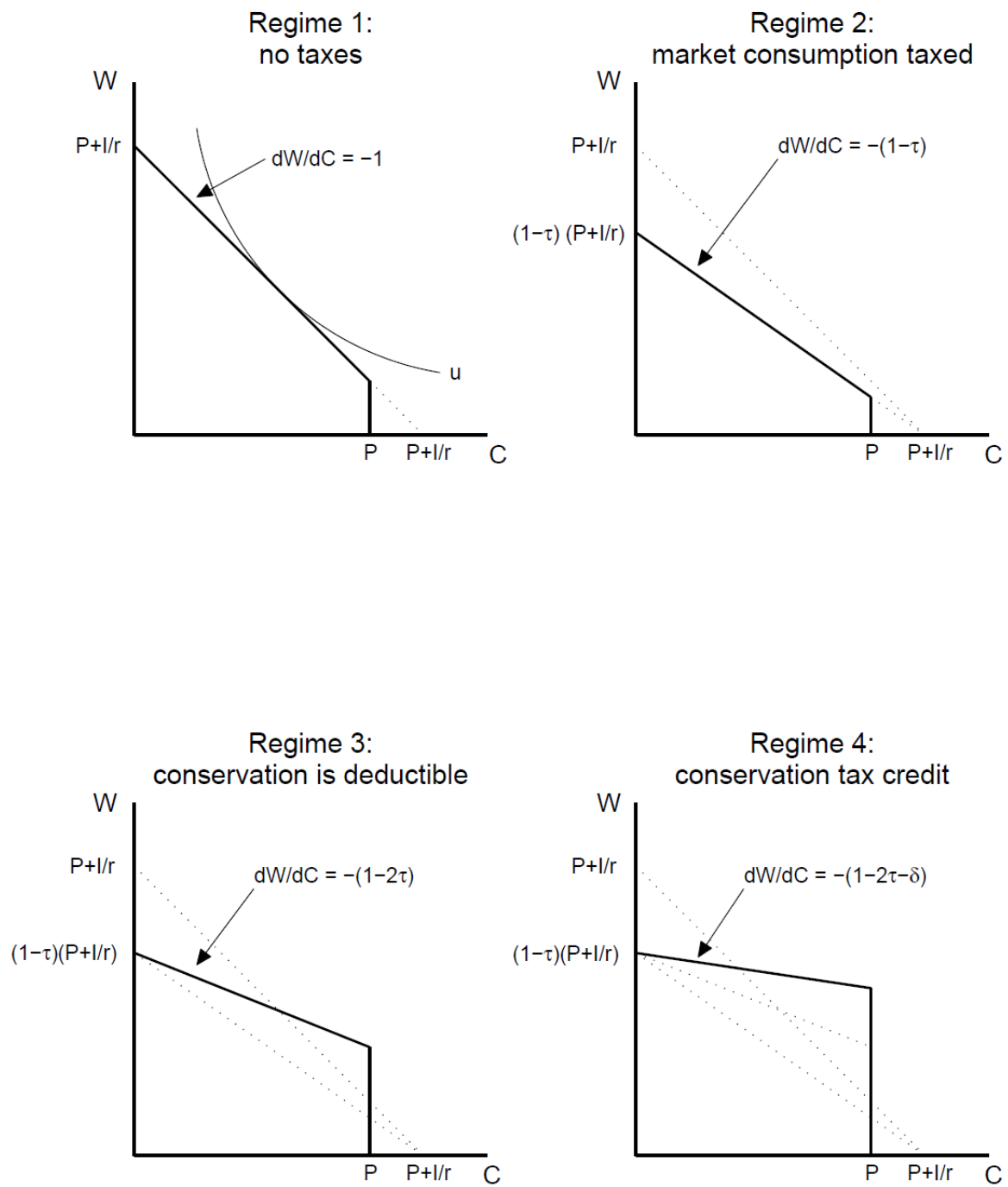
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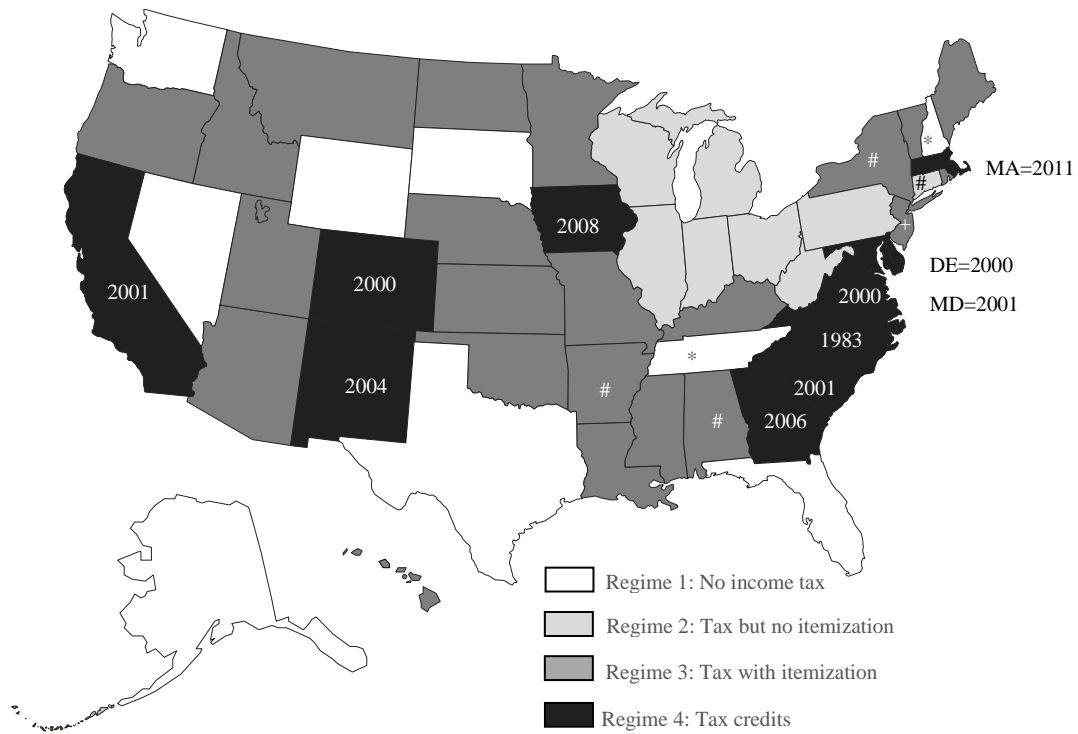
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**Figure 1:**  
**Budget Constraints of Landowner under Four Tax Regimes**

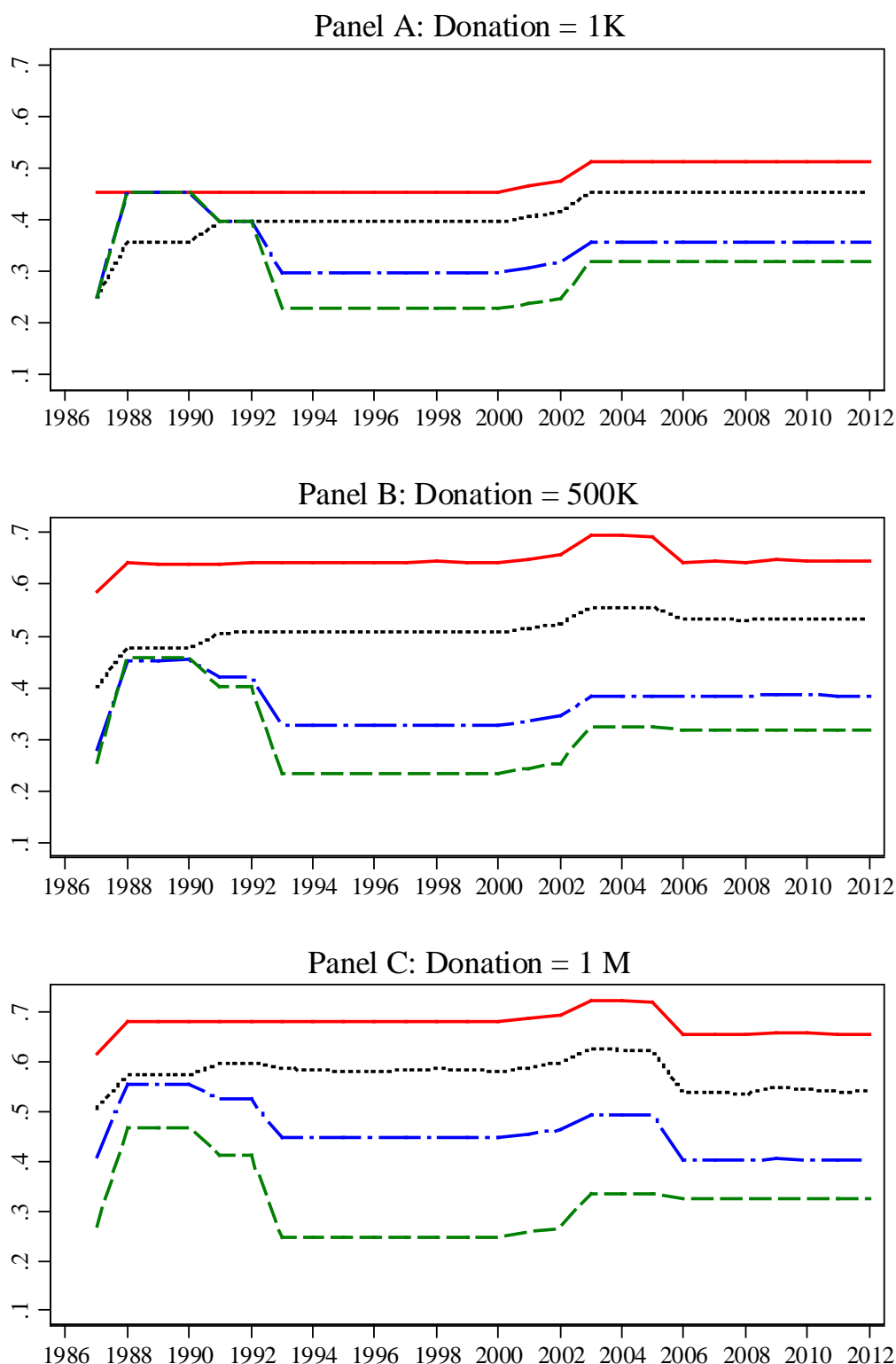


**Figure 2:  
State Income Tax Regimes in 2012**



**Notes:** Dates indicate when the initial tax credit legislation was first in force. # indicates that states have conservation easement specific tax incentives, but ones that are relatively weak and not based on income taxes. \* indicates the state only taxes dividend and investment income but not wage income. + New Jersey does not in general allow itemized deductions but began to allow itemization of conservation easements in 2000. California's program has operated intermittently since 2001.

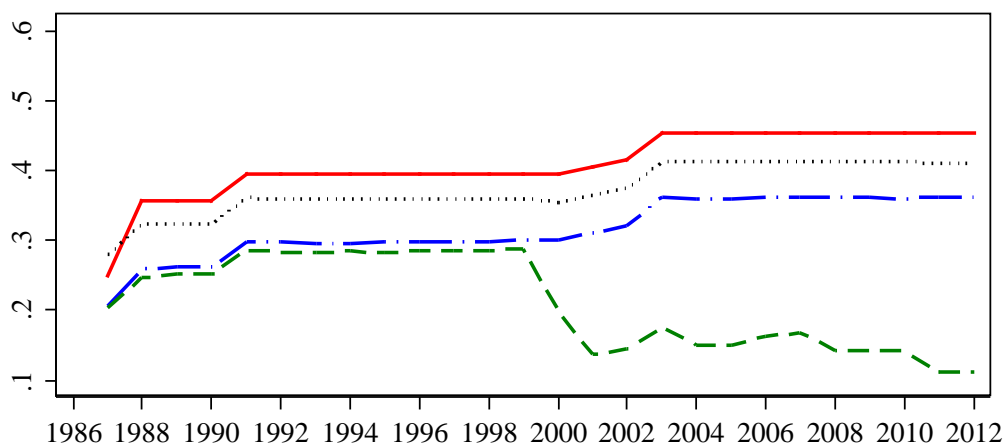
**Figure 3:**  
**Price of Conservation due to Federal Tax Policy**  
*(For AGI=\$100K, \$200K, \$350K, and \$1 million in states without income taxes)*



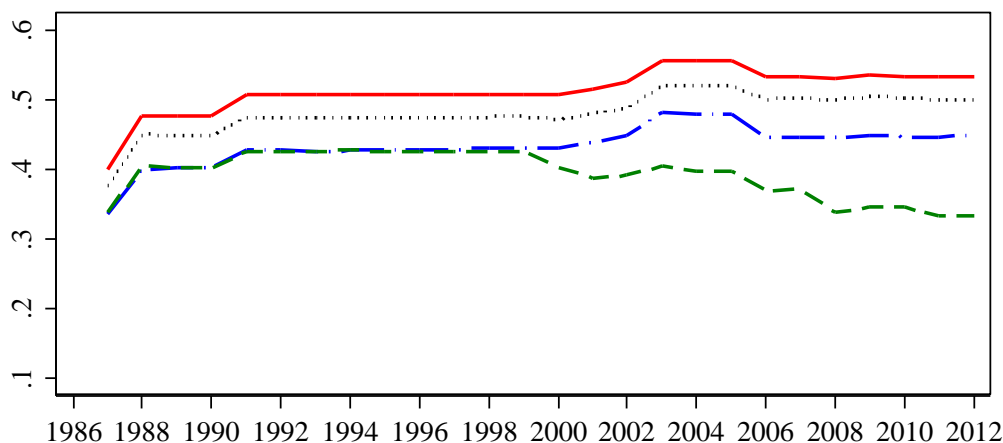
**Notes:** The legend is as follows. AGI \$100,000 is the red solid line. AGI \$200,000 is the black dotted line. AGI \$350,000 is the blue long dash-dotted line. AGI \$1,000,000 is the green dashed line. We assume the AGI \$100,000 and AGI \$200,000 donors are qualified farmers and the higher AGI donors are not.

**Figure 4:**  
**Mean Price of Conservation in States with the Four Tax Regimes**

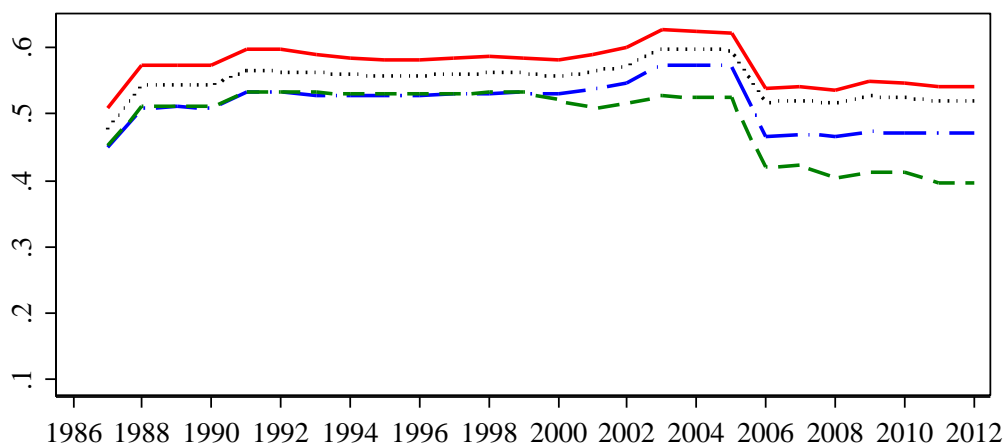
**Panel A: AGI = 200K Donation = 1K**



**Panel B: AGI = 200K Donation = 500K**

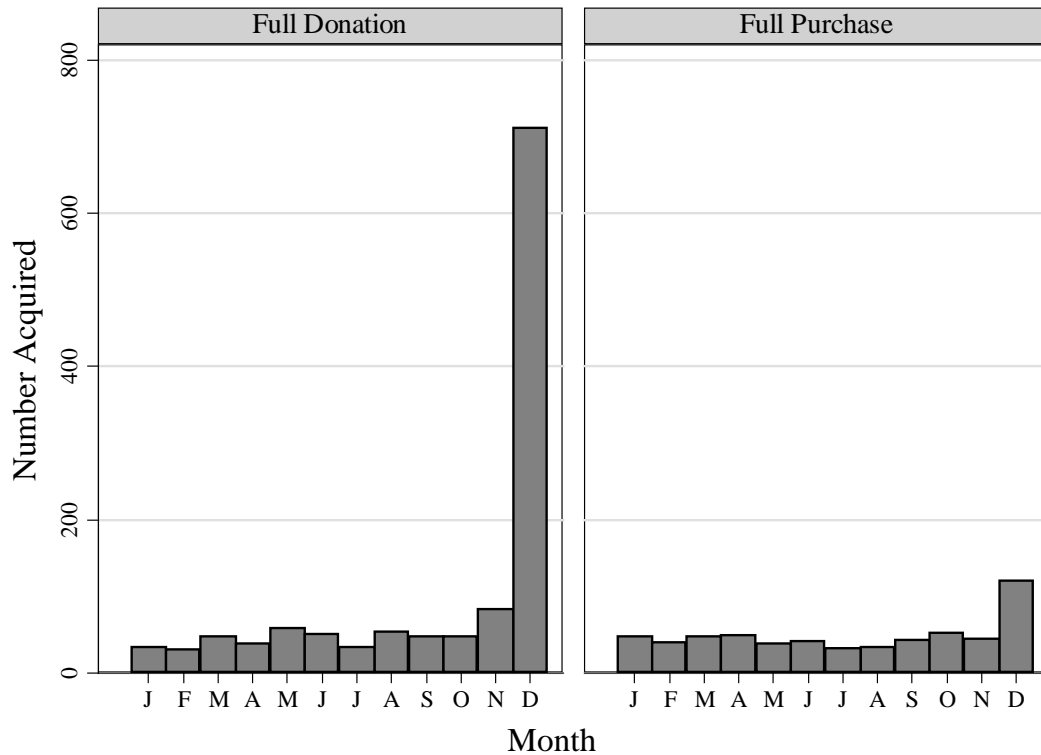


**Panel C: AGI = 200K Donation = 1 M**



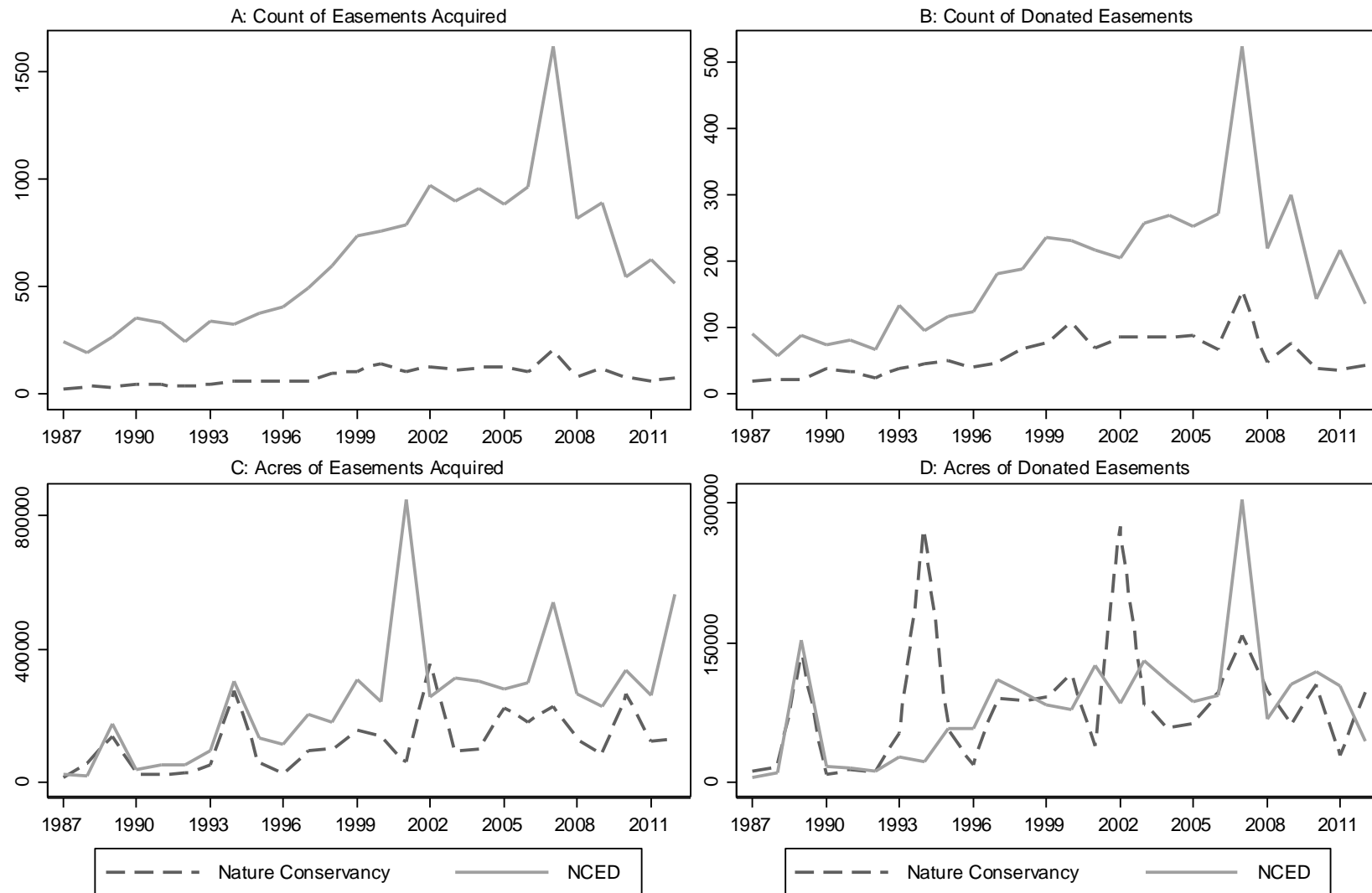
**Notes:** The legend is as follows. The red solid line denotes the mean across the 7 states without income taxes (regime 1). The black dotted line shows the means across states that have income taxes but do not allow itemized charitable deductions (regime 2). The blue dash-dotted line shows the means across states that have income taxes and allow itemized charitable deductions (regime 3). The green dashed line shows the means across states that introduced easement specific tax credits (regime 4).

**Figure 5:**  
**Distribution of Nature Conservancy Easement Acquisitions across Months, 1987-2012**



**Notes:** The letters on the horizontal axis indicate the first letter of each month. Reading from left to right, J = January and so on. The data come from the Nature Conservancy. The left hand panel shows the distribution of easements that were “All Gift” according the TNC. The right hand panel shows the distribution of easements that were neither “All Gift” nor “Partial Gift”, meaning these easements were purchased.

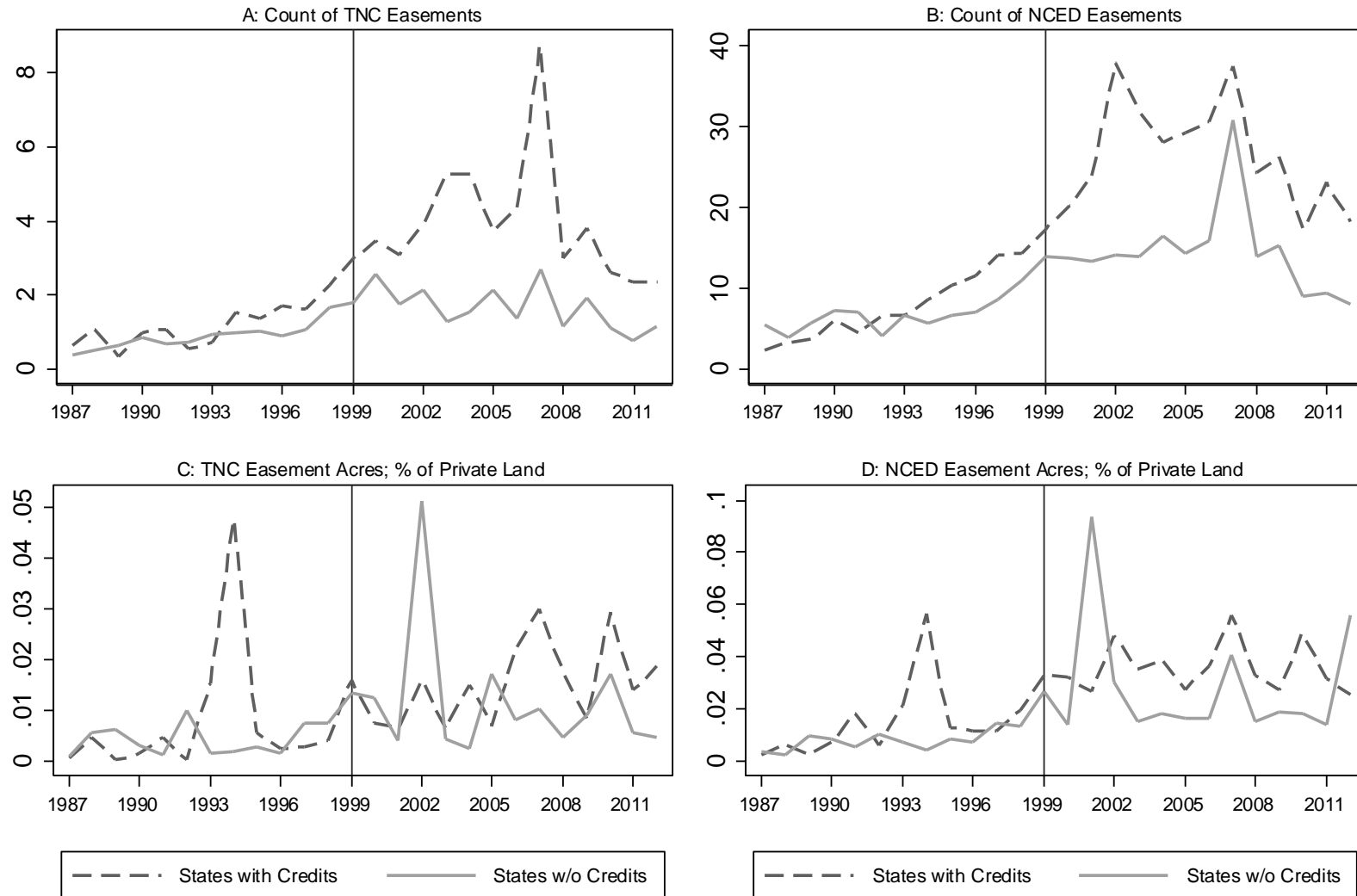
**Figure 6: Conservation Easements Acquired by Land Trusts**



**Notes:** Here the “donated” acres in the National Conservation Easement Database (NCED) refer to those acquired in December.



**Figure 7: Comparison of Mean Easements Acquired in States with and without Tax Credits**

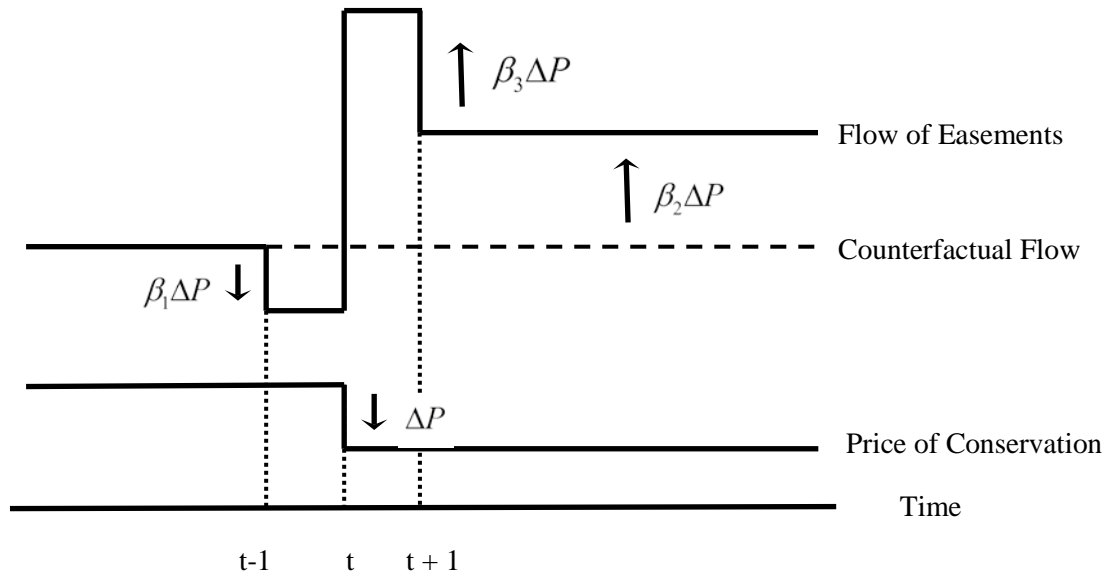


**Notes:** The vertical line signifies 1999, which is the final year before states began introducing new tax credit programs.

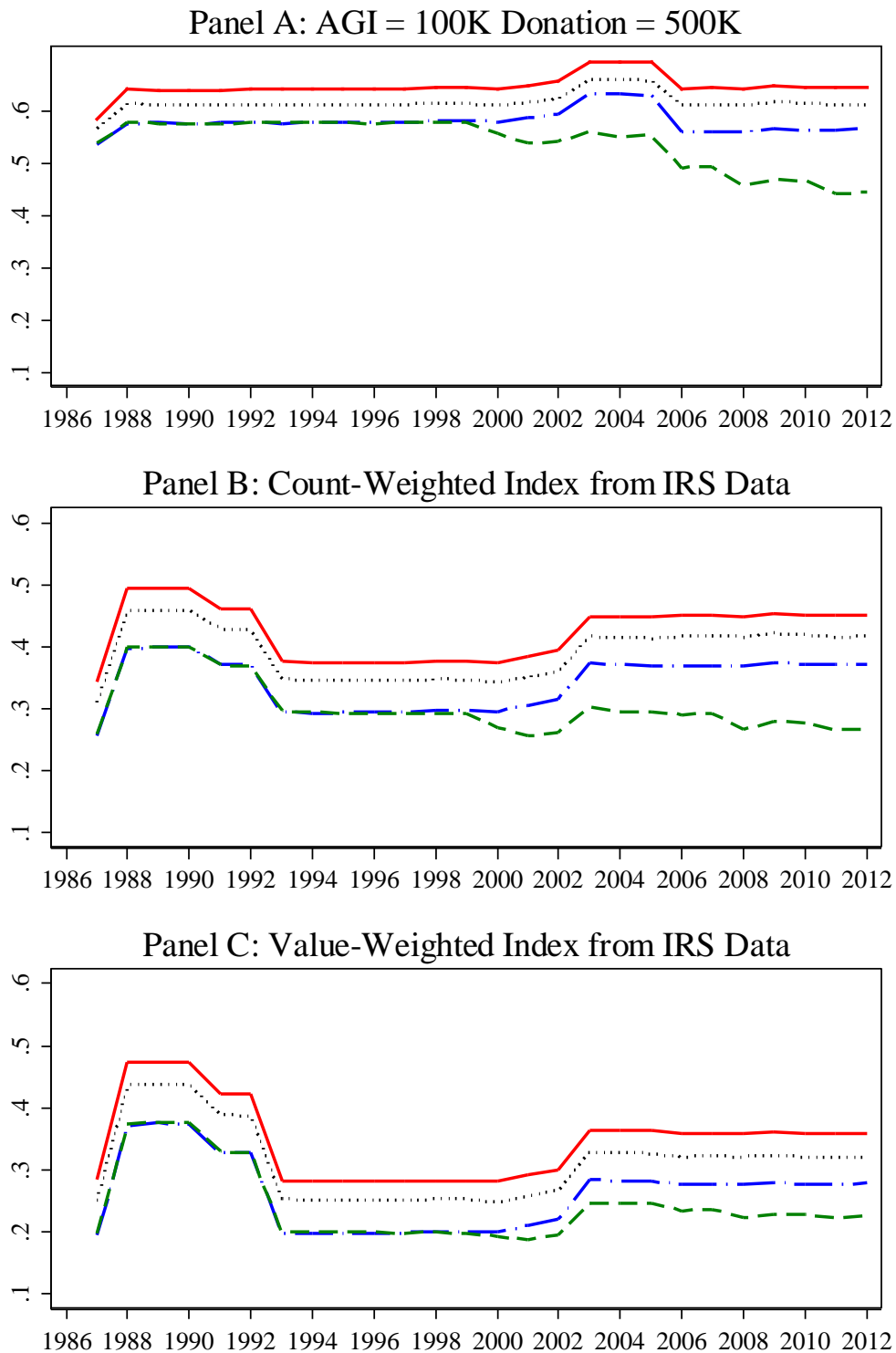
**Figure 8: Time Response of Easements to Change in the Price of Conservation**

$$Easements_t = \alpha + \beta_1 \Delta P_{t+1} + \beta_2 P_t + \beta_3 \Delta P_t$$

$(\beta_1 > 0, \beta_2 < 0, \beta_3 < 0)$



**Figure 9:**  
**Comparison of Best-Predictor Price with IRS Data Weighted Indices**



**Notes:** The solid line denotes the means across the regime 1 states, the dotted line shows the means across the regime 2 states, the blue dash-dotted line shows the means across regime 3 states, and the dashed line shows the means across regime 4 states. Panel A shows the price indices for the best-predictor scenario of AGI = \$100K, Donation = \$500K. Panels B and C show weighted averages of price indices across donation scenarios within 8 income bin categories as shown in Table A2 of the appendix. In panel B, the index is weighted by the number of donations. In panel C the index is weighted by the dollar value of donations.

**Table 1**  
**Comparison of Government and Land Trust Holdings**

	1990 Acres	2010 Acres	Change 1990-2010	% Change 1990-2010
<i>Four Federal Land Agencies</i>	358,891,255	368,047,552	9,156,296	2.55
Bureau of Land Management	168,223,327	171,186,890	2,963,563	1.76
US Forest Service	165,790,139	167,598,134	1,807,995	1.09
US Park Service	20,179,876	24,380,375	4,200,499	20.82
US Fish and Wildlife Service	4,697,914	4,882,153	184,239	3.92
<i>Federal Programs</i>				
Conservation Reserve	32,522,280	31,298,245	-1,224,035	-3.76
Wetland Reserve	0	2,311,702	2,311,702	na
<i>State Parks*</i>	7,895,296	10,526,759	2,631,463	33.33
<i>Land Trusts</i>				
Outright Ownership	2,165,041	7,681,198	5,516,157	254.8
Conservation Easements	793,137	13,392,500	12,599,363	1588.6

**Notes:** \*Denotes the data are for 2007 rather than 2010. The federal land data come from Payment and Lieu of Taxes (PILT) records of the US Department of Interior. The federal land program data come from the U.S. Department of Agriculture. The state parks data come from the US Census. The conservation easement data come from files sent to the authors from The Nature Conservancy and data from the periodic Land Trust Alliance Censuses. All comparisons exclude land held in Alaska.

**Table 2**  
**Characteristics of Land Trust Data Sets**

<i>Data Set</i>	<i>Annual panel?</i>	<i>National coverage of easements?</i>	<i>Indicates donations vs. purchases?</i>	<i>Indicates month of Acquisition</i>
TNC	Yes	Yes	Yes	Yes
NCED	Yes	Yes, with gaps	No	Partially
LTA	No (periodic)	Yes	Partially	No

Notes: The NCED data are available at <http://conservationeasement.us/about>. The Nature Conservancy (TNC) and Land Trust Alliance (LTA) data were provided to us by database managers of those organizations.

**Table 3**

**Summary Statistics of State-Level Annual Panel of Land Trust Acquisitions**

	<i>The Nature Conservancy (TNC)</i>			<i>National Conservation Easement Data (NCED)</i>	
	All (1)	Purchased (2)	Donated (3)	All (4)	December (5)
Easements Count					
Mean	1.60	0.454	1.15	12.36	3.65
Min	0 [635]	0 [972]	0 [754]	0 [403]	0 [697]
Max	31	14	31	255	92
Easements Acres					
Mean	2,439	783.5	1,655	4,953	1,634
Min	0	0	0	0	0
Max	244,753	149,993	244,753	610,814	141,946

**Notes:** The summary statistics are for a state-level panel spanning 1987 through 2012 (N = 1300, t = 26, i=50).

The number in brackets indicates the number of observations for which the value is zero. Many conservation easements in the NCED dataset (66%) are missing information about the month in which the easement was acquired. Column 3 combines ‘All Gift’ and ‘Partial Gift’ categories from TNC. The source for TNC data is data sent to us by the database manager. The NCED data were downloaded from

<http://conservationeasement.us/>, (updated in July 2015).

**Table 4**  
**Fixed Effects Estimates of the Number of Easement Acquisitions**

	TNC All	TNC Donated	TNC Purchased	TNC All	TNC Donated	TNC Purchased	NCED All	NCED December	NCED All	NCED December
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta \text{Price of Cons}_{t+1} (\beta_1)$	0.039 (0.459)	-0.082 (0.410)	0.508* (0.274)	-0.466 (0.385)	-0.613 (0.449)	0.640* (0.380)	0.388 (0.916)	-0.166 (0.837)	0.041 (0.471)	-0.065 (0.638)
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.280** (0.605)	-1.353** (0.576)	-0.572 (0.456)	-1.320*** (0.489)	-1.497** (0.717)	0.097 (0.329)	-0.500 (0.458)	-1.227* (0.633)	-2.021*** (0.643)	-1.683** (0.710)
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.487 (0.320)	-0.629** (0.292)	1.017** (0.470)	-0.992*** (0.269)	-1.042*** (0.251)	0.508* (0.263)	-2.479*** (0.557)	-2.257*** (0.570)	-1.507** (0.681)	-1.754*** (0.580)
First period response ( $\beta_2 + \beta_3$ )	-1.767*** (0.563)	-1.982*** (0.526)	0.445 (0.274)	-2.312*** (0.466)	-2.539*** (0.630)	0.605 (0.457)	-2.979*** (0.488)	-3.484*** (0.478)	-3.528*** (0.490)	-3.437*** (0.646)
<u>Controls</u>										
Land Price Index	-0.044**	-0.054**	0.012	-0.028	-0.039	0.018	-0.096***	-0.083***	-0.009	0.002
LN Forest Income	0.400**	0.339**	0.106	0.263	0.084	0.166	-0.331	-0.148	0.041	0.053
LN Farm Income	-0.080	-0.039	-0.106	-0.137	-0.338	0.291	0.653	0.182	0.637**	0.310
LN Per Capita Income	0.694	0.856	-0.400	1.123	1.352	-0.311	-1.195	-0.425	1.186	2.152*
LN Population	0.129	0.389	0.020	1.989	2.104	-0.125	-0.654	-0.403	-1.826	-6.248**
Govt. Easement Acres	-0.006	-0.008	-0.001	-0.003	-0.011	0.008	0.021	0.013	0.007	-0.006
State fixed effects	x	x	x	x	x	x	x	x	x	x
Year fixed effects	x	x	x	x	x	x	x	x	x	x
State specific trends				x	x	x			x	x
Adjusted R <sup>2</sup> (within)	0.145	0.139	0.064	0.223	0.203	0.158	0.347	0.244	0.530	0.419
N	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

Notes: \* p<0.1; \*\* p<0.05; \*\*\* p<0.01. The standard errors presented in parentheses are clustered at the state level. The observations are state-year combinations from 1992 through 2012. The dependent variable is the count of easements, transformed by the inverse hyperbolic sine function.

**Table 5**  
**Fixed Effects Estimates of the Acreage of Easement Acquisitions**

	TNC All	TNC Donated	TNC Purchased	TNC All	TNC Donated	TNC Purchased	NCED All	NCED December	NCED All	NCED December
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta \text{Price of Cons}_{t+1} (\beta_1)$	2.317* (1.361)	1.681 (1.395)	3.130* (1.592)	1.702 (1.880)	0.920 (1.692)	4.269* (2.298)	2.544 (1.922)	-0.476 (1.931)	1.110 (0.948)	-0.488 (1.628)
Price of Cons <sub>t</sub> ( $\beta_2$ )	-2.310 (2.145)	-2.602 (1.954)	-3.334 (2.890)	-1.037 (1.253)	-1.732 (1.506)	1.200 (1.405)	-0.266 (0.907)	-1.716 (1.319)	-5.152** (2.048)	-3.135* (1.797)
$\Delta \text{ Price of Cons}_t (\beta_3)$	-4.546 (3.476)	-4.368 (3.320)	5.550** (2.453)	-6.328** (3.087)	-5.843* (3.039)	2.527 (1.615)	-3.515*** (1.184)	-4.187** (1.590)	-0.807 (1.529)	-3.028* (1.702)
First period response ( $\beta_2 + \beta_3$ )	-6.856*** (1.995)	-6.970*** (2.074)	2.216 (1.579)	-7.365** (3.678)	-7.575** (3.555)	3.727* (2.134)	-3.781*** (1.237)	-5.903*** (1.393)	-5.959*** (2.121)	-6.163*** (2.144)
<u>Controls</u>										
Land Price Index	-0.066	-0.097	0.054	-0.076	-0.061	-0.028	-0.124*	-0.175**	0.091	0.101
LN Forest Income	1.361*	1.173	0.614	0.889	-0.420	1.060	-0.903	-0.550	0.662	0.357
LN Farm Income	0.168	0.334	-0.593	-0.917	-0.994	0.395	2.351**	1.088	1.708*	0.479
LN Per Capita Income	2.148	2.079	-2.630	4.586	3.568	-0.168	-1.829	0.929	-0.642	6.712
LN Population	-2.931	0.745	-0.913	8.014	12.427	-2.232	-2.696	-2.259	2.124	-2.939**
Govt. Easement Acres	-0.018	-0.028	-0.008	0.004	-0.038	0.054	0.005	-0.025	-0.018	-0.070*
State fixed effects	x	x	x	x	x	x	x	x	x	x
Year fixed effects	x	x	x	x	x	x	x	x	x	x
State specific trends				x	x	x			x	x
Adjusted R <sup>2</sup> (within)	0.091	0.079	0.068	0.135	0.121	0.139	0.222	0.190	0.349	0.305
N	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

Notes: \* p<0.1; \*\* p<0.05; \*\*\* p<0.01. The standard errors presented in parentheses are clustered at the state level. The observations are state-year combinations from 1992 through 2012. The dependent variable is the acreage of easements, transformed by the inverse hyperbolic sine function.

**Table 6: Robustness Checks**

	<i>Y= Easement Counts</i>				<i>Y= Easement Acres</i>			
	TNC All (1)	TNC Donated (2)	NCED All (3)	NCED Dec. (4)	TNC All (5)	TNC Donated (6)	NCED All (7)	NCED Dec. (8)
<b>A. Baseline</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.320***	-1.497**	-2.021***	-1.683**	-1.037	-1.732	-5.152**	-3.135*
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.992***	-1.042***	-1.507**	-1.754***	-6.328**	-5.843*	-0.807	-3.028*
<b>B. State Weights by NCED Completion</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )			-1.604***	-1.343***			-4.582**	-1.953
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )			-1.657***	-1.577**			-0.920	-2.669*
<b>C. State Weights by Private Land Area</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.027***	-1.027**	-1.667***	-1.334**	-1.145	-1.222	-5.392**	-2.877
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-1.017***	-1.257***	-1.969***	-1.989***	-6.166*	-6.201*	-1.266	-3.562**
<b>D. Winsorized Data: 5%</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.289**	-1.429**	-1.928***	-1.737**	-0.869	-1.508	-4.509**	-3.030*
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.953***	-1.006***	-1.550**	-1.737***	-6.422**	-5.915*	-1.056	-3.077*
<b>E. Winsorized Data: 10%</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.258**	-1.375**	-1.867***	-1.765**	-0.908	-1.484	-4.416**	-2.978*
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.938***	-1.013***	-1.584**	-1.757***	-6.411**	-5.970*	-1.181	-3.082*
<b>F. Placebo Timing</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	0.144	-0.283	-0.898	-0.906	3.655	0.191	-1.683	-2.420
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-1.097	-1.434	0.748	0.676	-1.028	-1.112	0.769	-0.465
Observations	882	882	882	882	882	882	882	882
<b>G. Estate Tax Control</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.321***	-1.498**	-2.028***	-1.687**	-1.071	-1.756	-5.189**	-3.158*
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.988***	-1.036***	-1.477**	-1.736***	-6.189*	-5.746*	-0.657	-2.934*
<b>H. ‘Almost’ Tax Credit Counterfactual States</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.399**	-1.535**	-2.372***	-1.639*	-2.238	-1.883	-6.377***	-2.941
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.970**	-0.898**	-1.277*	-1.808**	-5.554	-5.342	-0.039	-3.472*
Observations	320	320	320	320	320	320	320	320
<b>I. Tax Credit States Only</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.453**	-1.680**	-2.411***	-1.724*	-1.984	-2.397	-5.696**	-3.106
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.981*	-0.892*	-1.324	-1.728*	-5.599	-5.061	-0.398	-2.658
Observations	220	220	220	220	220	220	220	220
<b>J. Omit Tax Credit Obs.</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-3.725	-3.920	-2.554	-3.161	-5.414	-11.555	-3.254	-7.698
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-1.529	-1.653	-0.583	-2.355	-9.331	-3.353	-5.536	-10.458
Observations	882	882	882	882	882	882	882	882

**Notes:** \* p<0.1; \*\* p<0.05; \*\*\* p<0.01. All specifications include year effects, state fixed effects, controls, and state-specific trends and include 1000 observations unless otherwise noted. Panel A shows the baseline results from columns 5-6 and 9-10 of tables 4 and 5. Panel B weights each state by our estimate of how complete the NCED easement data coverage is for each state. Panel C weights the estimates by private land area. Panel D employs ‘winsorized’ data for the 5% of outlier observations and panel E does so for the 10%. Panel F moves treatment up two years before the actual year of a new tax credit. Panel G adds an indicator for whether or not a state followed the federal phase out of estate taxes during 2002-2005. Panel H trims the sample to only states with tax credits and states that attempted to pass credits. Panel I includes only states with tax credits. Panel J omits state-year combinations during which a tax credit program was in effect, and the year preceding a new tax credit program.



**Table 7: Regressions with IRS Data Weighted Price Indices**

	<i>Y= Easement Counts</i>				<i>Y= Easement Acres</i>			
	TNC All (1)	TNC Donated (2)	NCED All (3)	NCED Dec. (4)	TNC All (5)	TNC Donated (6)	NCED All (7)	NCED Dec. (8)
<b>A. Best-Predictor Price, All Years</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.320***	-1.497**	-2.021***	-1.683**	-1.037	-1.732	-5.152**	-3.135*
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.992***	-1.042***	-1.507**	-1.754***	-6.328**	-5.843*	-0.807	-3.028*
Observations	1000	1000	1000	1000	1000	1000	1000	1000
Adjusted R <sup>2</sup>	0.283	0.264	0.566	0.464	0.202	0.189	0.399	0.359
<b>B. Best-Predictor Price, Since 2000</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.141	-1.512	-2.574***	-2.196***	-0.498	-1.860	-6.142**	-1.307
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.587	-0.520	-0.776	-0.990	-7.266*	-6.454*	-0.657	-3.552**
Observations	600	600	600	600	600	600	600	600
Adjusted R <sup>2</sup>	0.230	0.242	0.426	0.321	0.201	0.202	0.234	0.201
<b>C. Count-Weighted Price, All Years</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.219***	-1.591***	-1.659***	-1.720***	-0.455	-1.516	-2.509	-2.672
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.321	-0.176	-0.430	-0.448	-2.641	-1.901	0.112	-0.985
Observations	1000	1000	1000	1000	1000	1000	1000	1000
Adjusted R <sup>2</sup>	0.284	0.270	0.564	0.465	0.196	0.183	0.394	0.358
<b>D. Count-Weighted Price, Since 2000</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.850***	-2.090***	-2.434***	-2.076***	-4.165**	-5.512**	-4.214*	-2.698
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	0.022	0.141	0.017	-0.042	-2.191	-1.673	0.266	-0.978
Observations	600	600	600	600	600	600	600	600
Adjusted R <sup>2</sup>	0.233	0.246	0.423	0.319	0.193	0.196	0.227	0.199
<b>E. Value-Weighted Price, All Years</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-0.996*	-1.458***	-1.254*	-1.441**	-0.305	-1.812	-2.091	-2.388
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	-0.430	-0.358	-0.279	-0.451	-2.673	-2.278	-0.041	-1.038
Observations	1000	1000	1000	1000	1000	1000	1000	1000
Adjusted R <sup>2</sup>	0.278	0.261	0.555	0.455	0.196	0.184	0.391	0.356
<b>F. Value-Weighted Price, Since 2000</b>								
Price of Cons <sub>t</sub> ( $\beta_2$ )	-1.720**	-2.085***	-2.974***	-2.391***	-3.156	-7.057**	-5.173*	-3.413
$\Delta$ Price of Cons <sub>t</sub> ( $\beta_3$ )	0.261	0.240	0.596	0.204	-1.377	-0.757	1.183	-0.578
Observations	600	600	600	600	600	600	600	600
Adjusted R <sup>2</sup>	0.226	0.239	0.412	0.314	0.190	0.195	0.221	0.200

**Notes:** \* p<0.1; \*\* p<0.05; \*\*\* p<0.01. All specifications include year effects, state fixed effects, controls, and state-specific trends. Panel A shows the results from columns 5-6 and 9-10 of tables 4 and 5. Panel B shows the results using the same best-predictor price, but for a sample of observations from 2000 to 2012. Panel's C and D show results with an alternative measure of the price index. Here the index is the weighted average of 2003-2006 donation scenarios based on IRS data, where the weights are based on the number of easements donated in each of eight AGI bin and donation amount scenarios. Panel's E and F also show results with an alternative measure of the price index. Here the weights are based on the dollar value of easements donated in each of eight AGI bin scenarios.

**Table 8: Simulated Changes in Donated Acre Flows due to Introduction of Tax Credit Programs**

						Simulated Percent Changes <sup>4</sup>		
State	Year of Tax Credit	Credit Percentage	Dollar Limit	Transferable	Years to Carry Over	Price of Conservation	Short-run Acres	Long-run Acres
NC <sup>1</sup>	1989	25%	25K	No	5	-5.3	31.4	27.2
CO	2000	100%	100K	Yes	20	-30.0	199.9	168.2
DE	2000	40%	50K	No	5	-1.4	8.4	7.3
VA	2000	50%	50K	Yes	5	-16.5	101.0	86.8
CA	2001	55%	1,000K	No	8	-6.4	37.7	32.6
MD	2001	100%	80K	No	15	-9.7	57.8	50.0
SC	2001	25%	1,000K	Yes	50	-34.7	240.2	200.2
NM	2004	50%	100K	No	5	-13.1	78.8	68.0
GA	2006	25%	250K	Yes	5	-5.1	30.2	26.1
IA	2008	50%	100K	No	20	-18.7	115.8	99.2
MA <sup>2</sup>	2011	50%	50K	No	0	-16.2	99.2	85.3
USA <sup>3</sup>	2006	changes in deductibility rules <sup>3</sup>				-7.5	44.7	38.7

**Notes:** (1) North Carolina's tax credit program began in 1983, before our sample period. The table reports a change in 1989 from a \$5K limit to a \$25K limit. (2) Massachusetts' tax credits are non-transferrable. They are, however, refundable, which in the calculator makes them effectively transferrable. (3) In 2006, the federal code changed, increasing the percent-of-AGI limit from 50% to 100% and the carryover limit from 5 to 15 years for qualified farmers and ranchers. (4) Percentage changes are calculated as geometric means of the discrete rates of growth using the initial donation flow as a base and the subsequent donation flow as a base.

**Table 9: Descriptive Statistics of Strategic Conservation**

	Number of Easements		Percent of a Trust's Easements		Number of Trusts
	Mean	St. Dev	Mean	St. Dev	
<b>Acquisition Method</b>					
All	29.76	97.76			631
Donated	23.88	86.46	79.47	32.30	631
Purchased	2.946	11.64	13.64	27.81	631
Bargain Sale	2.934	14.71	6.883	18.45	631
<b>Conservation Quality</b>					
Easements in Priority Area	23.79	96.64	75.25	30.60	548

**Notes:** Data come from the 2005 Land Trust Alliance survey of trusts. Observations included are those inferred to have responded to the relevant question. The stock of all easements was reported by survey participants. The stock of donated, bargain sales, and purchased easements are estimated by multiplying the reported estimated percentage of easements acquired through each method by the reported stock of all easements.

**Table 10: Trust-Level OLS Regressions of Strategic Conservation**

	<i>Y = Percent of Easements in Priority Area</i>			
	(1)	(2)	(3)	(4)
Percent Donated	-0.172*** (0.041)	-0.169** (0.078)		
Percent Bargain Sales	-0.086 (0.067)	-0.053 (0.097)	-0.089 (0.067)	-0.054 (0.089)
Number of All Easements	0.011** (0.006)	0.011** (0.002)	0.011* (0.006)	0.009** (0.004)
<b>Interactions with Price of Conservation</b>				
% Donated $\times$ Indicator for 1 <sup>st</sup> PCon Quartile (lowest price of conservation)			-0.163*** (0.060)	-0.113 (0.096)
% Donated $\times$ Indicator for 2nd PCon Quartile			-0.167*** (0.051)	-0.106 (0.079)
% Donated $\times$ Indicator for 3rd PCon Quartile			-0.122** (0.051)	-0.100 (0.084)
% Donated $\times$ Indicator for 4th PCon Quartile (highest price of conservation)			-0.218*** (0.049)	-0.300*** (0.084)
Constant	88.283*** (3.315)	87.734*** (6.561)	88.255*** (3.320)	88.390*** (6.641)
Weighted by Number of Easements	No	Yes	No	Yes
Observations	432	432	432	432
Adjusted R <sup>2</sup>	0.022	0.065	0.020	0.089

**Notes:** \* p<0.1; \*\* p<.05; \*\*\* p<.01. Robust standard errors are presented in parentheses. Data come from the 2005 Land Trust Alliance survey of trusts. Observations included are those inferred to have responded to all of the relevant questions. The indicator for the 1<sup>st</sup> PCons quartile equals 1 for states that were in the lowest quartile (25<sup>th</sup> percentile) for the price of conservation, averaged over 2000-2005. This quartile includes states with an average price of conservation under 0.575, for the AGI = \$100,000, Donation = \$500,000 scenario. The definitions for the other quartiles are similar.

## **Appendix A: Highlights of State Tax Credit Programs from Inception through 2012**

### **California**

First Year of Credit:	2001
Initial Act:	Natural Heritage Preservation Tax Credit Act of 2000
Eligible donations:	Fee simple and conservation easements
Individual Limit:	None
Fair Market Value cap:	55%
Carryforward:	8 years
Transferable:	No
Take credit and deduction:	No
Notes:	The program was suspended in 2002 and then reinstated in 2005 with a sunset at year end 2008. The program was re-authorized in 2010 with a sunset in 2015. Eligible donations must be approved and easement holders must reimburse the state's general fund for the loss in revenue resulting from the tax credits prior to acquiring the property. Given the constraints on this program, we treat California as having no income tax credit program in the empirical analysis.

### **Colorado**

First Year of Credit:	2000
Initial Act:	Credit Against Tax- Conservation Easements
Eligible donations:	Conservation easements only
Individual Limit:	\$100K in 2000-02; \$260K in 2003-05; \$375K from 2006-2012
Fair Market Value cap:	100% in 2000-02; 100% on first \$100K & 40% thereafter in 2003-05; 50% on entire donation from 2006-2012
Carryforward:	20 years
Transferable:	Yes
Take credit and deduction:	No

### **Delaware**

First Year of Credit:	2000
Initial Act:	Land and Historic Resources Protection Incentives Act
Eligible donations:	Fee simple and conservation easements
Individual Limit:	\$50K
Fair Market Value cap:	40%
Carryforward:	5 years
Transferable:	No
Take credit and deduction:	No

### **Georgia**

First Year of Credit:	2006
Initial Act:	Credit for the Donation of Property for Conservation Purposes
Eligible donations:	Fee simple and conservation easements
Individual Limit:	\$250K
Fair Market Value cap:	25%
Carryforward:	5 years during 2006-2007; 10 years from 2008-2012
Transferable:	No until 2011, when credit became transferable
Take credit and deduction:	Yes (but not after 2012)

## **Appendix A, continued**

### **Iowa**

First Year of Credit:	2008
Initial Act:	Tax Credit for Charitable Conservation Contribution of Land
Eligible donations:	Fee simple and conservation easements
Individual Limit:	\$100K
Fair Market Value cap:	50%
Carryforward:	20 years
Transferable:	No
Take credit and deduction:	Yes

### **Maryland**

First Year of Credit:	2001
Initial Act:	Income Tax Credit for Preservation & Conservation Easements
Eligible donations:	Conservation easements only
Individual Limit:	\$80K in total, \$5K annually
Fair Market Value cap:	50%
Carryforward:	15 years
Transferable:	No
Take credit and deduction:	No

### **Massachusetts**

First Year of Credit:	2011
Initial Act:	Approved in State Environmental Bond
Eligible donations:	Fee simple and conservation easements
Individual Limit:	\$50K
Fair Market Value cap:	50%
Carryforward:	None (but a refund applies)
Transferable:	No
Take credit and deduction:	No

### **New Mexico**

First Year of Credit:	2004
Initial Act:	Land Conservation Incentive Act
Eligible donations:	Fee simple and conservation easements
Individual Limit:	\$100K during 2004-07; \$250K from 2008-2012
Fair Market Value cap:	50%
Carryforward:	20 years
Transferable:	No from 2004-2007; Yes from 2008-2012
Take credit and deduction:	No

## Appendix A, continued

### North Carolina

First Year of Credit:	1983
Initial Act:	Credit for Certain Real Property Donations
Eligible donations:	Fee simple and conservation easements
Individual Limit:	\$5K during 1983-88; \$25K during 1989-1996; \$100K during 1997-98; \$250K from 1999 to 2012.
Fair Market Value cap:	25%
Carryforward:	5 years
Transferable:	No
Take credit and deduction:	Yes

### South Carolina

First Year of Credit:	2001
Initial Act:	South Carolina Conservation Incentives Act
Eligible donations:	Fee simple and conservation easements
Individual Limit:	\$52,500 (annual limit)
Fair Market Value cap:	25%
Carryforward:	Until credit is exhausted
Transferable:	Yes
Take credit and deduction:	Yes

### Virginia

First Year of Credit:	2000
Initial Act:	Virginia Land Conservation Incentives Act of 1999
Eligible donations:	Fee simple and conservation easements
Individual Limit:	\$50K in 2000; 75K in 2001; \$100K for 2002-09; \$50K for 2009-2012
Fair Market Value cap:	50% for 2000-06; 40% for 2007-2012
Carryforward:	5 years for 200-06; 10 years for 2007-09; 12 years for 2009-2012
Transferable:	Yes
Take credit and deduction:	Yes

**Sources:** *State Conservation Tax Credits: Impact and Analysis* (2007), Conservation Resource Center, Boulder; [www.timbertax.org/statetaxes/landdonationtaxcredits/](http://www.timbertax.org/statetaxes/landdonationtaxcredits/); and legislation and tax filing instructions from the individual states.

## **Appendix B: The Tax Calculator**

### **I. Overview**

The Tax Calculator comprises over 1200 lines of Matlab code. It takes as input a user-specified taxpayer scenario, consisting of three values: the taxpayer's Adjusted Gross Income, the value of the taxpayer's easement donation, and a characterization of the taxpayer as one who either qualifies or does not for the extended carryover and easement contribution limits enacted in federal law in 2006 for qualifying farmers or ranchers. For example, a possible scenario would be (\$200,000 AGI, \$500,000 easement value, and qualified = 1). From this scenario, the calculator determines what the federal and state income tax liabilities for the taxpayer would be in each of the 50 states and in each of the years 1987-2012. The calculator assumes that the donation is made once and calculates the tax liability that results from the donation in the year in question, and adds to the liability the present value of all future changes in taxes that result from a carrying over of unused deductions and credits into future years.

The code for the tax calculator can be browsed at:

[http://www4.ncsu.edu/~wthurman/state\\_fed\\_turbo\\_PC.html](http://www4.ncsu.edu/~wthurman/state_fed_turbo_PC.html)

The calculator repeatedly calls a Matlab function, taxCalc:

<http://www4.ncsu.edu/~wthurman/taxCalc.html>

The following narrative describes how the calculator's code simulates the joint federal and state tax systems.

### **II. Inputs External to the Calculator**

The primary representation of the federal and state tax codes comes in the form of spreadsheets containing the tax brackets and rates for each year at both federal and state levels. Other spreadsheets are read in that contain, for each state and year, the fraction of AGI allowed as an easement deduction. For example, since 2006 an ordinary taxpayer has been able to take an easement deduction of up to 50% of their AGI as a federal deduction; a qualified farmer or rancher has been able to take a deduction up to 100% of their AGI. The federal limits were 30% of AGI for both types of taxpayers prior to 2006. States vary as to the percentages of AGI that limit easement donations and the state limits change over time. Many states conform to federal rules in their treatment of the deduction of charitable contributions and for those states the calculator assumes that the same federal limits apply as just described. (See *All States Tax Handbook*, various years 1987-2012.)

The calculator divides the 50 states into 11 tax code categories, depending on: how deductions and exemptions are treated, the relationship of the state tax to federal tax, and the treatment of

tax credits for conservation easements. The categories are listed here. A few states change tax category once or more often over the 1987-2012 sample period.

State Income Tax Categories (with states listed according to their most frequent status in the sample)

1. States without an income tax (AK, FL, NV, SD, TX, WA, WY)
2. States that calculate income tax as a proportion of federal income tax (RI, VT)
3. States with an income tax that does not allow itemized deductions
  - 3a. States with a tax that does not allow itemization and that taxes dividends and wages at the same rate  
(CT, IL, IN, MI, OH, PA, WV, WI)
  - 3b. States with a tax that does not allow itemization and that taxes dividends and wages at different rates (MA, NH, TN)
4. States with an income tax that allows itemization of deductions  
(AL, AZ, HI, ID, KS, LA, ME, MN, MS, MO, MT, NJ, NY, ND, OK, UT)
5. States that allow itemization of deductions – exemptions are taken as credits (AR, CA, KY, NE, OR)
6. States that offer conservation easement tax credits
  - 6a. States that allow both deductions and credits – personal exemptions are deducted from income (GA, NC, SC, VA)
  - 6b. States that allow both deductions and credits – personal exemptions are taken as credits (IA)
  - 6c. States that allow either a credit or deduction – filers are assumed to take the credit. Exemptions are deducted from taxable income  
(CO, MD, NM)
  - 6d. States allow either a credit or deduction – filers are assumed to take the credit. Exemptions are taken as credits (DE)



### **III. Algorithm Logic**

#### **A. Adjustment for inflation**

The scenario inputs of AGI and donation are specified in 2012 dollars. The dollar values for AGI and donation are converted into 1987-2012 time series of equivalent dollar values, where the CPI-All Urban Consumers is used for deflation. For example, if AGI is set to \$100K in 2012 dollars and the value of the CPI in 1990 (normalized to 2012=1.00) is 0.50, then the AGI fed into the calculator for 1990 is  $\$100K \times 0.50 = \$50K$ . The 2012 value of the easement donation is similarly converted to dollar terms appropriate for the year in which the calculation is carried out. Because all dollar values are converted into purchasing-power adjusted values, the legislated nominal tax brackets from each year are appropriate.

#### **B. Calculation of tax liability and the price of conservation for a state without an income tax**

Residents of states without an income tax owe only a federal tax payment. To evaluate the consequences of donating an easement, the taxpayer's federal tax is calculated under three hypothetical situations, which are considered in the theory section of the paper: Full0, Base0, and BaseC.

Full0 refers to the tax that would be owed if the taxpayer took their full available income (the "Full" part of Full0) and donated no easement income (the "0" part of Full0). Full income with no donation is  $AGI + rC$ : AGI plus the investment return on the potential donation of C. With full income and no donation, the federal tax bill is calculated assuming that the taxpayer is married filing jointly and itemizes deductions. The amount of deductions is set equal to the standard deduction under the no-donation hypotheticals; the taxpayer takes personal exemptions for the taxpayer and spouse. Denote the taxes owed under the Full0 hypothetical as TaxFull0.

The second tax calculation assumes the Base0 hypothetical: the consumer takes Base income (equal to AGI) and makes no easement donation. This is the tax situation for a donor in years after the donation. The taxpayer has reduced their market income to AGI (from  $AGI + rC$ ) by virtue of the donation but does not receive the tax benefit of an easement donation in years after the donation (except for the consequences arising from the carryover of unused deductions, discussed below.) TaxBase0 is calculated from the federal tax code in the same way that TaxFull0 is calculated: the taxpayer is assumed to file jointly and take the standard deduction.

The third tax calculation assumes the BaseC hypothetical: the consumer takes Base income (equal to AGI) and makes an easement donation in the amount C. This results in the tax owed in the year of the donation, TaxBaseC. The calculation proceeds assuming that deductions are itemized and equal to the standard deduction plus any easement-related deduction. The calculation is similar to those under the two previous hypotheticals, with one important complication: the carryover of unused deduction. For example, if the taxpayer cannot deduct more than 30% of their AGI (as was the law in years prior to 2006), and if the value of the

easement donation exceeds 30% of AGI, then the unused portion of the deduction is carried forward into future tax years. In consideration of the next tax year, the unused deduction from the first year might again exceed 30% of the taxpayer's AGI, resulting in carryover into the second year after the donation decision year. Carryover continues until either the deduction is used in its entirety or until the carryover limit is reached. U.S. law allowed carryover into five subsequent years under the tax code for 2005 and before. The law was changed in 2006 to allow 15 years of carryover beyond the donation decision year.

### **B.1. The price of conservation without carryover**

If there is no carryover (because, for example, the donation is less than 30% of AGI), then the calculation of the price of conservation proceeds directly from the three tax values TaxFull0, TaxBase0, and TaxBaseC.

The taxpayer who does not donate is assumed to pay a perpetuity of tax payments of TFull0. The taxpayer who donates pays taxes equal to TBaseC in the year of the donation and equal to TBase0 in every year thereafter. The present value of the tax savings due to the donation is:

$$(A1) \quad \text{PV of tax savings} = \text{PV of tax stream without donation} - \text{PV of tax stream with donation} \\ = TFull0/r - [TBaseC/(1+r) + (Tbase0/r)/(1+r)],$$

where periodic payments are considered taken at the end of the period and discounted to the beginning.

The PV of tax savings is the tax benefit from donating, while the cost of donating is the permanent loss of income  $rC$ , which has a capitalized value of  $C$ . Therefore the price of conservation is:

$$\text{Dollar cost of donation} = \text{PV of foregone income} - \text{PV of tax savings} \\ = C - \text{PV of tax savings}.$$

Expressed per dollar of donated value:

$$(A2) \quad P_c = 1 - (\text{PV of tax savings})/C.$$

### **B.2. The price of conservation with carryover**

Carryover of unused deductions affects only the calculation of TaxBaseC. (Hypotheticals Full0 and Base0 involve no donation and, hence, no carryover.) If the taxpayer is unconstrained by the AGI limits then carryover is zero and TaxBaseC is simply the tax bill owed in the year of donation. If the donation is large enough relative to AGI to result in a carryover into future years, the calculator adjusts TaxBaseC for the value of the additional tax benefits that accrue

from having the carried over deductions in future years. In the year following the donation, the tax bill is calculated assuming a Base income (of AGI) and a deduction equal to the carried over value from the donation year. That tax bill is calculated and compared to the tax bill that would result from a Base income (of AGI) and no deduction. The difference between the two is the tax benefit, under the donation scenario, from having additional deductions carried into the second year. The difference between the two is discounted back to the donation year and subtracted from TaxBaseC to reflect the further tax benefit from carried over deductions.

If there remains unused deduction in the second year, the process is repeated into year three and beyond until either the deduction is exhausted or the carryover limit (of 5 or 15 years) is reached. For each future year in which carryover is relevant, the tax savings due to carryover is discounted back to the donation year and netted out of TaxBaseC. The ultimate adjusted value of TaxBaseC is used in expression A1 to calculate the present value of tax savings due to donating, and expression A2 is used to calculate the price of conservation.

### **C. Calculation of tax liability for a state with an income tax, but no itemization of deductions**

For states with an income tax code that does not allow itemization, there is no explicit state tax benefit from charitable donations, including the donation of easements. However, state taxes can be deducted from federal taxable income and so the state and federal tax codes interact. The deductibility of state tax payments from federal taxable income can affect the marginal federal rate paid and, hence, the tax benefit from donations. Further, the choice of donating determines the market income of a taxpayer and so the state taxes paid are affected directly by the choice to donate.

The calculator takes state taxes into account by first calculating state taxes owed under the two hypothetical levels of income (Full and Base) and then deducting the relevant state tax from federal taxable income under the three federal hypotheticals described above (Full0, Base0, and BaseC.) In each hypothetical year, the calculation of federal tax liability proceeds as described above for states without income taxes, but with state taxes deducted from income. The resulting state and federal tax liabilities are added together in each year and the same carryover calculations are made—adjusting federal taxable income in each future year for the state income taxes paid—making A1 still the relevant expression for the PV of tax savings, where tax savings are now understood to encompass the combined federal and state tax bill.<sup>1</sup>

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<sup>1</sup> The calculator diverges from the real-time calculation of a taxpayer's liability in two notable ways. The first is that on an actual tax return, the state taxes that are deducted from taxable income are those paid in the previous year, not the current year. The calculator abstracts from this timing issue by assuming that the state taxes paid this year are entirely deducted from this year's income. This abstraction is harmless to the extent that a taxpayer's withholding for state taxes in the current year matches this year's state tax liability because it is withheld (and estimated) state taxes that are deducted from the current year's federal taxable income.

The second divergence is that while the calculator acknowledges the federal deductibility of state tax payments, it ignores the fact that some states allow the deduction of federal tax payments from state taxable income. (In 2012

#### **D. Calculation of tax liability for a state with an income tax with itemized deductions**

In the previous case of a state with an income tax but no allowable deductions, the state tax bill depends only on taxable income, either Base (AGI) or Full (AGI + rC). Federal calculations proceed in all years and under all hypothetical assumptions taking state tax payments as exogenous. In the case of a state that allows the value of the easement to be deducted from state taxable income, the stream of state tax payments over time still is predetermined with respect to the calculation of federal tax, but carryover considerations influence the state tax calculations. The carryover limits at the federal level (5 years prior to 2006 and 15 years thereafter) are assumed to hold at the state level as well. However, carryover is determined by state-specific limits on the deduction as a proportion of AGI.

Just as in the federal case, when calculating the state tax bill assuming a donation, the calculator checks to see if the proportion-of-AGI limit is binding and, if so, carries forward the unused deduction into future tax years. Future state and federal tax bills are calculated year by year for as many years as federal or state allowed carryover is positive; the number of years in which deductions are allowed to be carried over need not be the same at the federal and state levels. The tax savings from carried over deductions are discounted back to the year of the donation and netted out of the state and federal tax bills. The present values of the tax savings due to the donation are combined from the federal and state tax calculations and the price of conservation is, again, calculated according to expression A2.

#### **E. Calculation of tax liability for a state that offers income tax credits for easement donations**

Tax credit provisions complicate the calculations described above.

##### **E.1. Transferable credits**

A tax credit is equivalent to a voucher for payment of state taxes equal to, say, 25% of the value of the easement donation. In some states (CO and VA) in some years, the credit is transferrable and easement donors can sell their credits, typically for 85 cents per dollar. In those states and years, if the state only allows the credit and not the deduction as well, then the calculation of state tax liability proceeds as above for a state with an income tax that does not allow itemization of deductions. The credit is calculated as a proportion of the easement value and assumed to be

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those states were AL, IA, LA, MO, MT, ND, OR, and UT. Of those states, only IA offers conservation easement tax credits.) The rationale for ignoring the deductibility of federal tax payments from these states' tax returns is that the deductibility would apply both to taxes paid if a donation is made and to taxes paid if no donation is made. While there would be some interaction between the donation's effects and the deductibility of federal tax payments, we believe the effect would be second order.

sold at \$0.85 per dollar. The credit proceeds are considered to be a tax benefit to donating the easement. Further, the credit sale proceeds are taken to be taxable at the federal level. With these adjustments, the tax liabilities and price of conservation are calculated as above in III.C.

## **E.2. Non-transferable credits: deductions and/or credits allowed**

For some states, easement donations can be deducted from taxable income and the donors also receive a state tax credit. In states that allow the taxpayer to have their cake and eat it too, the calculator deducts the easement value from state and federal taxable income—as outlined above in the case of states that allow itemization—and then adjusts state tax liabilities by the amount of the credit generated. If the credit is less than the state tax liability in the year of the donation then there are no further implications. If the credit exceeds the state tax liability in the year of the donation then the credit is used to pay the state tax bill and the remainder is carried forward. Future state tax liabilities are met by the remaining value of the credit until the credit is exhausted. Federal income tax is affected by the state tax credits because state tax paid, hence the federal state tax deduction, is reduced by the amount of the credit applied. Net state tax payments are discounted back to the year of donation and expressions A1 and A2, now adjusted for the benefits of the state tax credit, describe the tax savings and resulting price of conservation.

In some states, credits are granted, but the taxpayer is not allowed to both take the deduction and receive the credit. The taxpayer must choose. In those states and years, the calculator assumes that the credit is the more favorable tax option. The calculator acknowledges receipt of the credit as discussed in the previous paragraph, but the calculation is simplified by the fact that no deduction from state taxable income is taken.

## **IV. Aspects of the Income Tax code not Incorporated in the Calculator**

We call attention to two aspects of the income tax code that are not captured by the calculator and provide justification for price of conservation calculations that result.

### **A. Pease limitations**

The so-called Pease limitations were first introduced into the federal tax code in 1991. They were in effect until 2009, and reinstated in 2013. For high-income taxpayers (AGI greater than \$300,000 for joint filers in 2013), the limitations reduced itemized deductions allowed. According to this description, one might expect that such limitations could mute the tax benefits from easement donations. However, even for high-income taxpayers and despite the proper name of the Pease limitations (“overall limitation on itemized deductions”), Pease limitations have no effect on incentives to donate for almost all taxpayers (see Rosenberg *et al.*, 2013). For affected taxpayers, Pease limitations act by adding a dollar amount of deductions back into taxable income, with the amount added determined by income and not by the amount of deductions. The deductibility of charitable donations, including easement donations, is not affected.

## **B. Alternative Minimum Tax**

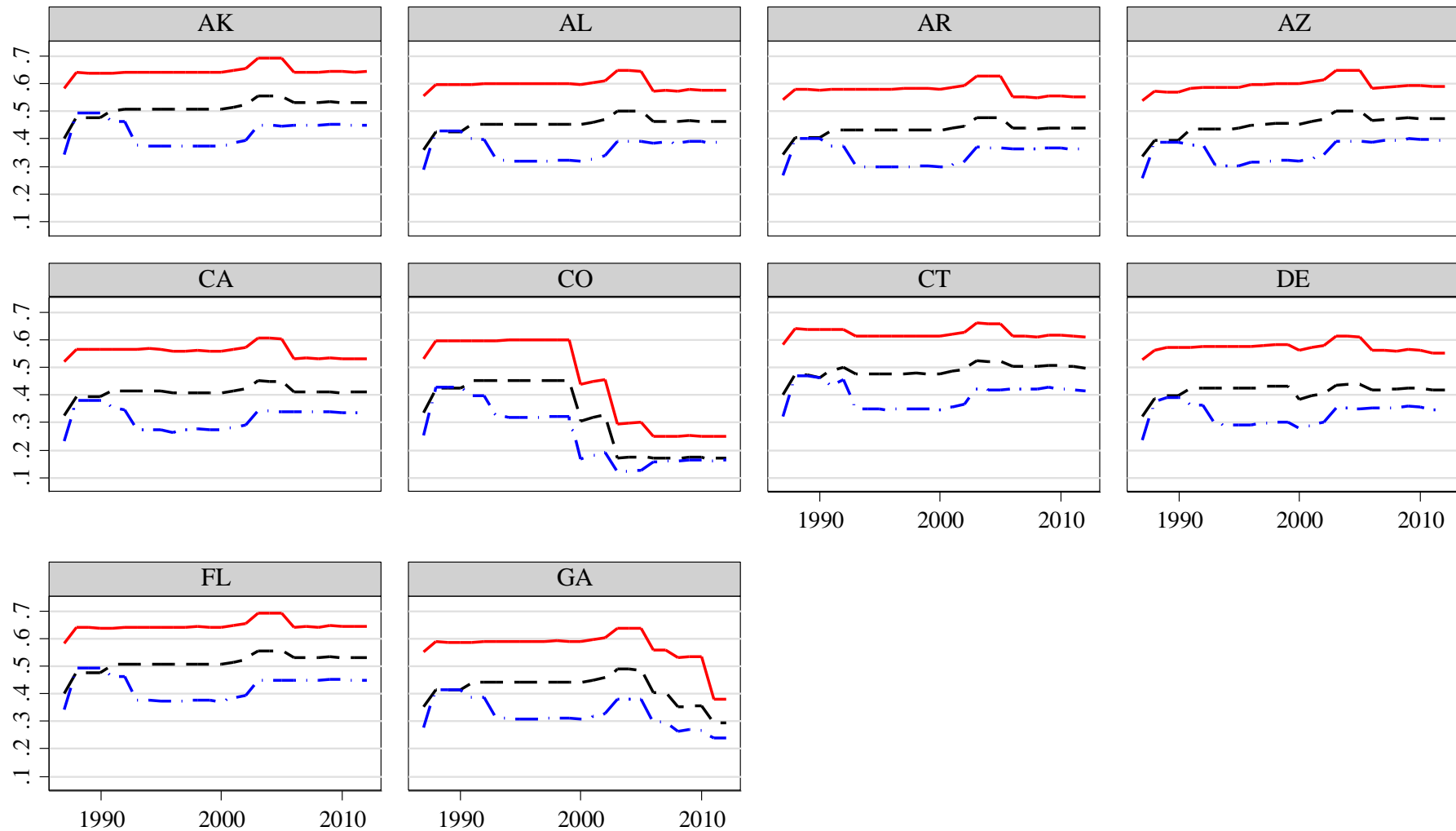
The AMT is a tax system parallel to the ordinary federal income tax, affecting taxpayers with high incomes and large deductions. It taxes a broader base of income than does the ordinary tax, at different rates. The AMT levies a maximum rate of 28% (lower than the 2016 ordinary income tax maximum rate of 39.6%) and recalculates taxable income by adding back in deductions taken for state and local income taxes, property taxes, mortgage interest, and miscellaneous itemized deductions (but not charitable contributions.)

The AMT is triggered by high incomes and high deductions. But once in the AMT system, taxpayers are allowed deductions for charitable contributions and, therefore, face the ordinary incentives to donate that arise from one's marginal rates. (And tax credit provisions and state income taxes are unaffected by the AMT.) Where the AMT might affect the incentive to donate an easement is through its effect on the marginal tax rate. Typically, the AMT schedule determines a lower marginal rate than faced in the ordinary income tax system and thus could be said to diminish the donation incentive for those subject to the AMT.

This discussion suggests that for high-income taxpayers the tax comparisons of the calculator overstate somewhat the tax benefits from easement donation (due, currently, to the difference between a 28% and 39.6% marginal rate) and, to that extent, understate the price of conservation. However, the AMT structure phases in the high 28% rate over an income range (from \$154,000 to \$477,000 for joint filers in 2013), which increases the effective marginal rate on income in that range from 28% to 35%. For comparison, the 2013 ordinary marginal rates for incomes in the \$146,000-\$450,000 range lie between 28% and 35%. Thus, the effective marginal AMT rate given the phased out exemption is much closer to the marginal rates experienced by ordinary income tax payers in that range, suggesting that for taxpayers in this range the calculator gives prices of conservation close to what result from a full consideration of the AMT. As to empirical evidence on the marginal rate effect of the AMT, the Congressional Budget Office (2010) concluded that "[i]n 2006, more than 70 percent of taxpayers subject to the AMT faced a higher marginal tax rate than they would have under the regular tax. On average, the AMT raised the marginal tax rates for those taxpayers by about 4 percentage points."

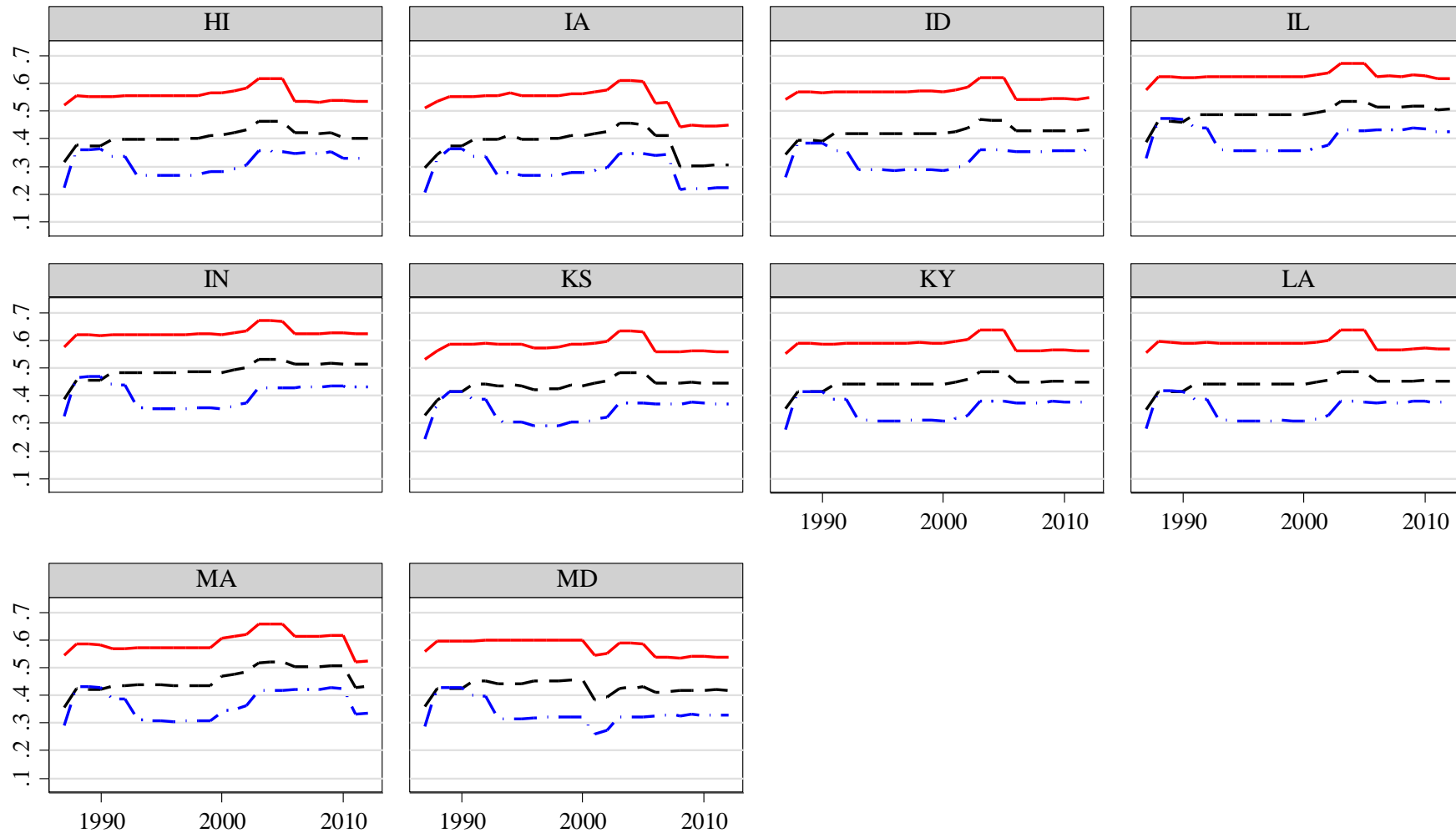
Because the AMT was not indexed prior to 2013, few taxpayers were subject to the AMT in the earlier years of our sample, but more have been subject to it in recent years. We note that we find the most empirically relevant index of the price of conservation in explaining easement donation variation to be that constructed for a taxpayer with \$100,000 in AGI and an easement donation of \$500,000. Taxpayers in this category are unlikely to be affected by the AMT. According to the Tax Policy Center, while 27% of tax units with expanded cash income in the range of \$200,000-\$500,000 were subject to the AMT in 2015, only 1.8% of those in the \$100,000-\$200,000 range were subject to the AMT. Thus, a potential donor in our most empirically relevant scenario was exceedingly unlikely to face the AMT in 2015, and the probability of their exposure to the AMT in earlier years was likely less.

## Appendix C: Price of Conservation by State: Alaska through Georgia



**Note:** The solid line indicates the price of conservation for AGI = \$100,000 and a donation of \$500,000. The dashed line is for AGI = \$200,000 and a donation of \$500,000. The dot-dashed line shows a weighted average based on AGI and donation values across eight categories of actual donors, based on 2003-2006 IRS data from Eagle (2011).

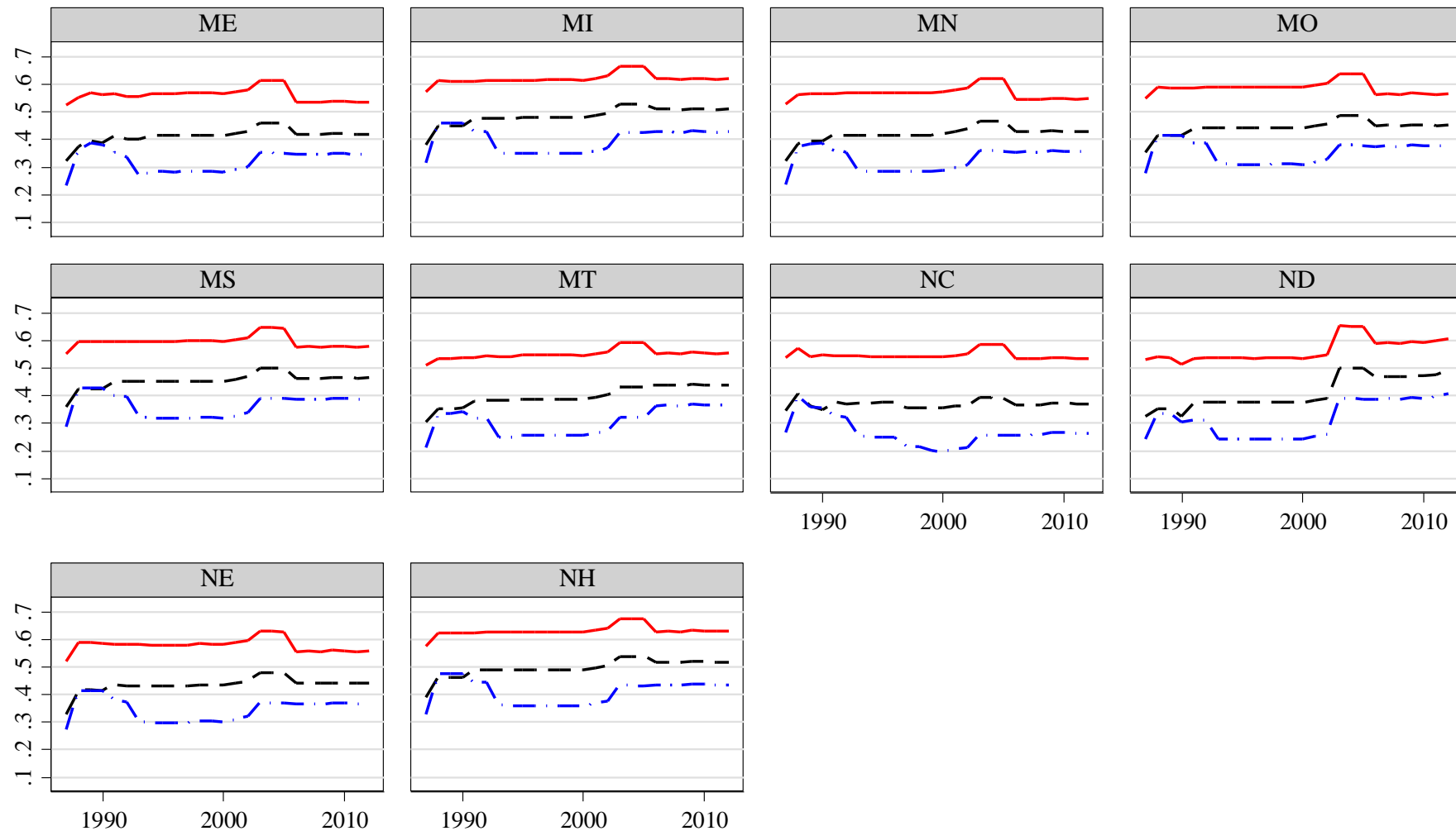
## Appendix C: Price of Conservation by State: Hawaii through Maryland



**Note:** The solid line indicates the price of conservation for AGI = \$100,000 and a donation of \$500,000. The dashed line is for AGI = \$200,000 and a donation of \$500,000. The dot-dashed line shows a weighted average based on AGI and donation values across eight categories of actual donors, based on 2003-2006 IRS data from Eagle (2011).

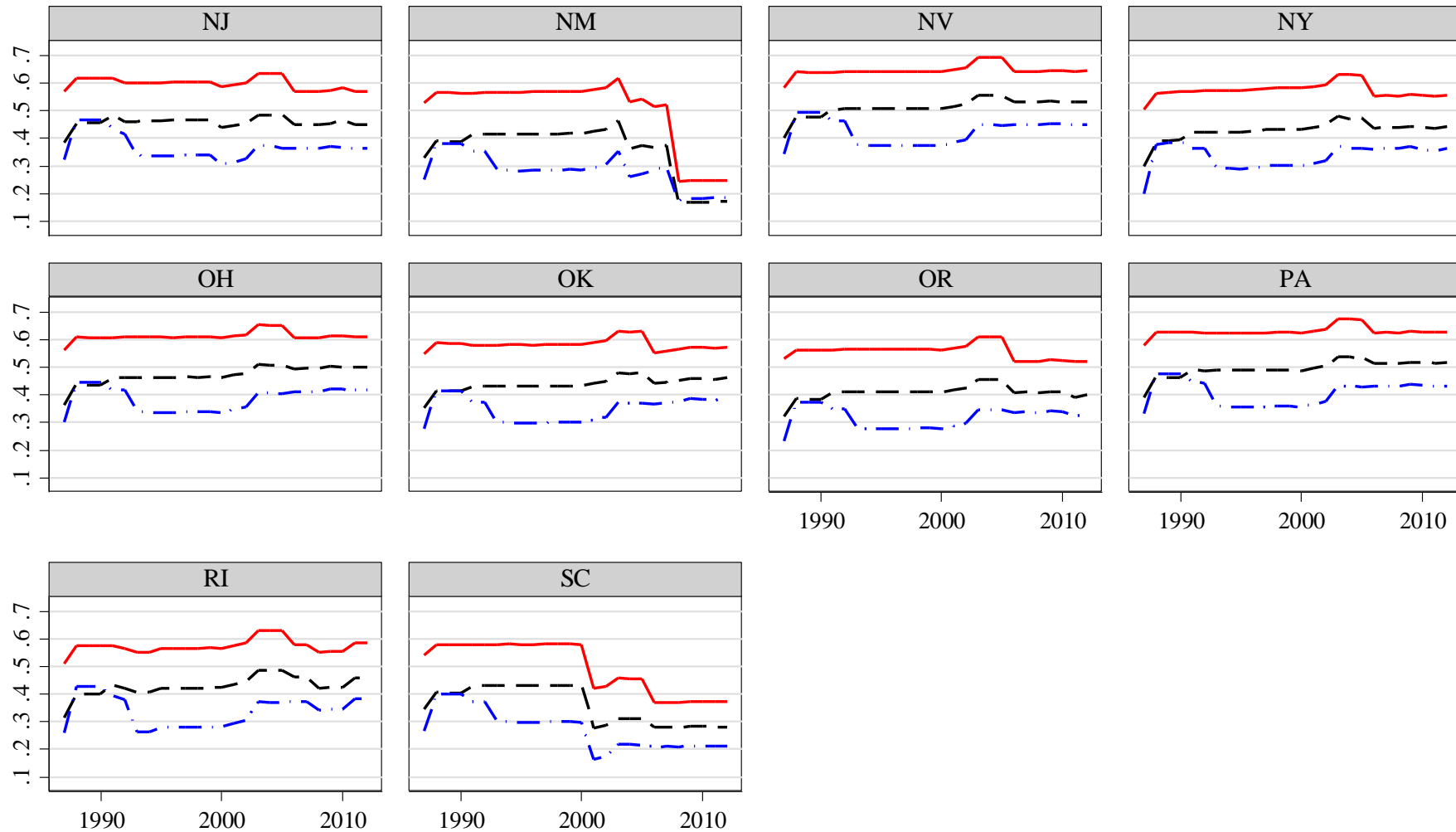


## Appendix C: Price of Conservation by State: Maine through New Hampshire



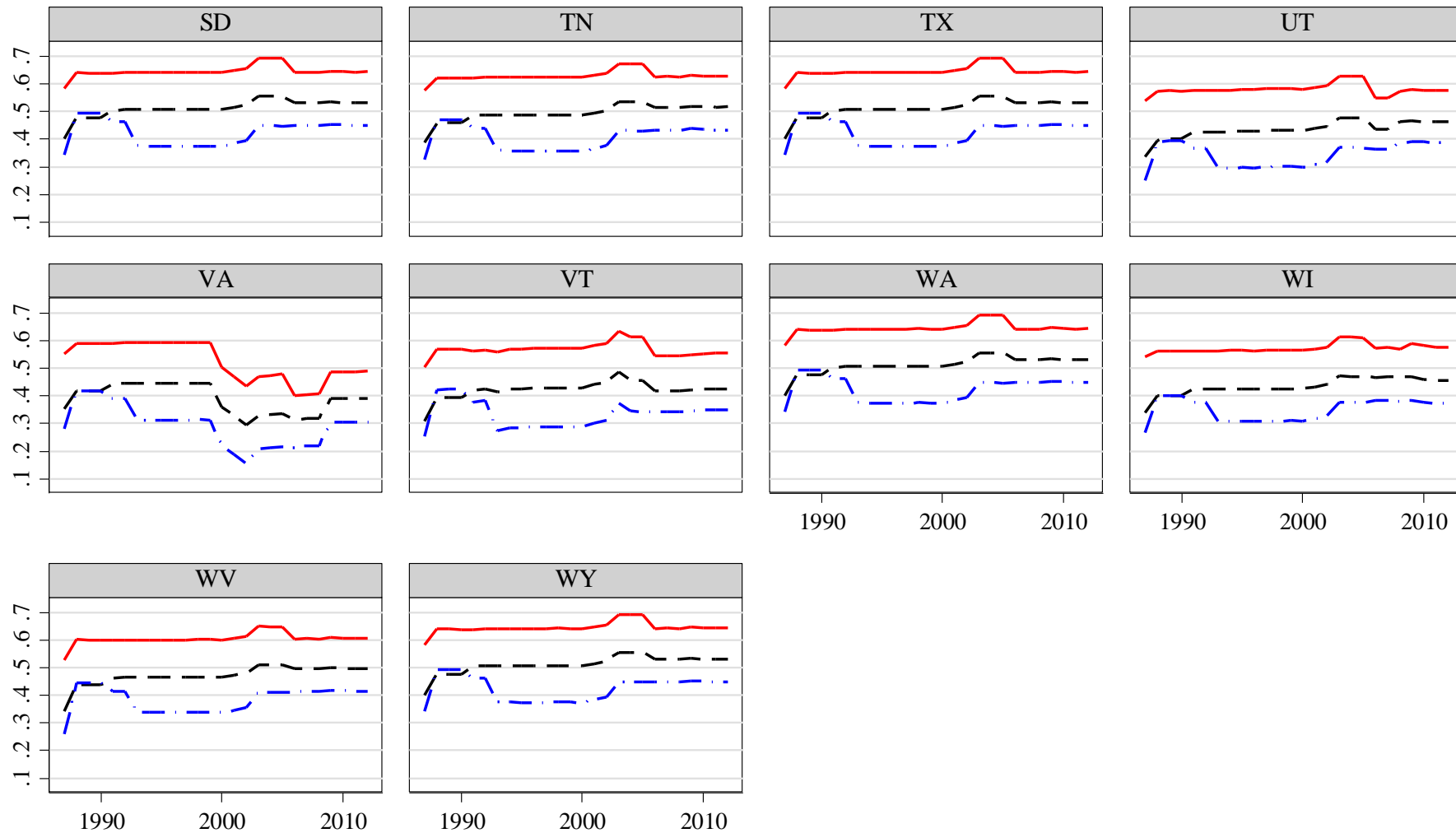
**Note:** The solid line indicates the price of conservation for AGI = \$100,000 and a donation of \$500,000. The dashed line is for AGI = \$200,000 and a donation of \$500,000. The dot-dashed line shows a weighted average based on AGI and donation values across eight categories of actual donors, based on 2003-2006 IRS data from Eagle (2011).

## Appendix C: Price of Conservation by State: New Jersey through South Carolina



**Note:** The solid line indicates the price of conservation for AGI = \$100,000 and a donation of \$500,000. The dashed line is for AGI = \$200,000 and a donation of \$500,000. The dot-dashed line shows a weighted average based on AGI and donation values across eight categories of actual donors, based on 2003-2006 IRS data from Eagle (2011).

## Appendix C: Price of Conservation by State: South Dakota through Wyoming



**Note:** The solid line indicates the price of conservation for AGI = \$100,000 and a donation of \$500,000. The dashed line is for AGI = \$200,000 and a donation of \$500,000. The dot-dashed line shows a weighted average based on AGI and donation values across eight categories of actual donors, based on 2003-2006 IRS data from Eagle (2011).

**Table A1**  
**Summary Statistics of State-Level Covariates**

Variable	Mean	St. Dev	Min	Max	Description
Land Price	1.411	2.043	0	15.20	An index measuring the value of residential land in a state based on sale and rental prices over time. The source is Davis and Heathcote (2007) and Lincoln Institute of Land Policy at <a href="http://www.lincolnst.edu/resources/">www.lincolnst.edu/resources/</a> .
Ln(Farm income)	15.02	1.345	10.68	17.61	The natural log of gross farm income in a state, in 2012 \$. The source is Economic Research Service of the U.S. Dept. of Agriculture, Farm and Wealth Statistics, available at: <a href="http://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/">www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/</a>
Ln(Forest income)	12.80	1.252	8.480	15.55	The natural log of gross income from forestry on farms in a state, in 2012 \$. The source is Economic Research Service of the U.S. Dept. of Agriculture, Farm and Wealth Statistics, available at: <a href="http://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/">www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/</a>
Ln(Per capita income)	10.20	0.338	9.295	10.99	The natural log of total income per capita in a state, in 2012 \$. The source is the U.S. Bureau of Economic Analysis, available at <a href="http://www.bea.gov/regional/">www.bea.gov/regional/</a> .
Ln(population)	15.04	1.011	13.02	17.45	The natural log of total population in a state. The source is the U.S. Census Bureau.
Govt. easements	5.035	4.835	-2.302	12.49	The acres of conservation easements acquired by government agencies in a state including federal, state, and local governments. The source is the National Conservation Easement Database (NCED), available at <a href="http://nced.conservationregistry.org/about">http://nced.conservationregistry.org/about</a> . (July 2015 update).

**Table A2**  
**Calculator Input for Weighted-Average Price Indices, based on 2003-2006 IRS Data**

	(1)	(2)	(3)	(4)	(5)
<b>IRS donor income range, in \$000s</b>	<b>Assumed AGI for Calculator Input, \$000s</b>	<b>Average Donation, in \$000s</b>	<b># of Donations (prop. of total)</b>	<b>Total Donations, in \$000s (prop. of total)</b>	
Under 200	100	223.4	5,764 (0.42)	1,287,885 (0.11)	
200 to 500	350	502.9	4,025 (0.29)	2,024,150 (0.17)	
500 to 1,000	750	915.6	1,123 (0.08)	1,028,356 (0.09)	
1,000 to 1,500	1,250	1,841.7	790 (0.06)	1,455,200 (0.12)	
1,500 to 2,000	1,750	1,240.7	524 (0.04)	650,404 (0.06)	
2,000 to 5,000	3,500	1,799.6	920 (0.07)	1,655,503 (0.14)	
5,000 to 10,000	7,500	3,531.8	368 (0.03)	1,298,820 (0.11)	
Greater than 10,000	10,000	6,081.5	370 (0.03)	2,250,139 (0.19)	

**Notes:** The data come from Eagle (2011) and summarize conservation easement donations across the income bins over 2003-2006.

**Table A3**  
**Cross-Section OLS Regression Estimates of the 2005 Stock of Easements, Based on**  
**Land Trust Alliance Census Data**

	Count of All Easements	Count of Donated	Count of Bargain Sales	Count of Purchased
	(1)	(2)	(3)	(4)
Price of Conservation	-2.374*** (0.615)	-2.407*** (0.613)	-1.422** (0.608)	-0.341 (0.555)
Constant	1.730*** (0.325)	1.333*** (0.323)	-0.110 (0.308)	0.525* (0.287)
Weighted by # of Easements	No	No	No	No
Observations (land trusts)	432	432	432	432
Adjusted R <sup>2</sup>	0.025	0.023	0.014	0.022

Notes: \* p<0.1; \*\* p<.05; \*\*\* p<.01. Robust standard errors are presented in parentheses. The observations are land trust level holdings of conservation easements, as of 2005. The dependent variable is the count of easements, transformed by the inverse hyperbolic sine function. The price of conservation is logged. The observations include all land trusts that held at least one conservation easement, and that are inferred to have responded to questions about priority area conservation and easement acquisition method.