DO CONSERVATION EASEMENTS REDUCE LAND PRICES? THE CASE OF SOUTH CENTRAL WISCONSIN

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Abstract: While theory strongly suggests that restricting development rights should reduce land prices, empirical evidence of this effect has been notoriously hard to obtain. Indeed, largely based on this difficulty a Congressional committee has recently recommended that tax benefits for such restrictions be severely curtailed. We collect data on 131 land transactions in South Central Wisconsin, including 19 cases of development-restricted parcels. When we use the whole sample to estimate the impact of conservation easements we replicate the results of Nickerson and Lynch (2001), finding a negative but statistically insignificant effect. However we then show that when the sample is appropriately restricted to a more homogenous group of land parcels, our ability to detect an effect increases dramatically. In particular, for vacant agricultural land we find a statistically significant negative impact of conservation easements that ranges up to 50% of land values

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1. Introduction

The contribution of future development potential to current land prices is as well understood theoretically as it is difficult to measure empirically. Although such information could have great value to planners, governments, and other market participants, the value of development rights is generally not directly observable, remaining roughly 'guesstimated' by appraisers and tax assessors.

The seriousness of this problem was brought into the public eye in early February of this year when the Joint Committee on Taxation (JCT) of the U.S. Congress recommended severely limiting the deductions landowners can take for donating a conservation easement. Two of the main proposed changes to the current system include (a) reducing the maximum amount that can be deducted from federal incomes taxes from 100% to 33% of an easement's value; and (b) restricting deductions to only properties on which the landowner has no residence. In their discussion of the issues, the JCT made clear that a primary problem with the existing rules is exactly the difficulty of assigning a dollar value to development rights,

> "Valuation is especially problematic because the measure of the deduction (i.e. generally, the difference in fair market value before and after placing the restriction on the property) is highly speculative, considering that, in general, there is no market and thus no comparable sales data for such easements." (JCT, p. 281)

To a large extent, the new limits on the proportion of an easement valuation that can be taken as a tax deduction reflect a desire to reduce the effect of erroneous valuations. However, other than requiring specially licensed appraisers for higher value parcels, the JCT report does not suggest any method for improvement in this arena. They conclude that "a proper determination of the fair market value of a contribution of a conservation or façade easement remains critical …" (JCT, p.287)

In the meantime, conservation groups around the country are up in arms. The Washington-based Land Trust Alliance is coordinating with The Nature Conservancy, the National Trust for Historic Preservation, the American Farmland Trust, Ducks Unlimited, the Trust for Public Land, and the Conservation Fund to barrage Congress with a campaign of letters, e-mails, and phone calls to protest the possible changes, claiming they would "wreak havoc" and "destroy" the good work of the nonprofits (Stephens 2005).

However when it comes to producing compelling empirical evidence that conservation easements significantly reduce the market value of restricted land (and thus merit a tax deduction), and that this effect can be convincingly measured, conservation groups are at a distinct disadvantage. In fact, empirical research on the topic to date has been unable to robustly demonstrate *any* effect on land prices of conservation easements, let alone a tightly estimated one. This could be, as the JCT points out, because of the dearth of appropriate data. However some suspect that even with the right data, the impact of an easement on price could in fact be negligible in some cases; for example when a conservation easement is taken out on a lovely family retreat far from development pressures.

The primary requirement for testing this hypothesis is the collection of appropriate data. While an active market in development rights *per se* does not yet exist, the growing popularity of conservation easement programs throughout the United States may inadvertently be creating a quasi-natural experiment through which the price of development rights in general, and conservation easements in particular, can be indirectly estimated. By observing competitive prices and parcel characteristics from land sales of a sufficient number of parcels with and without restrictions on development, researchers may be able to use regression analysis to tease out any effect on market values that an easement confers.

Indeed, a small number of studies have attempted to do exactly this. Collecting data for such an exercise is extremely difficult, however, and the results from these efforts have been inconsistent. The only published paper thus far, Nickerson and Lynch (2001), finds a negative but statistically insignificant impact of conservation easements on land prices. Several other smaller studies have found both negative and positive effects (often not significant) with varying degrees of thoroughness.

We contribute to this continuing effort by attempting to indirectly estimate the value of development rights from sales of land parcels with and without conservation easements in South Central Wisconsin. When we use the full sample of 131 land sales, including 19 of restricted parcels, we replicate the results of Nickerson and Lynch (2001), finding a negative but statistically insignificant effect. However, we argue that land parcels with an existing residence are much less likely to be dramatically effected by a development restriction than vacant land, which has limited attractiveness to non-neighbor buyers. Additionally, easements which completely disallow any future development are likely to have a larger effect than more lenient restrictions. Indeed, when we restrict our sample to only vacant parcels, the magnitude of the negative effect of easements on land value increases dramatically and, for strict easements, this negative effect becomes strongly statistically significant. When we further restrict the sample to vacant agricultural land, we similarly find a robust, negative and statistically significant effect. The order of magnitude of these effects is economically large; on average, we find that development restrictions on vacant land reduces market prices between 35% - 50%.

This paper proceeds as follows. In section 2 we describe and discuss the importance of conservation easement programs nationally and in Wisconsin and briefly review the limited existing literature on measuring the value of development rights. Section 3 describes the data. The estimation methodology and results are presented in section 4, with section 5 concluding. Summary statistics and regression tables are presented in the Appendix.

2. Conservation Easement Programs and the Value of Development Rights

Rural lands were converted to rural residential and urban land at a rate of 2.1 million acres per year from 1992-97, a significant increase from the 1950-92 period (Vesterby and Krupa 2001). The associated rise in public concern about land conversion has led to the introduction of a menu of land conservation schemes designed to protect open spaces from residential and urban development. These include exclusive agricultural zoning, conservation tax credits, fee simple land purchases, direct regulation and conservation easement programs. This latter category entails the voluntary transfer of development rights in some form and has proven particularly popular. In particular, a conservation easement is a legal contract that prevents current and future landowners from engaging in certain activities on their land and/or compels the landowner to maintain certain attributes of the land. The conservator (government agency or land trust) is responsible for monitoring and enforcement of the easement contract for perpetuity. Easements are often referred to as "partial interests" because they do not transfer the full title to the property, only the right to enforce restrictions on development.

Across the U.S. easement procurement programs have popped up that facilitate the purchase, transfer or donation of development rights from land owners to either governmental or non-governmental conservation entities. To date, nearly 2.6 million acres have been preserved by conservation easements (Land Trust Alliance 2004a). As of 2001, nineteen state-level and 34 county-level Purchase of Development Rights (PDR) programs in eleven states had preserved 819,490 acres of farmland at a cost of $1.2 billion (Heimlich and Anderson 2001).

Landowners benefit from direct payments for the development rights and/or tax savings, as well as from any personal satisfaction from knowing their land will be protected in the future. Although the only tax benefit received by a landowner who *sells* a conservation easement is the direct effect of the reduction in the recognized land value, for those *donating* easements several additional tax benefits are available. These include charitable donation tax deductions, and estate tax deductions. Crucially, the value of all of these benefits depends on the value assigned to the donated development rights. Some states, such as Illinois, automatically reduce the assessed land value by 75%, but in many cases the value of an easement must be estimated by local assessors. As discussed in the introduction, the Federal Government is currently considering severely limiting the types of land and the proportions of the easement valuation that would be eligible for tax deductions.

As discussed in the introduction, the estimates of the value of development rights generated at the establishment of the easement are just that; estimates. If at a later date the land is sold at a discount that is significantly higher or lower than the original estimate there are a variety of possible consequences. For example, many programs are designed to make agricultural land more affordable for farmers, but if the market value of development rights turns out to be low (perhaps because development pressures are lower than expected) the administration costs may not be justified by the small changes in land prices. Furthermore, without an accurate price signal there exists the possibility of over-payment to the landowner from taxpayers and charitable organizations, either directly through a PDR program or indirectly through excessive tax transfers. Thus, if the current practices for valuing development rights are shown to return inflated estimates, then the income transfers may be unfair to taxpayers. If they are under-estimated then the most socially and/or environmentally desirable lands may not be attracted into the programs.

Although knowledge of the true value of development rights is critical for the efficient application and targeting of conservation easement programs, the actual process of assessing easement values is notoriously fraught with difficulties. Conservation easements are not bought and sold in an open market and thus do not have observable prices. Although some easements are sold, it is not in a competitive environment; demand derives primarily from government agencies that act as a single buyer in any one market and may have a subjective and inaccurate conception of the easements' value (Boyd et al 1999). Furthermore, appraisers determining the value of a parcel's development rights explicitly factor in past valuations of "similar" land and an inaccurate conception of these values is thus self-perpetuating. For example, Florida appraisers factor in easement values of similar parcels located in Pennsylvania, even though these values themselves had no empirical basis (Boyd et al. 1999). Thus, easement appraisals are only a vague guess at the actual value of the easement and can significantly under- or over-estimate the “true” market value.

Despite the importance of understanding the magnitude and determinants of the price effects of conservation easements, there have been very few empirical studies on this issue. In order to estimate a market-determined value for easements, an ideal data set would contain many observations of open market land transactions, including data on the relevant land characteristics that determine price, with a sufficient number of plots with attached easements. However this kind of data is very difficult to collect. Land trusts and conservation agencies are scattered with various quality of record keeping on sales of eased parcels. Land registries often do not include easement information in the easily accessible, digital records of land sales. Furthermore, due to self-selection, landowners with easements on their property may be less inclined than average to sell[1], and the sale is less likely to be “arms-length” (e.g. where there is no relationship between buyer and seller). Finally, since many conservation easement programs have only been in existence for less than two decades, very few restricted properties have come on the market.

Despite these difficulties Nickerson and Lynch (2001) manage to collect a sample of 244 land transactions, including 24 restricted properties and data on many plot characteristics. They test the effect of development restrictions on land prices in three Maryland counties, a region known for its well-funded agricultural protection programs and where GIS data on state and county PDR programs are relatively abundant. Their results show modest evidence that development restrictions lowered sales price, but these results are not statistically significant.

[1] A survey by Gathering Waters, Wisconsin’s umbrella land trust, found that 97% of restricted parcels are still owned by the easement grantor.

Plantinga et al. (2002) suggest an innovative alternative estimation strategy to identify the value of development rights indirectly from county-level data. Sensibly, they find that the share of total land value due to development potential increases with highway density, proximity to urban centers, and the rate of change in population density, and decreases with the amount of county land base that is undeveloped. In particular, they predict that for the contiguous U.S. as a whole, the present value of future development on agricultural land represents about 10% of the total value of agricultural land, whereas in counties near urban centers, future development potential often accounts for over 50% of agricultural land value. While intuitive, the results are of limited value to local planners assessing individual parcels within a county. Furthermore, by and large their aggregate estimates do not correspond very closely with those of Nickerson and Lynch (2001), suggesting that further parcel-level analysis is needed to cross-check and verify that this indirect approach is accurate.

Finally, two as yet unpublished Masters theses have attempted to estimate the value of conservation easements directly from land purchase data. Blakely (1991) finds that sale prices of agricultural parcels enrolled in a Washington PDR program were significantly lower on average than unpreserved farmland. With a sample of 64 restricted plots and 39 unrestricted plots, but controlling only for improvements, the mean difference was $1,217 per acre (standard error of difference = $446). Zhang (2004) uses a limited data set of 85 land transactions (including 6 restricted parcels) and finds that easements had a positive but insignificant effect on sales price in Howard County, MD. Thus the results from existing studies are extremely limited and mixed without much consensus about the sign of the price effect, and much less an idea of the order of magnitude.

At first glance basic economic theory predicts an unambiguous fall in the market price of restricted parcels. The price of an unrestricted property reflects not only the future stream of income in the current use (e.g., agriculture), but also the option to convert the land to some alternative use (e.g., residential subdivisions) at a future date when more information on conditions is available. The price of a conservation easement reflects the current returns and expected future returns from current use and the expected returns from converting the land to developed use.

A simple model illustrates the concept. In each period that a property remains undeveloped (and unrestricted), landowners decide whether to convert their land or maintain current use. Landowners make the conversion decision that maximizes the price of their land (the decision to convert is assumed to be irreversible).

The price of unrestricted land =

$$P\left(0, x_0\right) = \max\left[\left\{I^D(x_0) + d\,E\left[P(1, x_1)\right]\right\}, \quad \left\{I^U(x_0) + d\,E\left[P(0, x_1)\right]\right\}\right], \tag{4}$$

where P is a function of development status (0 = undeveloped; 1 = developed) and parcel characteristics; x_0 is the vector of parcel characteristics in the current period; x_1 is a vector of parcel characteristics in the next period, as predicted by a state equation $x_1 = G(x_0, e)$, in which e is a vector of random variables; I^D is development income as a function of parcel characteristics in the current period; d is the discount rate $\left(\frac{1}{1+r}\right)$, and I^U is income from current undeveloped use. This is a recursive formula that reflects the opportunity to develop in the future when more information is available.

The price of restricted land = $$P^R\left(x_0\right) = E\left\{\sum_{t=0}^{\infty} d^t I^U(x_t)\right\}, \tag{5}$$

where P^R is different from P.

Thus, the price of a conservation easement = $$P_{eas} = P^R\left(x_0\right) - P(0, x_0). \tag{6}$$

Corresponding to our initial economic intuition, under these simple assumptions the price of restricted land will always be less than or equal to the price of unrestricted land. However we have seen that the empirical results are very mixed; are there any circumstances in which we might observe the price of restricted land being *greater* than unrestricted land? Two possibilities come to mind. First, the decision to conserve a parcel may be correlated with unobserved factors that are simultaneously causing the price to increase. This could be the case for an area where land trusts are targeting parcels with high amenity value and/or development pressure. Second, as Geoghegan, Lynch, and Bucholtz (2003) found, conservation easements have the potential to raise the value of nearby properties. If the change in neighborhood property values causes other characteristics to change (e.g., more affluent residents may have nicer gardens), this may result in an increase in the price of the restricted land – a spill-over-and-back-again effect.

Although theory does thus suggest several mechanisms through which conservation easements may have a negligible or even positive impact on land prices, the preponderance of theory as well as intuition leads most economists' priors to remain that the effect should be significant and negative. Unfortunately, as described above, empirical work has not been particularly helpful in shedding much light on these questions as results have been mixed in sign and generally not statistically significant. In the next three sections we make our own attempt at addressing this lingering dilemma.

3. Data

According to the American Farmland Trust, Dane County is in the third most threatened farm area in the country (Sorenson et al. 1997) with about 5,000 acres of farmland being converted each year. South Central Wisconsin also has a proactive Department of Natural Resources (DNR) and a vibrant land trust community, both of which have conserved land with conservation easements. The USDA Natural Resource Conservation Service has also bought many conservation easements on Wisconsin wetlands. Thus this region provides a promising arena in which to assess whether conservation easements affect market land prices.

Data collection was a painstaking process relying on plenty of shoe leather as well as the generosity of the Wisconsin DNR and local land trusts. Control parcels were chosen in order to provide the best possible comparable group; outlier parcels of unusually small acreage or unusually high price-per-acre value, or waterfront property, were not included in the final sample. The final cleaned data set includes 19 restricted properties and 131 unrestricted properties with complete data, sold between 1999 and 2004 in three contiguous Wisconsin counties near the capital city of Madison – Dane, Jefferson, and Columbia. The detailed information on easement characteristics comes from files in the DNR real estate office, from the records of local land trusts, and from county courthouse interactive databases. All 19 easement sales were arms-length (no relationship between buyer and seller) with easements specifying non-development, agricultural preservation, or wetland reserve. The control parcels come from a real estate transfer return database maintained by the Wisconsin Department of Revenue (DOR). All control sales are also confirmed 'arm's length' transactions of greater than 10 acres.

The dependent variable is captured in the market sale price, but the literature on hedonic price functions provides no guidance in choosing between sale price, log of sale price (*ln(price)*), price per acre (*ppa*), or *ln(ppa).* Nickerson and Lynch (2001) use *ln(ppa)*, Geoghegan, Lynch, and Bucholtz (2003) use *ln(price)*, and Plantinga, et al. (2002) use *ppa*. Using level sales price rather than price per acre as the dependent variable has the advantage that it is intuitive and does not impose any fixed linear restriction on the relationship between price and acreage[2]. The disadvantage of using level price as the dependent variable is that a conservation easement would be expected to have an effect on price per acre or perhaps as a percentage discount on the price, but likely not as a single intercept-shift, suggesting that using *ln(price)* may yield the most intuitively interpretable specification. Thus we adopt *ln(price)* as our dependent variable to test for sign/significance of conservation easements[3].

Economic theory and the vast literature on hedonic land price models (as well as practical limitations) informed the choice of RHS control variables collected. Tables 1

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[2] note that ln(ppa)=ln(price/acre)=ln(price)- ln(acre) which is equivalent to a regression of ln(price)=a+b ln(acre) in which there is a restriction that b=1.

[3] In an earlier version of this paper we used level Price as the dependent variable, with broadly similar qualitative and quantitative results. Using Price without logs imposes the constraint that the effect of an easement on price per acre will decline as the number of acres increases, which is clearly an undesirable assumption.

and 2 provide detailed descriptions and summary statistics for all variables. The main variable of interest is whether a parcel was sold encumbered with a development restriction *Easement* =1 if there is a restriction, 0 otherwise. Other control characteristics of each parcel include parcel size, assessed value of improvements (house, barn etc.), distance to Madison, road density nearby, whether the parcel is vacant, whether it is predominantly used for agriculture, county dummies, zoning dummies, village, town or city location, and year of sale. From Tables 1 and 2 we observe that many of the characteristics and distributional properties of the restricted and unrestricted parcel groups are fairly similar.

Thus our primary estimating model is:

$$\ln(Price_i) = a + b_1 \ln(acres_i) + \sum_k b_k control_{ki} + \partial Easement_i + e_i \qquad (7)$$

4. Results and Discussion

We begin by running simple regressions controlling for all our collected land characteristics and a dummy variable for restricted parcels (*easement*). Results are presented in Table 3, columns 1-3. Our model explains about 65% of the variation in the log of sales prices and the signs of the control variables are sensible. The coefficient of *easement* is slightly negative, but statistically insignificant. Following Kennedy (1981) we calculate the effect of an easement on land prices as

$$\hat{k} = 100\left(\exp\left\{\hat{b} - \frac{1}{2}\hat{s}_b^2\right\} - 1\right) \qquad (8)$$

where $\hat{b}$ and $\hat{s}_b^2$ are the estimated coefficient and variance of *Easement*, respectively. Kennedy's estimate is presented at the bottom of Table 3 for each regression where it is calculable[4].

[4] We have not presented Kennedy's estimate for the two-stage treatment effect models as the standard errors are calculated nonlinearly and we are not certain whether Kennedy's formula would apply.

Regression (1) includes all the control variables, while regression (2) represents a simplified specification from systematically deleting the control variables that were statistically insignificant in the general model, a so-called ‘general-to-simple’ reduction to yield a final, parsimonious specification that economizes on degrees of freedom. In both models (1) and (2), however, easements have a very small negative impact on price that this is not statistically significantly different from zero.

While theory does leave open the possibility that easements may have zero (or even positive) effects, the analysis so far cannot justify such a conclusion. There are several reasons why we may not observe a negative effect (if it exists) with the data as it stands. First, it could be that we have too few observations to pick up an effect. Another possibility is that there is a selection effect going on. In general, easement restrictions are not a randomly assigned characteristic of a parcel, for example there may be unobserved characteristics of eased parcels (including both characteristics of their owners as well as unobserved characteristics of the land itself) that increase the chances that they will be restricted. In that case the error terms in the regressions presented in columns (1) and (2) of Table 3 may include unobserved characteristics that determine the probability that a parcel will be selected for a conservation easement, creating a treatment bias in the results.

To address this possibility, we assume that a parcel will be restricted if the returns (in terms of total utility) to the landowner are greater than leaving it unrestricted. The actual net return to the landowner from a restriction is an unobserved latent variable, say z_i^*. While we cannot observe z_i^* directly, we do observe its sign; z_i, which takes the value 1 if z_i^* is positive and the parcel is restricted, and 0 otherwise. Following the standard two-step treatment estimation (see Greene (1993)) we estimate a first stage probit selection equation of z_i:

$$z_i = h_0 + \sum_n h_n control_{ni} + m_i \qquad (9)$$

Ideally we would want to include in (9) at least one explanatory variable that influenced the landowners decision to put a restriction on the land, but which did not directly impact the market sale price. In practice there are no such variables available in our data set.

Instead, we build a model which explains selection into an easement program with different transformations of some of the same variables that we use in the primary land price equations. Thus we use *acres* and *acres_squared* instead of *ln*(*acres*), and *improvements* and *distance*, instead of their respective logs. Other control variables included include *zone3*, *zone5*, *dane*, *year2*, *year3*, *vacant*, and *road_den*. The parameters from (9) are used to calculate an Inverse Mills Ratio, or hazard term (*Lambda*), which reflects the likelihood (or hazard) that a particular parcel will be selected for an easement restriction. This hazard term is then included in the second stage regression to control for the endogenous treatment effects. We rely on both the transformations of the independent variables as well as the nonlinear construction of the Inverse Mills Ratio itself for identification. Column (3) reports the results; we still do not find any significant effects of easements. The pseudo R-squared from the first stage probit model (9) is a respectable .53, however the hazard term, *lambda*, is not statistically significant. This finding is also consistent with those of Nickerson and Lynch (2001) who also failed to find evidence of selection bias in their data, suggesting that endogenous treatment effects may not have a major influence on the results.

This is not to say that there is definitely no self-selection of parcels into restricted status – quite to the contrary, there are very strong theoretical and anecdotally-supported reasons to expect that endogenous selection of certain kinds of parcels is in fact a major characteristic of conservation easement programs. However, whatever self-selection does occur either does not have a systematic correlation with the development values, or cannot be detected with the observed characteristics that we are able to include in the first-stage selection equation.

Finally, we consider whether the fact that conservation easements are themselves heterogeneous could explain why we do not detect an effect on sales prices. We define a new variable, *Hard Easement*, which is a conservation easement that does not allow any development at all in the future (i.e., no additional development on already improved parcels and the preservation of vacant status on unimproved parcels). On the one hand, we would expect a bigger impact from more severe restrictions, but on the other hand we have fewer parcels with *Hard Easement* and so have less data to work with. Column (4) of Table 3 presents the results using *Hard Easement* instead of *Easement*. Instead of 19 restricted properties, we now have only 11. However, the magnitude of our estimated effect is now much larger and is much more tightly estimated, albeit still not statistically significant.

Thus the results in columns (1)-(4) of Table 3 are quite similar to those found by Nickerson and Lynch (2001) – there is some very weak suggestion that easements may have a negative effect but the correlation is not statistically significant. However, we have yet to consider the conditions under which an easement really bites. While a property that is both improved (e.g., with a house or barn) and easement-restricted cannot be subdivided, people can live on it and even remodel/improve the existing buildings (and the presence of an easement suggests that the surrounding land may be very nice). Thus that parcel would retain good value for either agricultural work or as a weekend retreat/holiday house. Hence, while the easement should, in theory, lower the sales price, we may not be able to pick up this effect with our data either because the effect may be modest to begin with if immediate subdivision pressures are not looming, or because the easement may be associated with a lovely setting, which is an unobserved characteristic of the plot.

On the other hand a *vacant* plot with a development restriction is much less attractive. If it is agricultural land it is really only of any use to the neighboring farms. Farmers further away will find it inconvenient to access and city people looking for a retreat will be put off by the fact that they cannot stay there, regardless how lovely. Thus by so limiting the effective market, an easement may have a much more pronounced impact on vacant land.

Following our intuition, in Table 4 we explore what happens if we restrict our sample to *vacant* land only. First, we lose 59 observations, 4 of which are restricted parcels. However now our sample of 72 parcels is more homogenous in nature. Hopefully by limiting ourselves to only those plots where we would expect to see the largest impact of easements we will further indirectly control for many unobservable characteristics which may have confounded our analyses with more heterogeneous data. Furthermore, since most easements were on vacant land, in the earlier regressions it may have been difficult to identify the easement effect from the vacant effect.

Regressions (5) and (6) of Table 4 present the results from both the full general model and the reduced, parsimonious model using our vacant-only sample. The coefficient of *Easement* is still negative and much larger in magnitude than we found in the full sample. Furthermore, while *Easement* is not technically statistically significant in the general model, it's p-value of just under .12 is very close. Once we eliminate insignificant variables the coefficient does manage to tip into 10%-significance with a p-value of around .09. Essentially, our finding that *Easement* is barely significant at the 10%-level is not particularly strong evidence but certainly suggestive of an effect. The estimated impact of an easement (following Kennedy, as in equation (8) above) is about a 35% reduction in sales price. In column (7) we present the outcome from a two-step treatment effects model. Controlling for the probability that a parcel was selected for an easement now increases the magnitude, if not the statistical significance, of our *Easement* variable. However, as before the hazard term, lambda, is not statistically significant.

Our story about why easements should impact vacant land more than improved land suggests that the strongest kind of easement – i.e. those that allow no future development at all – will have the biggest impact. Thus in column (8) we again introduce *Hard Easement* into the model; now we have only 8 restricted parcels in our sample, but the coefficient jumps to -.60 and is statistically significant at the 1% level. Thus our intuition seems to be justified; we find that strict no-development easements on vacant land reduce sale prices by 47% on average.

Finally, we focus our attention on the sample where we would expect to observe the biggest impact of all from a development easement by further restricting our sample to vacant *agricultural* land. As discussed above, theoretically we would expect a restriction on vacant agricultural land to significantly reduce the potential market as these parcels are primarily of interest only to farmers in relative proximity. Furthermore, given that costly data collection leaves us with a limited number of control variables, restricting the sample to a more homogenous group of parcels should help to reduce the impact of unobservable characteristics. However this exercise does inflict a cost; we lose 25 observations including 4 restricted parcels, bringing our sample size down to 36 non-restricted and 11 restricted parcels.

Table 5 presents the results of our analysis with the vacant agricultural land sample. In regressions (9) and (10) our models explain just over 68% of the variation in *ln(price).* With a highly statistically significant coefficient of -0.66, the effect of *Easement* is estimated to reduce market land values by about 50%. In column (11) we again try a two-step treatment effects estimation. This increases the magnitude of the coefficient on *Easement* and slightly lowers the statistical significance. However, again the hazard term is not found to be statistically significant.

Lastly, in column (12) of Table 4 we estimate the impact of *Hard Easement.* The number of restricted parcels is now only 6, and the Kennedy estimate of the magnitude of the impact on land prices falls to 42%. The coefficient is still significant, but at the 5% rather than the 1% level.

5. Conclusions

Understanding the contribution of development rights to land prices is important for a number of reasons, not least the targeting and design of conservation easement programs. Indeed, the lack of a reliable mechanism to evaluate the value of development rights has led some to doubt whether easements have a measurable effect on prices at all. This uncertainty can have less than benign effects on conservation efforts; recently Congress has suggested shutting down or limiting many of the tax deductions that are a major incentive for landowners to preserve their land, in part because of the inability to correctly assess easement values. In the meantime, while open market land sales of parcels encumbered with development restrictions would seem to provide an ideal quasiexperiment from which to indirectly estimate the value of development rights, in practice this has proven to be quite difficult. As the JCT proposals go to Congress, conservation groups have been left with little or no empirical evidence with which to defend the tax benefits associated with their programs.

This paper attempts to address this deficit. Unlike previous research, we are able to provide strong and robust evidence of a significantly negative impact of conservation easements on market land prices. We also demonstrate why previous studies may not have been able to pick up this effect. In particular, given the difficulties of gathering data on myriad basically unobservable plot characteristics, we find that a measurable impact of easements shows up empirically in only a subset of transactions. For land that already includes a residence the possible uses and desirability on the open market may be much greater than for a vacant parcel with reduced or no possibility of building a house. In fact, due to self-selection, an easement-restricted parcel with a home may be more likely to contain interesting wildlife or scenic vistas than other parcels without easements and thus may make an even more desirable residence or vacation home. On the other hand, a vacant parcel – especially a vacant agricultural parcel – would be of use primarily to neighboring farmers or hunters and thus face a much more limited set of potential buyers. Theoretically we would still expect the former parcel (with home) to suffer a price decline when encumbered with an easement, but in the absence of control variables for amenities such as wildlife and views, the reduction may be too heterogeneous and slight to detect with such a limited sample.

Indeed, when we analyze our whole sample we find similar results to the previous studies: a negative but statistically insignificant impact of easements on prices. However by limiting our sample to vacant land only (or even to vacant agricultural land for an even more homogenous sample) we find very different results. Even with a severely limited data set we find statistically significant evidence that conservation easements reduce the market values of land, and we estimate that effect from around 35% (with high variance) up to just under 50% for vacant land, depending on the severity of the restrictions imposed by the easement. For vacant agricultural land we find that development easements reduces market land prices by 50%. Consistent with Nickerson and Lynch (2001) we find no evidence that self-selection into easement programs has had an effect on these estimates. However we suspect that this finding could have more to do with our inability to collect sufficient data on amenity characteristics of the parcels and leave more analysis on the topic for future research.

With regard to the JCT proposals, the results from this paper suggest that the upper limit of 30% of an easement value that can be taken for tax deductions that has been suggested by the JCT may be quite harmful. Given the economic consequences of an easement, such a limit may deter quite a few landowners from preserving their lands. On the other hand, our results are rather supportive of the JCT's suggestion not to include restricted residential parcels in the Federal tax program. In our sample we find that measurable effects of easements on land prices only show up on vacant land.

Finally, perhaps one of the more promising findings of this research is that it is possible, even with quite limited data, to indirectly estimate the values of development rights in a statistically rigorous fashion. Given the problem of multiple unobservable characteristics of land parcels, we have shown that by appropriately limiting the sample to a reasonably homogenous group of land parcels (with 'homogenous' defined relative to the use of the land) it is still possible to tease out the impact of a conservation easement. Clearly, there is considerable scope for future research.

Tables and Summary Statistics

Table 1: Continuous Variables

Variable	Definition	No. Obs.	Mean	Std. Dev.	Min	Max
Easement = 0						
sale_price	Sale price	112	157,675.6	122,785.6	5,000	600,000
Ppa	Price per acre	112	5,032.166	3,796.439	400	14,751
Acres	Acres	112	36.09821	25.56707	10	154
Improvement	Value of Improvements	112	51,033.49	72,856.81	.01	317,850
Road_den	Road density	112	2.64039	.8062855	1.2593	5.2165
Dist	Distance to Madison	112	28.25607	10.65498	3.383239	45.32708
Easement = 1						
Sale_price	Sale_price	19	204,273.7	115,727.4	78,000	485,000
Ppa	Price per acre	19	3,124.901	3,094.605	629.0323	12,034.74
Acres	Acres	19	100.0474	71.80127	37	357
Improvement	Value of Improvements	19	25,270.53	52043.89	.01	158,340
Road_den	Road density	19	2.308711	.7180318	1.2689	3.4244
Dist	Distance to Madison	19	21.62735	13.98221	3.912329	37.42102

Table 2: Qualitative (dummy) Variables

Variable	Definition	Easement = 1		Easement = 0	
		count	share	count	Share
col	Columbia County	8	0.42	48	0.43
dane	Dane County	9	0.47	32	0.29
jeff	Jefferson County	2	0.11	32	0.29
year1	1999 & 2000	6	0.32	31	0.28
year2	2001 & 2002	10	0.53	66	0.59
year3	2003 & 2004	3	0.16	15	0.13
City	City	0	0.00	2	0.02
Town	Township	19	1.00	109	0.97
Village	Village	0	0.00	1	0.01
Zone3	Minimum of 1-5 acres	1	0.05	29	0.26
Zone4	Minimum of 8-16 acres	0	0.00	8	0.07
Zone5	Minimum of 35 acres	17	0.89	63	0.56
Zone_oth	Other zoning	1	0.05	12	0.11
Vacant	No buildings on parcel	15	0.79	57	0.51
Agric	Primarily Agricultural Use	15	0.79	64	0.57

Table 3: Dependent Variable = Ln(Price)

Full Sample[D]				
	1	**2**	**3**	**4**
	GLS	**GLS**	**2S treatment[a]**	**GLS**
Easement	-0.0569 (-0.37)	-0.0513 (-0.34)	0.0289 (0.09)	
Hard Easement				-.172 (-1.27)
ln_acres	0.743*** (7.25)	0.739*** (8.03)	0.724 *** (6.88)	.754*** (7.67)
ln_improv	0.0237 (1.56)	0.0237 (1.61)	0.0235 (1.57)	.0236 (1.55)
Ln_dist	-0.212 (-1.24)	-0.212** (-2.01)	-0.21 (-1.22)	-.207 (-1.23)
Road_den	0.0957 (1.56)	0.0964* (1.68)	0.0957 (1.38)	.0928 (1.52)
Jeff	0.169 (0.61)	0.176 (1.11)	0.176 (0.47)	.188 (0.70)
Col	0.0077 (0.04)		0.0128 (0.06)	-.00444 (-0.02)
Year2	-0.0508 (-0.40)		-0.0441 (-0.36)	-.0462 (-0.36)
Year3	-0.047 (-0.24)		-0.0408 (-0.24)	-.0277 (-0.14)
City	0.0743 (0.46)		0.0703 (0.16)	.0777 (0.49)
Village	0.769*** (3.28)	0.793*** (4.33)	0.77 (1.25)	.764*** (3.30)
Zone3	0.0138 (0.06)		0.00529 (0.02)	-.0264 (-0.11)
Zone4	0.517* (1.83)	0.491* (1.89)	0.503 * (1.75)	.505* (1.79)
Zone5	0.13 (0.81)	0.122 (0.97)	0.119 (0.61)	.124 (0.78)
Vacant	-0.73*** (-2.84)	-0.734*** (-2.99)	-0.746 *** (-3.06)	-.734*** (-2.88)
Constant	9.7*** (13.64)	9.69*** (16.39)	9.75 *** (14.30)	9.66*** (13.54)
Lambda			-0.0657 (-0.30)	
Kennedy's Estimate[b]	**-7.24%**	**-6.59%**	-	**-17.73%**
No. Obs.	131	131	131	131
Easements	19	19	19	11
R-square	.6471	.6465		.6487
Pseudo Rsq (1st stage)			.5208	

[D] Robust t-statistics in parentheses. *sig. at 10%, **sig at 5%, ***sig at 1%
[a] For 2-step treatment regressions, z-scores in parentheses
[b] Kennedy's estimate of the effect of an Easement on land prices, as given in eq. (8)

Table 4: Dependent Variable = Ln(Price)

Vacant Parcels Only Sample[D]				
	5	6	7	8
	GLS	GLS	2S treatment[a]	GLS
Easement	-0.391 (-1.59)	-.388* (-1.72)	-0.551* (-1.66)	
Hard Easement				-.600*** (-2.91)
ln_acres	0.994*** (6.05)	.98*** (6.49)	1.05*** (6.94)	.982*** (6.81)
ln_dist	-0.0905 (-0.32)	-.311* (-1.84)	-0.123 (-0.48)	.0139 (0.05)
Road_den	0.136 (1.18)	.0736 (0.70)	0.124 (0.98)	.123 (1.06)
Jeff	-0.0804 (-0.21)		-0.0107 (-0.02)	-.0682 (-0.18)
Col	-0.242 (0.83)		-0.211 (-0.66)	-.335 (-1.14)
Year2	-0.202 (-0.94)	-.156 (-0.90)	-0.235 (-1.24)	-.169 (-0.78)
Year3	-0.153 (-0.50)		-0.167 (-0.64)	-.0317 (-0.10)
Village	0.708** (2.57)	.655*** (2.74)	0.708 (1.04)	.712** (2.63)
Zone3	-0.141 (-0.41)		-0.167 (-0.34)	-.293 (-0.90)
Zone4	0.798 (1.38)	.719 (1.29)	0.917** (2.01)	.781 (1.37)
Zone5	0.157 (1.01)		0.163 (0.69)	.137 (0.91)
Constant	7.82*** (6.82)	8.62*** (9.79)	7.79*** (8.26)	7.6*** (6.67)
Lambda			0.229 (0.79)	
Kennedy's Estimate[b]	**-35.00%**	**-34.50%**	-	**-47.78%**
No. Obs.	72	72	72	72
Easements	15	15	15	8
R-square	.5664	.5549		.5781
Pseudo Rsq (1st stage)			.7913	

[D] Robust t-statistics in parentheses. *sig. at 10%, **sig at 5%, ***sig at 1%

[a] For 2-step treatment regressions, z-scores in parentheses

[b] Kennedy's estimate of the effect of an Easement on land prices, as given in eq. (8)

Table 5: Dependent Variable = Ln(Price)

Vacant Agricultural Land Sample[D]				
	9	**10**	**11**	**12**
	GLS	**GLS**	**2S treatment[a]**	**GLS**
Easement	-.664*** (-2.80)	-.668*** (-2.87)	-.782** (-2.56)	
Hard Easement				-.509** (-2.37)
ln_acres	.997*** (7.13)	.993*** (7.52)	1.04*** (7.47)	.865*** (6.46)
Ln_dist	-.391 (-1.47)	-.425*** (-2.83)	-.421* (-1.90)	-.207 (-0.76)
Road_den	.0376 (0.38)	.0268 (0.27)	.0247 (0.23)	.0799 (0.76)
Col	-.0404 (-0.13)		-.0127 (-0.05)	-.235 (-0.76)
Year2	-.253 (-1.36)	-.242 (-1.65)	-.282 (-1.61)	-.141 (-0.69)
Year3	-.0335 (-0.15)		-.0453 (-0.20)	.13 (0.57)
Village	.37 (1.57)	.382* (1.80)	.363 (0.78)	.406* (1.74)
Constant	9.14*** (10.52)	9.25*** (12.79)	9.14*** (11.77)	8.9*** (10.32)
Lambda			.142 (0.60)	
Kennedy's Estimate[b]	**-50.14%**	**-50.19%**	-	**-42.05%**
No. Obs.	47	47	47	47
Easements	11	11	11	6
R-square	.6855	.6852		.6606
Pseudo Rsq (1st stage)			.7808	

[D] Robust t-statistics in parentheses. *sig. at 10%, **sig at 5%, ***sig at 1%

[a] For 2-step treatment regressions, z-scores in parentheses

[b] Kennedy's estimate of the effect of an Easement on land prices, as given in eq. (8)

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