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Land-use regulations and property values in Portland, Oregon: A regression discontinuity design approach

Cyrus A. Grout, William K. Jaeger, Andrew J. Plantinga *

Department of Agricultural and Resource Economics, Oregon State University, 213 Ballard Extension Hall, Corvallis, OR 97331, United States

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ABSTRACT

Over the past two decades, the tension between public and private interests in the use of land has given rise to state-level legislation seeking to limit government controls on private property. In 2004, voters in Oregon approved Measure 37, which required payments to private landowners for reductions in the value of their property resulting from land-use regulations. The central economic question behind Measure 37 and compensation statutes adopted in other states is, what is the effect of land-use regulations on property values? Economists investigating this question have typically estimated hedonic property value models with regulations included as exogenous regressors. This approach is likely to be invalid if the parcel characteristics that determine property values also influence the government's decision about how to implement regulations. We use Regression Discontinuity Design (RDD) to study the effect of the Portland, Oregon, Urban Growth Boundary (UGB) on property values. RDD provides an unbiased estimate of the treatment effect under relatively mild conditions and is well-suited to our application because the UGB defines a sharp treatment threshold. We find a price differential on the western and southern sides of the Portland metropolitan area ranging from $30,000 to at least $140,000, but no price differential on the eastern side. Support for Measure 37 was fueled by price differences such as these among parcels subject to different regulations, but one must be careful not to view current price differentials as evidence that regulations have reduced property values.

1. Introduction

Over the past two decades, the tension between public and private interests in the use of land has given rise to state-level legislation seeking to limit government controls on private property. Since 1992, some form of property rights legislation has been introduced in every state in the U.S. and passed in 26 (Jacobs, 2003). The majority of this legislation consists of largely symbolic "look-before-you-leap" statutes that require legislators to consider the effects of new laws on private property values. However, since 1995, more substantive "compensation" statutes have been introduced in 20 states (Cordes, 1997) and adopted in six.[1] Compensation statutes require payment to a landowner whose property value has been reduced by government action(s). Because of its comprehensive land-use planning system, the Oregon case is perhaps the best known. In 2004, voters approved Measure 37 with a 61 percent majority.[2] The new law required state, county, and local governments to compensate private landowners for the negative effects of existing land-use regulations or, in lieu of payments, to waive the regulations. Measure 37, the text of which came to fewer than 3 pages, raised, but did not clarify, a multitude of legal and economic issues.[3] Partly because of these ambiguities, Oregon voters approved Measure 49 in 2007, which significantly scaled back the provisions of Measure 37.

The central economic question behind Measure 37 and other compensation statutes is, what is the effect of land-use regulations on land values? A related question, which has also received much attention in the Oregon context is, does growth management increase housing prices? Economists investigating these issues have mostly relied on hedonic price models that include regulatory variables as right-hand side determinants of property value (Cervero and Duncan, 2004; Henneberry and Barrows, 1990; Knaap, 1985; Netusil, 2005; Nickerson and Lynch, 2001; Shultz and Taff, 2004; Spalatro and Provencher, 2001).[4] For

* Corresponding author. Tel.: +1 541 737 1423; fax: +1 541 737 1441.
E-mail addresses: cyrus.grout@dijon.inra.fr (C.A. Grout), wjaeger@oregonstate.edu (W.K. Jaeger), andrew.plantinga@oregonstate.edu (A.J. Plantinga).

[1] States that have passed compensation legislation are Florida, Louisiana, Mississippi, and Texas (1995); Oregon (2004); Arizona (2006); Oregon (2007).

[2] Prior to the passage of Measure 37, there had been numerous other ballot initiatives in Oregon designed to limit land-use regulations.

[3] See the issue of *Environmental Law* (vol. 36, issue 1) devoted to legal and economic aspects of Measure 37 and Jaeger and Plantinga (2007a,b).

[4] These studies use data on prices and attributes of individual properties. In contrast, Malpezzi and Green (1996) and Phillips and Goodstein (2000) estimate hedonic housing price models using aggregate data on U.S. cities. With this approach, one gains more variation in regulations but loses precision in terms of prices, regulations, and other variables that must be represented as city aggregates. Both studies treat regulations as exogenous determinants of median house prices.

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example, Knaap (1985) estimates a hedonic model of prices for vacant home sites in the Portland, Oregon metropolitan area and includes a dummy variable to distinguish parcels inside and outside the Urban Growth Boundary (UGB). In Knaap, as in most other hedonic studies, land-use regulations are assumed to be exogenous attributes of land parcels. However, many parcel characteristics that determine property values also plausibly influence the government's decision about how to implement regulations. In the case of Portland, it is clear that the regional planning authority (Metro) considers factors such as soil quality, slope, and proximity to existing infrastructure when it specifies the location of the UGB. Failure to control these variables in a hedonic regression can bias estimate the effects of regulations. A few earlier studies have recognized this problem and used instrumental variables or matching methods to address the endogeneity of regulations (Lynch et al., 2007; McMillen and McDonald, 2002; Zhou et al., 2008).[5]

In this paper, we adopt an alternative identification strategy, regression discontinuity design (RDD), to study the effects of Portland's UGB on property values. RDDs involve a dichotomous treatment that depends on an observable and continuous score variable. The average effect of the treatment is measured as the difference in the outcome of interest above and below the threshold. An unbiased estimate of the average treatment effect is obtained under relatively mild continuity assumptions. Because the UGB sharply defines a treatment threshold, our problem is naturally suited to RDD analysis. RDD has been applied in a number of recent economic studies (see, for example, Imbens and Lemieux, 2008) but has not, to our knowledge, been used to study land-use regulations.[6]

UGBs are a central feature of Oregon's land-use planning system, and the source of much controversy. The UGB controls the location of urban development by dividing land parcels into two groups, each of which is subject to different sets of rules regulating use. For instance, parcels within the boundary are zoned for intensive uses, such as high-density residential housing, whereas those outside are zoned for less intensive uses such as agriculture, forestry, and in limited cases, low-density residential development. Portland's UGB is of particular interest. Portland is the largest city in Oregon. The metropolitan area population exceeds 2 million and increased by 26% between 1990 and 2000. A large share of the claims filed under Measure 37 was made on agricultural and forest lands just outside the Portland UGB. Fig. 1 depicts the Portland UGB along with Measure 37 claims (in orange) drawn to scale. In almost all cases, claimants sought the right to develop land for residential housing.

Before proceeding, it is important to clarify what one measures with an RDD, propensity score matching, or a correctly specified hedonic property value model. In a study with cross-sectional data, these approaches estimate the average price differential between parcels inside and outside the UGB. Parcels within the boundary face less stringent controls with respect to urban development and subdivision, which should have a weakly positive effect on the parcel's value. The effect will be strictly positive if, on a metropolitan area scale, the UGB increases the scarcity of developable land. There is also a net difference in neighborhood amenity values that can be positive or negative. Outside the UGB, zoning for agricultural and forest uses minimizes negative externalities resulting from the mixing of incompatible uses (e.g., farms located next to residential subdivisions). Inside the UGB, urban planning can produce attractive and livable residential neighborhoods that raise the value of development rights. Netusil (2005) finds evidence that housing prices are higher in areas of Portland with more restrictive environmental zoning. What none of the approaches measure is the effect of the UGB relative to the case in which the UGB was never established.[7] The counterfactual is needed to identify the total (or with/without) effect of land-use regulations on property values, but is very difficult, if not impossible, to identify when regulations have have been in place for long periods of time.

In the next section, the institutional features of Oregon's land-use planning system are summarized and further information is given about Portland's UGB. Section 3 motivates and presents our identification strategy. Section 4 discusses the data used in the study and, in Section 5, we present the RDD results, along with a series of robustness tests. Discussion and conclusions are found in a final section.

2. Background

Oregon's landmark statewide land-use planning system was established in 1974 with the adoption of 14 (now 19) statewide planning goals that provide guidance on how cities and counties should plan future urban development and uses of rural lands. The goals relate to agriculture, the environment, housing, transportation, energy, and recreation. Goal 14, in particular, requires local governments to establish UGBs to "identify and separate urbanizable land from rural land." The amount of land contained within each UGB must be based on long-range population forecasts and related needs for housing, employment opportunities, livability and uses such as public facilities, streets and roads, schools, and parks or open space. In determining needs for land, local governments may specify characteristics, such as topography or proximity, necessary for land to be suitable for an identified need. Thus, we see that factors that logically affect property values may also influence a government's decision about where to locate its UGB. At regular intervals, each city is required to reassess the adequacy of its UGB and ensure that there is a 20-year supply of developable land within its boundary based on population forecasts and anticipated demands.

Once a parcel is brought inside an UGB, its status changes with respect to permissible land uses, subdivision, access to city services, and taxes. Outside an UGB, parcels may not be developed for high-density residential, commercial, and industrial uses. If land is incorporated into a city, it typically gains access to city sewer, water, and other services. Property taxes are likely to be higher inside an UGB because assessed values rise with development rights and parcels lose eligibility for preferential tax assessment available to agricultural and forest lands outside UGBs. Thus, the location of a parcel with respect to an UGB is a summary measure of the rights and obligations of its owner, as well as his or her access to urban services.

The Portland UGB was designated in 1979 and currently contains portions of three counties, 24 cities, and approximately 256 thousand acres of land. The UGB is managed by a regional planning authority referred to as Metro. To satisfy the requirement for a 20-year supply of developable land, Metro has expanded the UGB many times, in most cases by amounts less than 20 acres. However, larger expansions have occurred three times: in 1998 (3500 acres), in 2002 (18,867 acres) and in 2004–05 (2300 acres). In Fig. 1, undeveloped parcels within Portland's UGB are shown in green.

3. A regression discontinuity design approach

3.1. The identification problem

To set the stage for the RDD approach, we examine a standard hedonic model in which the UGB is an exogenous determinant of land

[5] Chamblee et al. (2009) use propensity score matching estimation to test the robustness of estimates from a hedonic study.

[6] Cunningham (2007) estimates a hazard model of vacant land development to analyze the effect of Seattle's UGB on the amount and timing of urban development. In the spirit of RDD, he restricts his sample to parcels within 3 mi and 1 mi from the UGB in an effort to control for unobservable characteristics of land markets.

[7] The studies, mentioned above, using aggregate data can, in principle, measure the counterfactual if there is sufficient variation in regulations within the sample of cities. Identifying the effects of regulations in these models is especially challenging with aggregate data.