Land Use Policy 67 (2017) 679–689

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Not my problem: Growth spillovers from uncoordinated land use policy☆

Charles A. Towe[a], H. Allen Klaiber[b], Douglas H. Wrenn[c,*]

[a] Agricultural and Resource Economics, University of Connecticut, United States
[b] Department of Agricultural, Environmental, and Development Economics, The Ohio State University, United States
[c] Department of Agricultural Economics, Sociology, and Education, Pennsylvania State University, United States

ARTICLE INFO

JEL specifications:
Q15
R14
R21
R30

Keywords:
Housing supply
Land use regulation
Spatial spillovers
Urban economics

ABSTRACT

Land use policy is administered at the local level in the U.S. However, many of the benefits and costs have broader spatial impacts. Thus, a lack of coordination across local jurisdictions may lead to unintended spillovers. Using historical data from the Baltimore, Maryland metro, we examine the impact that an extensive zoning policy change in Baltimore County had on new housing supply in surrounding counties. Defining treatment and control locations in surrounding counties based on their adjacency to Baltimore County, we find that the change in zoning policy led to an increase in housing supply of 42%–97% in adjacent counties. In both spatial and temporal falsification tests, we fail to find evidence of a spillover effect suggesting that the increased development was likely the result of spillovers from uncoordinated policy.

1. Introduction

Coordination among local land use planning agencies has long been challenging due to the spatially disaggregated nature of the planning process as well as the competing interests of local policymakers and their constituencies. The U.S. Constitution does not provide the federal government with the authority to regulate land. As a result, states have delegated most regulatory authority to local governments, namely counties and municipalities. This has led to a great deal of spatial and temporal variation in the types of land use regulations enacted. For example, each of the 48 most populous cities in the U.S. include, on average, more than 13 counties within a 25-mile radius of their central business district. Thus, the residents of these large urban areas are likely under very different, and potentially conflicting, policy regimes. Many of these counties also include a myriad of smaller, local jurisdictions whose policies jointly, and often in an uncoordinated manner, influence the spatiotemporal evolution of land use. While it is acknowledged that heterogeneity in local land use regulation likely impacts the price, location, and intensity of development, researchers still debate the degree of these effects – i.e., the debate centers on exactly which types of regulations are effective at altering urban development and the precise impact these regulatory structures are likely to have on the housing market (Gyourko and Molloy, 2015; Quigley and Rosenthal, 2005).

There are several major obstacles to causally identifying the impact of land use regulations on market outcomes. First, data rarely exists on outcomes before and after regulations are enacted – i.e., most data on land use regulations, and the impact of these regulations on market outcomes, is cross sectional in nature.[1] Second, even the data that does exist over time is often not at a spatial or temporal scale of sufficient granularity to allow researchers to address endogenous correlation between changes in land use policies and other spatially or temporally varying unobservable factors such as school quality, crime, or environmental amenities. And finally, it is frequently the case that local regulatory bodies use many different policies to manage land use. In many cases, this complex, overlapping suite of policies is the direct result of unforeseen outcomes resulting from earlier policy interventions which has resulted in a historical layering of policies. In light of these limitations, it is clear that the ideal empirical environment is one in which data exists at a fine spatial and temporal scale before and after a change in a single land use policy, and that the change in the policy can be identified, in isolation, from the influence of other policies. This is precisely the type of policy environment we exploit.

In this paper, we estimate the spillover effect, in terms of the number of new single-family housing units supplied, following a major

☆ We thank conference participants at the Agriculture and Applied Economics Association and Association of Environmental and Resources Economics summer meetings.
* Corresponding author at: Agricultural Economics, Sociology, and Education, Pennsylvania State University, 112A Armsby Building, University Park, Pennsylvania, 16801, United States.
E-mail address: dhw121@psu.edu (D.H. Wrenn).
[1] One reason for this is that many of the most dramatic changes in land use policy in the U.S. took place before data was collected on prices and other policy variables. Thus, researchers have been forced to analyze the impacts of these policies *ex post* using empirical techniques designed to handle endogeneity issues.

http://dx.doi.org/10.1016/j.landusepol.2017.06.019
Received 9 August 2016; Received in revised form 22 June 2017; Accepted 22 June 2017
Available online 14 July 2017

change in land use regulation. Specifically, we focus on how a large-scale change in minimum-lot zoning in the Baltimore County, Maryland in 1976 impacted the supply of new single-family housing in four surrounding counties in the Baltimore metro region in the years following the policy change. The intuition of our model is that the change in zoning policy in Baltimore was exogenous, from the land developers' perspective in the neighboring counties, thus allowing us to exploit this exogenous variation to identify the spillover effect into neighboring counties.

The theory underlying our empirical model is based on the concept of urban sorting and the spatial equilibrium defining an urban housing market (Tiebout, 1956; Henderson, 1985; Turner et al., 2014). In this model, landowners in each jurisdiction of an urban area set house prices based on the willingness to pay of the marginal agent moving into that area. In this setting, non-marginal changes in minimum-lot zoning laws constitute a supply restriction on the amount of land that is available for future development. This change in available supply, which shifts equilibrium prices throughout the metro region, constitutes a pure transfer of land rent (Turner et al., 2014). As a result, the effect on total housing supplied is same regardless of which jurisdiction makes the change provided the change in available supply varies between jurisdictions and is viewed as exogenous by the agents on the supply side of the market in the jurisdictions not enacting the policy.[2] Using this theoretical result, and restricting our sample to supply outcomes that occur in close proximity to the border with Baltimore County, we are able to abstract from any impact that the change in zoning policy in our study region may have had on aggregate land rents and focus exclusively on the impact that the change had in determining the quantity of housing supplied – i.e., the spillover effect from a regulated to an unregulated county in a tight band along the border.

To estimate our model, we make use of data on the timing and location of housing development and changes in minimum-lot zoning laws. These data track changes in housing supply (year built) and zoning (year implemented) at a fine spatial and temporal scale, which allow us to make direct cross-border comparisons of equivalent development regions in order to limit the impact of unobservables. To develop these cross-border comparisons, we grid the landscape in each of the counties bordering Baltimore into quarter-mile cells and sum the number of new homes built in each grid cell in each year. We then use these cells and the number of houses supplied in each cell to create treatment and control cells based on their adjacency to the border with Baltimore. Specifically, we define grid cells as treated if they are located outside of Baltimore but adjacent to restricted zoning areas, and we define grid cells as controls if they are located adjacent to areas without restrictive zoning.

Our empirical design is an application of standard difference-in-differences and spatial regression discontinuity methodologies used in other papers looking at the cross-border effects of policy changes (Holmes, 1998; Black, 1999; Bayer et al., 2007). The main difference in our model is that: (1) we use a single unidirectional change in policy – i.e., the impact of the zoning change flows in one direction from Baltimore to neighboring counties in the region and (2) we exploit changes across space and time to determine the indirect spillover effect of the change in zoning on housing supply.

While our model provides a consistent framework for evaluating the spatial and temporal impact that the zoning change in Baltimore had on housing supply in the region, the validity of our results depend on the assumption that the mean differences in unobservable factors between counties is uncorrelated with the change in the minimum-lot zoning. To assure that this condition holds, we adopt several different strategies based on the nature of our data.

First, the fine-scale nature of our grid cells allow us to exploit spatial variation in the zoning change in Baltimore along the border with other counties to create matches between areas adjacent to downzoned areas (treated cells) and areas not adjacent to downzoned areas (control cells). The change in minimum-lot zoning occurred in 1976 in Baltimore with downzoned areas seen as darker regions within Baltimore County in Fig. 1. This change in zoning, which effectively downzoned over 65% of the county from one house per acre to one house per 50 acres, is not continuous along the border of the county. As a result, there is heterogeneity along the border between Baltimore and the surrounding counties which we exploit to identify treatment and control locations to isolate the impact of downzoning on cross-border development. This method assumes that the most likely direction of the spillover to neighboring counties is from a grid cell on the Baltimore side of the border to a cell in a neighboring county.

Second, we follow previous empirical work (Zhou et al., 2008; Kuminoff and Pope, 2012; Turner et al., 2014) and assume that if we limit our analysis to locations in close proximity to the border that the unobservable characteristics of both the grid cells and the agents will vary continuously across the border and have very similar distributions. Land use policy in Maryland is established at the county level. As a result, we assume that the average preferences of the residents of the entire county determine what types of land use policy changes are made. If we had data on the characteristics of these individuals, in addition to information on the years the homes were built, then we could include them in our model as an additional set of controls. Unfortunately, these data are unavailable. So, we follow previous empirical work and assume that if we limit our analysis to locations in close proximity to the border (a quarter mile) that the unobservable characteristics of both the parcels and the agents will vary continuously across the border and have very similar distributions. By focusing our analysis on locations close to the border, the potential impact and correlation of individual characteristics with our parameter of interest will be minimal. We also estimate a series of panel data models, in addition to our pooled OLS model, where we include grid-cell fixed effects to control for any additional time-invariant unobservables impacting our results.[3]

Finally, we exploit a similar concept in the temporal dimension and vary the temporal buffer on either side of the policy from one year to three years. By constraining the temporal buffer around the downzoning policy, we are able to limit any potential unobserved time-varying factors that may bias our results. We also use a series of spatial and temporal falsification tests whereby we artificially change the location of the county border and the date when the policy was implemented and re-estimate our models to determine if the spillover effect still exists.

The results from our model reveal that the change in minimum lot zoning in Baltimore did indeed lead to a statistically significant spillover effect in terms of the number of houses built in surrounding counties in the years following the policy change. Using our preferred panel data models, we find that the downzoning policy resulted in between 0.174 and 0.191 new homes being built per grid cell, on average, for locations located a quarter-mile away from the Baltimore border in the first two to three years after the policy. Multiplying these values by the number of grid cells in the treated region, we get average

[2] Turner et al. (2014) specifically evaluates the impact of interjurisdictional changes in land use regulation on land prices and welfare. They separate the impact of regulation into three parts – an own-lot effect, an external effect, and a supply effect. Ideally, we would like to look at the impact of changes in minimum-lot zoning laws in the Baltimore region on land prices and welfare, but we do not have these data for this time period. However, as Turner et al. (2014) demonstrate, since the impact of regulations on supply constitutes an aggregate transfer of rent, all that can be identified in a supply equation is the impact of regulation on the supply of land or housing, so our lack of these data do not preclude us from identifying the impact of a policy change on housing supply. It does, however, preclude us from saying anything about the welfare impacts of these changes in supply.

[3] As Turner et al. (2014) point out, many judicial boundaries in the Eastern portion of the U.S. were drawn based on physical features of the landscape such as soils, slopes, and water. While many of these features are unobservable, they are also time invariant and thus can be controlled for with fixed effects.