Demographics and the Value of Park Proximity in Greenville, South Carolina

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Abstract

The effect of proximity to different types of parks on housing prices is estimated using a unique data set of single family homes sold between 1990 and 1999 in Greenville, South Carolina. The value of park proximity is found to vary with respect to park size and amenities, as well as household income and family size. The greatest impact on housing values was found with proximity to small neighborhood parks, with property values as much as 13 percent higher for homes within 600 feet of such parks. The positive impact of proximity to attractive medium size parks extended to homes as far as 1500 feet from the park. The value of park proximity increases with family size and is greater, as a percentage of housing value, for households with income below the median.

Introduction

Urban sprawl has been blamed for loss of wildlife habitat, farmland, and wetlands. Many states have been increasing their efforts to protect remaining open space. For example, in November 2000 voters across the country considered at least 205 ballot measures that proposed to raise funds for conserving open spaces (Barber 2000). Eighty-two percent of these measures were approved raising more than $7.3 billion.

But what is the protection of open space worth? One way to quantify the benefit of protecting open space in an urban environment is to determine the impact of open space on housing prices. The objective of this study is to determine the impact of parks on residential property values in Greenville, South Carolina and the relationship between those values and certain demographic characteristics.

Parks can provide recreational opportunities and attractive views for nearby residents. They might also lead to increased traffic and noise. This study will estimate the net impact of proximity to parks and park type on housing sales price by using a data set that includes housing and neighborhood characteristics and park size and proximity. The value of parks reflected in residential property values would provide a lower bound on the overall value of parks and open space protection to residents.

Background

According to a recent Sierra Club report (1999), South Carolina lags behind the rest of the nation in terms of open space protection, ranking third to last among the fifty states. In funding for parks and recreation, Greenville County households provide at least thirty percent less than the state's other metropolitan areas, Spartanburg, Richland, and Charleston counties (Romain 2000). City planners, however, have displayed

increased focus on protection of the Reedy River, downtown revitalization, and improving the quality of life for Greenville residents. If the acquisition and protection of open space increases residential property values, property tax revenues would also increase, providing a possible funding mechanism for purchase, development, or maintenance of open space. Quantification of the impact of open space protection on residential property values could guide local and state land use decision-makers in preservation efforts and planning for future growth.

A number of other studies have used hedonic models to estimate the effect of different open space types on a house's sales price or assessed value. Weicher and Zerbst (1973) studied parks in Columbus, Ohio. Correll, Lillydahl, and Singell (1978) studied greenbelts in Boulder, Colorado. Frech and Lafferty (1984) estimated that actions by California Coastal Commission to preserve open space increased home prices by between $990 and $5,000. Do and Grudnitski (1995) found that proximity to golf courses increased property values.

Lupi et al (1991), Doss and Taff (1993), and Mahan, Polasky, and Adams (2000) all estimated a positive value of proximity to different types of wetlands. Finally, Netusil and Bolitzer (2000) and Lutzenheiser and Netusil (1999) examined the impact of proximity to various types of open space on property values in Portland, Oregon.

Data

Housing sales data used in this study includes all sales of single family houses in the City of Greenville between 1990 and 1999. Housing prices are deflated using monthly consumer price indices. The first explanatory variable is based on the county assessor's percentage depreciation factor used to assess effective house age, taking into account both actual age and the condition of the house. This variable

(DEPR) has a maximum value of 100 for a new house. Other explantory variables are the number of bathrooms (BATH), square footage of the house (SQFT), whether or not the house has air conditioning (AC=1 if yes, and 0 otherwise), whether or not the house has a garage (GARAGE=1 if yes, and 0 otherwise), and lot size. Lot size data was limited to properties over an acre and two variables accounting for lot size were used in the final regressions: ACR24=1 if the lot acreage is between 2 and 4 and 0 otherwise, and ACR4=1 if lot acreage is greater than four acres and 0 otherwise. Twenty-eight census tracts in the city limits serve as proxies for neighborhood characteristics. Table 1 shows the summary statistics for the housing characteristics.

Parks are categorized into four groups. There are twelve small parks, ranging in size from 15,620 to 87,687 square feet, that are group together as basic neighborhood parks (Type 1). All of these parks have some playground equipment in a sandy area and a small grassy area, typically mottled with weeds and bare spots. None of these parks could be considered particularly attractive. Four other small parks, ranging in size from 17,541 to 69,921 square feet, are grouped together as generally attractive as well as having some playground equipment (Type 2). Six medium size parks, ranging in size from 210, 635 to 1,101,310 square feet, are grouped together (Type 3). These parks vary in terms of the type of amenities available, including baseball fields, tennis courts, a frisbee golf course, and playgrounds, but all included some walking trails and more natural areas. Finally two other medium size parks (95,425 and 169,751 square feet) were group together as being generally less attractive with fewer amenities and no natural area (Type 4). The proximity of each house sold to each park type was determined by creating buffer zones of various distances around each park in ArcView, a widely used GIS software package.

Model

The price of a house reflects the value of a bundle of attributes including structural characteristics, neighborhood characteristics, and environmental characteristics. The hedonic housing price technique can be used to model the price of a house as a function of these various characteristics as follows:

$$P_i = f(S_i, N_i, E_i)$$

where P_i is the price of a given house, S_i is a vector of structural characteristics, N_i is a vector of neighborhood characteristics, and E_i is a vector of environmental characteristics. The first derivative of P with respect to any one variable reflects the marginal value of that characteristic. For example, if an environmental variable that measures proximity to a park in miles is included, the price model would show the value of being one mile closer to a park.

In this study, S_i includes condition (DEPR) with a higher value indicating better condition, the number of baths, square footage of the house, air conditioning, lot size, and whether or not the house has a garage. N_i is approximated here by census tract dummy variables and E_i is park proximity. The specific measures of park proximity are explained in the next section. This study uses ordinary least squares estimation of a semi-log model, the structural form found to produce the best results in previous hedonic studies.

To determine the relationship between the value of park proximity and demographic characteristics, the sample was stratified by household income and family size using census block information. Separate regressions were estimated for those above the median household income and below, and for those with three or more persons per household and those with fewer. These results are then compared to determine if there are statistically significant differences in the value of park proximity based on household income or family size.

Estimation Results

First the general impact of park proximity was estimated without regard to park size or type. These initial results indicated that proximity to parks has a positive impact on housing values, with homes located within 1500 feet of any park selling for 6.5 percent more than homes greater than 1500 feet from a park. This impact appears most significant for small neighborhood parks, with homes within 1500 feet selling for 8.5 percent more than those further away.

Next, parks were categorized as explained in the previous section. Various buffer zones around parks in each category were analyzed to determine if and where park proximity had a negative impact on housing price, for example where the negative impact of noise or lights of being adjacent to a park outweigh the positive value of easy access. Then various buffer zones were analyzed to determine for each park type the distance at which there was no longer any significant positive or negative impact related to park proximity. Finally, various ranges between these inner and outer bounds of significance were tested to determine ranges within which there was not a statistically significant variation in impact of the park proximity. Dummy variables were then created for houses within each of these distinct ranges. These results are shown in Table 2. Note that the distance categories are not mutually exclusive as some houses were, for example, within 1500 feet of one park and within 500 feet of another. In addition, some ranges weren't statistically significant but were included for comparability to other park types.

Table 3 shows the estimation results using each of these proximity measures. Model 1 isolates the analysis to proximity to the small basic parks, Model 2 includes only the small attractive parks, Model 3 includes only the more attractive medium size parks, and Model 4 includes only the less attractive medium size parks. Model 5 includes all of the parks with the various ranges used in the previous models. Coefficient estimates for the census tract dummy variables are included in the Appendix.

The estimates indicate a negative impact of park proximity for houses within 300 feet of the small basic neighborhood parks, reducing property values by about 14 percent. On the other hand, there is a significant positive impact on housing prices for homes between 300 and 500 feet of about 15 percent. Further, there is a significant positive, though smaller, impact on housing values for homes between 500 and 1500 feet from a Type 1 park, equal to about 6.5 percent higher housing values.

There is also a significant positive impact of proximity to small attractive parks (Type 2) for homes within 600 feet, but no significant impact beyond that. Homes within 600 feet of Type 2 parks sold for almost 11 percent more than other homes. For the attractive medium size parks, there was no statically significant impact on houses within 200 feet but a positive impact on homes between 200 and 1500 feet, raising values by about 6 percent. Finally, Type 4 parks were estimated to have a significant negative impact on home values for homes within 600 feet, reducing housing sales values by just over 50 percent, but no statistically significant impact (positive or negative) beyond that.

The median income of households located within 1500 feet of the small basic parks is about $27,000, compared to close to $34,000 citywide, indicating that park proximity has a greater value, as a percentage of housing value, for lower income households. There was also a strong positive correlation between household size and the value of park proximity, suggesting that families with children are willing to pay more for houses located close to parks.

Conclusions

It is possible that acquisition of land for new parks, particular in the growing suburbs surrounding Greenville, could be partially financed by higher property tax revenues that would result from increased

home sales prices. Better estimates of the impact of parks on home sales values could be valuable information to local parks and recreation departments attempting to justify current expenditures on land acquisition in rapidly growing areas. Such information could also be useful to developers deciding whether or not to include parks or other open space in new subdivisions, or to land use planners attempting to implement open space requirements for newly developed areas. Demographic information obtained from census tract data can help city planners determine the differential impacts of their public expenditures and perhaps modify their plans based on equity considerations.

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Table 1: Summary Statistics for Housing Characteristics (N=4153)

Variable	Mean	Std. Dev.	Minimum	Maximum	# of observations = 1 for dummy variables
DEPR	80.2	13.2	5	100	
BATH	1.7	0.8	0.5	7	
SQFT	1453	615	240	6276	
AC	0.45	0.52	0	1	1854
GARAGE	0.10	0.30	0	1	421
ACR24	0.04	0.19	0	1	160
ACR4	0.02	0.14	0	1	85

Table 2: Park Proximity Measures by Park Type

Park Type	Proximity	Number of Houses in Range
Type 1: Small Basic	Within 300 feet	26
	300-500 feet	70
	500-1500 feet	434
Type 2: Small Attractive	Within 600 feet	80
	600-1500 feet	289
Type 3: Medium Attractive	Within 200 feet	28
	200-1500 feet	289
Type 4: Medium Basic	Within 600 feet	5
	600-1200 feet	79

Table 3: Estimation Results: Dependent Variable Log of Price

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	4.31***	4.30***	4.29***	4.30***	4.30***
DEPR	0.008***	0.008***	0.008***	0.008***	0.008***
BATH	0.24***	0.24***	0.24***	0.24***	0.24***
SQFT	0.0005***	0.0005***	0.0005***	0.0005***	0.0005***
AC	-0.03***	-0.03**	-0.04***	-0.04***	-0.04***
GARAGE	0.10***	0.10***	0.10***	0.10***	0.10***
ACR24	0.12***	0.13***	0.12***	0.13***	0.13***
ACR4	0.11***	0.11***	0.11***	0.12***	0.11***
T1: < 300	-0.15**				-0.15**
T1: 300-500	0.13***				0.14***
T1: 500-1500	0.07***				0.06***
T2: < 600		0.13***			0.11**
T2: 600-1500		0.01			-0.001
T3: < 200			0.06		0.03
T3: 200-1500			0.06**		0.06**
T4: < 600				-0.66***	-0.72***
T4: 600-1200				-0.007	-0.01

Note: significance levels *=0.10, **=0.05, ***=0.01