The Impact Of A Shopping Center On The Value Of Surrounding Properties

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In the last two decades, a great deal of research has been conducted on residential property values. Apart from the physical characteristics of property and the financial conditions of the sale, location factors have been found to be among the primary determinants of property values.[19] These locational determinants include proximity to highways, mass transit, parks, nuclear power plants and utility lines. This study examines the influence of another locational factor, a neighborhood shopping center, on property values in the surrounding area. Neighborhood shopping centers are becoming increasingly popular throughout the United States. The impact of these centers is not only a matter of concern to the owners of residential properties, but also to the real estate community, financial institutions and local public officials.

The emergence of the centers suggests developers find them to be profitable. While the centers do offer many conveniences, the neighborhood residents generally have been opposed to such commercial activity, fearing a loss in their property's value resulting from the disamenities of noise, traffic and crime. The growing popularity of the centers seems to be at odds with the traditional posture of neighborhood residents. One of the many possible explanations is that increases in the cost of transportation and the value of leisure time may have muted the opposition from local residents.

The establishment of these centers, however, does not result only from the market forces of supply and demand. The land use in urban areas is governed by zoning ordinances, and approval from the zoning boards is

a necessary prerequisite for the construction and operation of shopping centers in residential neighborhoods. Although the widespread growth of these centers would tend to suggest a more favorable disposition on the part of zoning authorities, zoning regulations historically have been aimed at preserving and promoting more homogenous land uses in order to stabilize the market

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values of properties. These regulations restrict commercial and industrial land uses within residential neighborhoods on the ground that the disamenities generated by commerce and industry supposedly decrease the value of residential properties.

The effects of zoning and externalities on land prices have been examined empirically in a number of important studies. Most of these studies do not provide support for zoning regulations. Reuter's[21] findings reinforce Crecine, Davis and Jackson's[9] earlier results for Pittsburgh that there are no systematic adverse effects on the value of single family homes in the neighborhood of nonresidential land uses. Maser, Riker and Rosett,[18] using a rather large sample of Monroe County, also conclude that zoning does not produce systematic effects on property values. Grether and Mieszkowski's study, which considers physical aspects of zoning in New Haven, again finds "nonresidential land use per se has no systematic effect on housing values".[13, p. 14] The absence of measurable externalities may be explained by clientele effects that those who care least about the externality will live closest. Alternatively, the design of the studies which finds no externality effects may be faulty.

We are inclined to believe in the possibility raised by Grether and Mieszkowski that "land use externalities may be very localized so that they are next door phenomena".[13, p. 3] In other words, the proximity effect is not likely to extend very far in space. Furthermore, the effects of proximity to a specific land use may vary across locations. Proximity to churches, schools or shopping centers may have different effects in different parts of a metropolitan area or even in different parts of a large municipality. Generally, the studies which have found no externalities have either used aggregate data (e.g., census tract averages) and missed the proximity effects, or used microdata (i.e., individual property data) but extended the study across large regions thereby encountering the nonstationarity of the relationships across space.

There is some support in the literature for the notion that proximity matters. Colwell and Foley[10] have found an effect for proximity to electric transmission lines. Kain and Quigley[17] have shown that proximity effects can have a negative impact on apartment rents and on the value of single-family homes. Tideman's analysis of zoning hearings in Chicago[24] offers indirect support to the proposition that the effects of externalities are localized. He shows that indifference on the part of property owners to zoning hearings increases as proximity decreases to the property. This suggests that property owners beyond some critical distance do not regard the presence of disamenity as having any negative effect on the value of their property. To measure the amenity or disamenity effects of zoning, therefore, it would be necessary that the localized effect be bounded by some critical distance so as not to be swamped by other major determinants of residential property values.

The question is whether neighborhood shopping centers increase, decrease or both increase and decrease the value of proximate residential property. This paper analyzes the impact of a small neighborhood shopping center in Urbana, Illinois on the value of surrounding properties. A hedonic regression model is developed to explain the variations in property values before and after the announcement of the proposed shopping center. Six functional forms (linear, semilog, exponential, log linear, inverse and inverse-inverse) of the model are considered. The best model is selected using functional form analysis. Finally, the implications of the model are explored.

The Neighborhood Shopping Center

The neighborhood shopping center, the subject of this study, is typical of the many small neighborhood shopping centers throughout the country. This newly constructed center, opened for business in 1982, is called Southgate; it is located at 2110 Philo Road, Urbana, Illinois. The center has a lot area of 252,000 square feet and consists of five small retail stores and one independent grocery store. On its west, Southgate borders a fully developed section of Urbana, the Ennis Ridge Subdivision.

The center was initially proposed to the Urbana Planning Commission on June 7, 1979. The local newspaper carried a story the next day on the proposed shopping center's construction. Although the commission approved the center a short time later, construction did not begin until 1981 and the premises were not cleared for occupancy until the beginning of September, 1982. The date, June 7, 1979, when the project was publicly announced, is of special significance for the empirical analysis presented in this study.

The Data

The data on the selling prices and characteristics of 43 single-family homes and condominiums sold from 1976 to 1982 in Ennis Ridge Subdivision, were gathered from the Champaign County Multiple Listing Service. Although the public records on measurements of lot area or living space might be preferred over data supplied by multiple listing services, the marginal differences are not likely to have any discernible impact on this study's findings. All of the 43 properties lie within three-quarters of a mile from the Southgate shopping center. Distances from the center of Southgate to each property sold were recorded with the aid of plat maps. Summary statistics are in Table 1.

The Model Specifications

To analyze the impact of a shopping center on neighborhood property values, one might compare property values in two homogeneous neighborhoods, one with a neighborhood shopping center and the other without. But ideal situations are hard to find and the two neighborhoods are bound to be dissimilar with respect to physical characteristics or socio-economic conditions. This study uses only the affected neighborhood, but controls for proximity and for before and after effects as well as conventional hedonic variables. If the effect of proximity is different before and after the announcement then we may conclude that property owners are justified in opposing shopping centers because of the associated disamenities.

TABLE 1

Summary Statistics for Data

Variable	Mean	Standard Deviation
X_1 = Bathroom	2.0814	0.51636
X_2 = Living Area	1884.5	510.91
X_3 = Fireplace	0.69767	0.63006
X_4 = Lot Area	9027.7	3950.9
X_5 = Month of Sale	51.396	22.297
X_6 = (1 − AADUM)(DIST)	7.8895	14.118
X_7 = (AADUM)(DIST)	16.942	11.617
X_8 = (AADUM)	0.74419	0.43632

CORRELATION COEFFICIENTS

	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_2	0.6738						
X_3	0.5045	0.5380					
X_4	0.0562	0.0742	0.2443				
X_5	−0.1084	−0.1041	−0.2567	−0.8145			
X_6	0.3132	0.2047	0.2645	0.6816	−0.8150		
X_7	0.0024	0.1035	0.2262	0.8191	−0.9532	0.8550	
X_8	0.6252	0.7651	0.5069	−0.0432	−0.0016	0.1119	0.0287

In this respect, external costs capitalized into value decreases for the most proximate properties, may outweigh the benefits offered by the neighborhood shopping centers.

The model for determining the relationship between property value and the specific characteristics of the location utilizes the following function:

$$SP_i = f(X_{1i}, X_{2i}, \ldots, X_{8i})$$

where SP_i is the selling price of the ith property and the X_is are defined as follows:

- X_{1i} = the number of bathrooms in the ith property
- X_{2i} = the living area (sq. ft.) of the ith property
- X_{3i} = the number of fireplaces in the ith property
- X_{4i} = the lot area (sq. ft.) of the ith property
- X_{5i} = the sale month of the ith property from 0 to 46
- X_{6i} = distance of the ith property to Southgate times $(1 - X_8)$
- X_{7i} = distance to Southgate times X_8
- X_{8i} = after announcement dummy: O = before and 1 = after

The first four variables relate to the characteristics of the sampled properties and the fifth variable provides a record of the sale month in order to capture overall trends in the selling prices. The last three variables are included in the model to capture the effects on the property values in the neighborhood following the announcement of the shopping center. The first of these variables, X_{6i}, can be viewed as a control in the sense that its coefficient will measure the effect of proximity prior to the announcement data.

Before running the regressions, hypotheses were developed with regard to the signs of the explanatory variables. The coefficients of variables X_{1i} to X_{4i} were hypothesized to be positive meaning that an increase in any one of these variables would tend to increase the selling price of the ith property, other things being equal. The coefficient of variable X_{5i}, the month of sale of the ith property, was also hypothesized to be positive. The before announcement distance variable X_{6i}, on the other hand, was hypothesized to be zero on the assumption that distance from Southgate before the announcement would not be expected to affect the property values. The variable X_{7i}, distance to Southgate if the sale was after the announcement, was assumed to have a positive coefficient since property values might be expected to increase as distance from Southgate increased. That is, the shopping center was expected to depress values of the nearest properties relative to those at some distance. Finally, the coefficient of X_{8i} was hypothesized to be negative on the assumption that diseconomies associated with the presence of a shopping center would cause an absolute decline in the values of the nearest properties.

Functional Form Analysis

Six functional forms were tested. The results are summarized in Table 2. The magnitude of the maximum log likelihood is determined to be −428.661. This magnitude is not significantly less at 95 percent level of

TABLE 2

Regression Results

Model Number Functional Form	1 Linear $\lambda_L = 1$ $\lambda_R = 1$	2 Semi-Log $\lambda_L = 1$ $\lambda_R = 0$	3 Exponential $\lambda_L = 0$ $\lambda_R = 1$	4 Log Linear $\lambda_L = 0$ $\lambda_R = 0$	5 Inverse $\lambda_L = -1$ $\lambda_R = 1$	6 Inverse-Inverse $\lambda_L = -1$ $\lambda_R = -1$
X_1 = Bathroom*	11,798 (3.279)	24,357 (2.9972)	0.16978 (4.1913)	0.37364 (4.4)	-0.2776×10^{-5} (−4.0586)	0.1198 (5.2725)
X_2 = Living Area*	5.3181 (1.25)	4,785.1 (0.5458)	0.8347×10^{-4} (1.7428)	0.12471 (1.3612)	-0.1458×10^{-8} (−1.8031)	$.3215 \times 10^{-2}$ (1.4743)
X_3 = Fireplace	4,177 (1.666)	5274.2 (2.0453)	0.03789 (1.3427)	0.04697 (1.7435)	-0.2559×10^{-6} (−0.53697)	$-.4815 \times 10^{-6}$ (−1.3560)
X_4 = Lot Area*	1.9033 (3.685)	1.7528 (2.9135)	0.3363×10^{-4} (5.7834)	0.277×10^{-4} (4.418)	-0.6036×10^{-4} (−6.1465)	$-.3994 \times 10^{-9}$ (−4.3687)
X_5 = Month of sale*	143.47 (1.4444)	6,150.8 (1.5517)	0.00185 (1.6502)	0.07427 (1.7925)	-0.2649×10^{-7} (−1.4025)	$.6885 \times 10^{-6}$ (1.1704)
X_6 = (1 − AADUM)(DIST)	−321.63 (−1.0787)	−246.71 (0.7434)	−0.00625 (−1.8617)	−0.005349 (−1.5426)	0.1093×10^{-6} (1.9275)	$.1302 \times 10^{-6}$ (2.9151)
X_7 = (AADUM)(DIST)	489.91 (2.1989)	514.12 (2.2252)	0.00411 (1.6405)	0.00462 (1.9138)	-0.2491×10^{-7} (0.58797)	$-.4117 \times 10^{-7}$ (−1.3141)
X_8 = AADUM	−11,832 (−1.0787)	−11,623 (−1.0489)	−0.1565 (−1.2675)	−0.15478 (−1.3368)	0.21754×10^{-5} (1.0433)	$.2432 \times 10^{-5}$ (1.6085)
Constant	15,194 (1.2978)	−19,579 (−0.3122)	10.336 (78.417)	9.9491 (14.485)	0.2811×10^{-4} (12.628)	$.8118 \times 10^{-5}$ (3.7632)
Adjusted R^2	0.8450	0.8299	0.9056	0.91	0.8976	.9408
Log Likelihood	−442.287	−444.28	−432.859	−431.649	−440.936	−429.2123

t-ratios in parentheses

*variables subject to transformation

confidence from that of the inverse-inverse function, the function with the highest log likelihood (−429.213). Neither is the log likelihood of the log linear function significantly different from the maximum log likelihood at the 95 percent level of confidence. From these two functional forms, we selected the log linear model (Model 4) because of the ease for interpreting the regression coefficients. The log likelihoods of all other well-known functional forms are significantly less than the maximum. A similar application of the test for choosing the model that best fits the data is explained more fully in Brennan, Cannaday and Colwell.[5]

Regression Results

The regression results confirm most of the hypotheses developed above. The hypothesized signs of coefficients for all variables in all models are consistent with the regression results. The results for Model 4 suggest a fairly strong relationship between the dependent and independent variables. The R^2 shows that 91 percent of the variation in the dependent variable is explained by the regression.

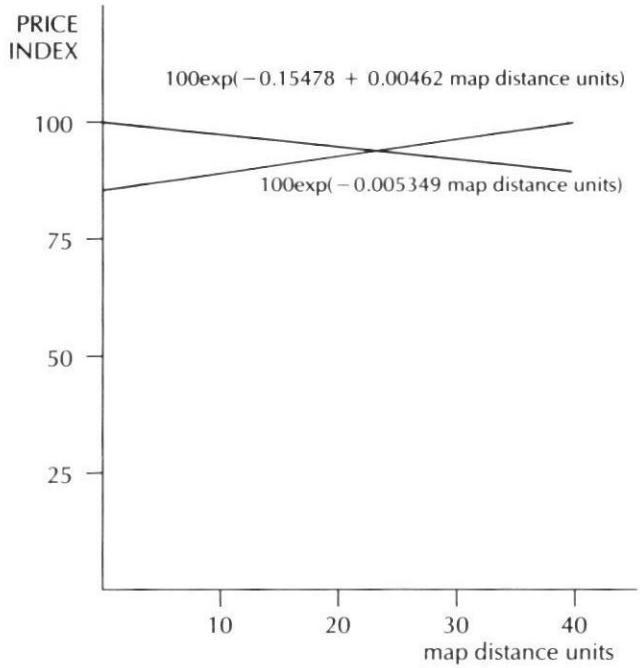
The values of regression coefficients (except on X_3, X_6, X_7, & X_8) represent partial elasticities. That is, these coefficients measure a percent change in selling price for one percent change in each of the independent variables when the influence of other variables is held constant. A percentage increase in variable X_1 (bathroom), for instance, increases the selling price of the dwelling unit by about four-tenths of one percent when the influence of other independent variables is held constant. The coefficient on the month of sale variable, X_5, has a similar interpretation. It indicates property values appreciated at an overall monthly rate of about one-tenth of one percent for every one percent increase in time measured in months from 1976 to 1982. The coefficient on X_3, however, has a different interpretation. It indicates that a fireplace adds about 5 percent (exp .04697 = 1.048) to the value of a residential property.

The interpretation of the coefficients on X_6, X_7 and X_8 is of primary interest. The coefficient on X_6, the before announcement distance effect, shows a possible small decrease in selling price as distance (in feet) increases away from Southgate (although this effect appears to be quite significant in Model 6). While the variable X_6 has a coefficient which is significantly negative at the 90% level of confidence, the coefficient is not significantly different from zero at the 90 percent level of confidence. It may be the Southgate location, or something near it, had some amenity value prior to the announcement. Alternatively, residents could have had different expectations for the development of the Southgate site than those realized. However, it is reasonable to assume there is no significant distance effect prior to the announcement of the

forthcoming shopping center as hypothesized. The variable X_7, the distance to Southgate after announcement, however, proved to be a significant determinant of the selling price. As expected, the regression coefficient revealed that after the announcement property values increased as distance from the site of impending construction increased. That is, the coefficient on X_7 is significantly positive at the 90 percent level of confidence.

The after announcement price effect, variable X_8, tends to confirm the general apprehension on the part of residential property owners that the location of commercial activity in the immediate neighborhood tends to adversely affect property values. The regression coefficient, which is significantly negative at the 90 percent level of confidence, indicates properties located adjacent to the center decreased in value after the announcement in 1979. The results from Model 4 are depicted in Figure 1.

FIGURE 1



The downward sloping curve in Figure 1 illustrates the impact on selling price before announcement and the upward sloping curve illustrates the impact after the announcement. The intersection of the two curves shows that properties located beyond 15.53 map distance units, or approximately 1,500 feet, from the shopping center were valued more after the announcement than before. The results depicted in Figure 1 illustrate the impact of the announcement on the price-distance relationship indicated by Model 4.

Conclusion

The announcement of the proposed shopping center had both negative and positive effects on the value of residential properties. At distances closer than 1,500 feet, diseconomies appear to dominate. Beyond 1,500 feet, economies appear to dominate. The trade-off between values proximate to the shopping center and properties served by the center, but removed from its negative effects, would seem to suggest there may be an optimal spatial frequency of these small shopping centers.

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