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Did Southpoint Mall Lower Property Values?

Of the many factors that impact residential property values, the primary determinants of these values include the physical characteristics of the property, the financial conditions of the sale, and various location factors. These location factors depend on the proximity or access to amenities, such as mass transit, or possible disamenities, such as large factories or power plants. This paper examines the effect of a shopping center, Southpoint Mall in Durham, NC, on the property values of surrounding homes. The results indicate that residential property is not adversely affected by the mall. In addition, the price gradient is actually nonlinear, with prices rising with distance up to a critical point, after which prices begin to decline.

A shopping center is unlike many urban amenities because it provides many conveniences at the potential cost of noise, traffic, or crime.[1] The proposal of Southpoint Mall in 1998 generated a fair amount of controversy in the surrounding neighborhoods, due to concerns ranging from the increase in traffic to the potential economic blow to local businesses, such as the now-redeveloped South Square Shopping Center. The opponents claimed that the proposed improvements to the transportation were inadequate and that the losses in local business would hurt the city.[2] However, the development project also allowed for many possible benefits, both for the convenience of shoppers and the growth of the local economy.[3]

Ultimately, the zoning was approved for Southpoint Mall (now called the Streets at Southpoint), which lead to the closure of the South Square Mall shopping center. In 2002, at its opening, Southpoint Mall attracted 40 stores new to the Triangle area and 23 new to North Carolina.[4] By the end of the year, the mall was attracting 1 million customers a month from as far away as Wilmington, Charlotte, and Virginia.[5] With such a large impact, it is hard to imagine people would be opposed to the mall. Nevertheless, this paper examines if and how property values were affected after the opening of the Southpoint Mall (SPM).

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[1] Colwell, Gujral, and Coley, "The Impact of a Shopping Center on the Value of Surrounding Properties."
[2] "I-40 Mall Would Diminish Life in Southwest Durham."
[3] "SOUTHPOINT MALL - Zoning Panel's High Sign."
[4] Christmas, "2002: Year in Review."
[5] Krishnan and Zimmer, "Southpoint Takes Top Slot."

LITERATURE REVIEW

In the past, much research has been conducted about the externalities of land use on surrounding property values. However, these studies provide conflicting conclusions about the effects of nonresidential land use, such as commercial centers and industrial zones, on the values of nearby residential properties. For example, Grether and Mieszkowski (1978) examine housing adjacent to various nonresidential land uses and conclude that most such land uses have no significant impact on home values.[6] Employing a hedonic pricing model, they consider houses within a one-quarter mile radius of the nonresidential sites and run separate regressions corresponding to each site. They find that as expected, the industrial activity and public housing zones appear to be disamenities, showing a small, but positive correlation between distance and housing sales price. However, the highways, garden apartments, commercial strips, and point commercial developments show no significant effect on prices. They also refer to a possible explanation of these indeterminate results as the "next door" phenomenon. Hughes and Sirmans (1992) explore this phenomenon, finding that traffic generated by commercial activity only has a negative impact on home prices if it directly involves the streets on which the home is located.[7] An increase in traffic on a major neighborhood street away from the house does not significantly affect the house price. With traffic being a potential negative externality in the development of Southpoint Mall (SPM), Hughes and Sirmans' result is important in the analysis of the property values within the immediate vicinity of the mall.

In a study conducted by Colwell, Gujral, and Coley (1985), they find that the diseconomies of a shopping center development are present up to a distance of approximately 1500 feet.[8] In other words, within 1500 feet, increased proximity leads to a decline in property values. Outside of 1500 feet, the positive externalities of the shopping center become more prevalent and property values decline with increased distance. To find this critical point, Colwell et al. plot the intersection of two regression lines representing the price-distance relationship before and after the announcement of the shopping mall. This method can be duplicated if using data from before and after the announcement of the development project. More recently, Aydin, Crawford, and Smith (2011) expand upon Colwell et al.'s research by studying a large scale commercial department, rather than

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[6] Grether and Mieszkowski, "The Effects of Nonresidential Land Uses on the Prices of Adjacent Housing: Some Estimates of Proximity Effects."
[7] Hughes and Sirmans, "Traffic Externalities and Single-Family House Prices."
[8] Colwell, Gujral, and Coley, "The Impact of a Shopping Center on the Value of Surrounding Properties."

the small neighborhood shopping centers.[9] They find that the housing price gradient does increase up to a distance and then decrease, though they can only find a critical range, not point. Since their methods involve using only a single year of data and they study a large commercial shopping center, Aydin et al.'s methods heavily inspire this paper's.[10]

DATA AND METHODOLOGY

The objective of this study is to measure any possible property value impact of the SPM development on the surrounding residential areas. This analysis will provide additional insights into the effect of a large commercial development enabled by aggressive rezoning.

The methodology follows a traditional hedonic model to isolate any SPM-specific impact. The semi-log form, as the literature commonly uses, is employed here due to the skewed nature of the dependent variable, total assessed value. The total assessed value is used as a proxy for the market price of a house. The results from this model are also simple to understand and appropriate for the purposes of this short study. After running regressions on the data, the Breusch-Pagan test reveals that the data are heteroskedastic. Therefore, the regressions are run with robust estimates. In addition, the data appears to have spatial correlation. Thus, using an estimator with clustering will also give robust estimates. However, the cluster correct regressions yield larger standard errors and lead to insignificant estimates. These regressions are included in the analysis.

The semi-log estimating equations for determining the relationship between the housing values and structural and locational characteristics of the house use the following forms:

$$Log\ P_i = \beta_0 + \beta_1 SF_i + \beta_2 SF_i^2 + \beta_3 Age_i + \beta_4 Log(Lot_i) + \beta_5 Bath_i + \beta_6 Bed_i + \beta_7 Fireplace_i$$
$$+ \beta_8 Basement_i + \beta_9 Garage_i + \beta_{10} DIST_i + \beta_{11} DIST_i^2 + \varepsilon_i$$

Or

$$Log\ P_i = \beta_0 + \beta_1 SF_i + \beta_2 SF_i^2 + \beta_3 Age_i + \beta_4 Log(Lot_i) + \beta_5 Bath_i + \beta_6 Bed_i + \beta_7 Fireplace_i$$
$$+ \beta_8 Basement_i + \beta_9 Garage_i + a_1 D_{1i} + \ldots + a_9 D_{9i} + \varepsilon_i$$

where P_i is the appraised value of the i^{th} home; SF_I, Age_I, Lot_I, $Bath_I$, Bed_I are respectively the square footage of the living area, age, lot size, number of baths, and number of bedrooms; $Fireplace_I$, $Basement_i$, $Garage_i$ are dummy variables for whether the home has the feature; $DIST_i$ is the distance

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[9] Aydin, Crawford, and Smith, "Commercial Development Spillover Effects Upon Residential Values."

[10] Hopefully Aydin et al.'s Town Center Improvement District is close enough in character to Southpoint Mall

of the i^{th} home to the boundary of SPM; and D_i's are the dummy variables for the distances rings around SPM.[11] These distance rings are set in accordance with those from Aydin et al., due to the similarities between their study of a large shopping development and the SPM development studied here.[12] Note that $DIST_i^2$ and SF_i^2 are added to the model to account for possible nonlinear relationships. The distance squared term accounts for the potential "next door" phenomenon by providing two forces through which distance affects price (within the regression).[13] This term gives a method to find the inflection point at which the price gradient changes signs. In addition, this term aids with the definition of the distance bands.

The data source is a combination of two databases. The actual pricing and structural data come from the Durham County Real Estate Database from the Office of Tax Administration (for the tax year 2012 with assessed value January 1, 2008). The location data come from 2010 tax parcel data with GIS information. This combination of data is necessary since only the 2012 data contain the structural characteristics needed to run the hedonic model. Since both datasets contain assessed property values from January 1, 2008, as long as only properties existing in the 2010 data are used, the merging of the databases is acceptable. In addition, the distances from each parcel to the nearest boundary of SPM are calculated using the 2010 GIS coordinates.

Since the SPM development was announced in 1998, with zoning approved in 1999, using appraisal or sales data from before and after the announcement would provide the best estimates of the mall's impact on the nearby property values. However, the data from that time period is not readily available, so the large dataset of tax appraised values should suffice as a proxy for sales data.

The geographic range of the data extends up to 7 miles from the edge of the SPM to allow for enough control areas far from the development. This increased range improves upon the study by Grether and Mieszkowski, which stops at 0.25 miles. It is appropriate to include distant properties as controls since they do not experience any of the negative traffic or pollution externalities from the development. However, the most distant of the control areas may introduce some bias due to their proximity to the South Square shopping area, Chapel Hill, or the Research Triangle Park. Therefore, the data is restricted by distance to properties within 5 miles of the edge of SPM. In addition, the data is restricted to properties less than 50 years old to remove any potential price effects of federally designated historic buildings. Finally, three outliers due to

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[11] One dummy variable is excluded from the regression to avoid collinearity

[12] Rings at .75, 1.0, 1.25, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 5.0 miles

[13] Grether and Mieszkowski, "The Effects of Nonresidential Land Uses on the Prices of Adjacent Housing: Some Estimates of Proximity Effects."

possible data mis-entry were removed. As a result of this cleaning, the unrestricted distance data set contains 15,615 appraisal values. The analysis in this paper focuses on the distance restricted data set, containing 14,809 values.

EMPIRICAL RESULTS

Tables 1 gives the regression results for the non-distance restricted data set. Table 2 gives results from the cluster correlated regression, using the Neighborhood Class coding from the 2012 tax database as the cluster IDs. Table 3 gives heteroskedastic consistent estimates (non-clustered). Also, both Tables 2 and 3 are restricted to properties within 5 miles.[14] All R-squares reported in the tables are approximately 85-86%, suggesting that these models explain a relatively large portion of the variation in the housing values. However, this high R-squared value could simply be a result of using tax appraised values created from the same covariates and cannot be used to explain any causal relationship between distance from SPM and housing price. As expected, the housing characteristics, across Tables 1-3, all have significant coefficients at the 1% level.

Since the non-distance restricted data is potentially affected by other market factors, as mentioned previously, the results from Table 1 are presented only for reference. The linear model 1 suggests that house prices tend to rise with proximity to SPM. This finding appears to contradict the commonly held notion that commercial developments produce negative externalities. However, the findings in models 2 and 3 suggest a nonlinear relationship. Nevertheless, due to the above factors, this study focuses instead on Tables 2 and 3, clustered and non-clustered regressions respectively.

Before further discussion of the relationship between distance and housing price, it is important to consider whether clustering should be considered. In Figure 1, a heat map of the property values shows the presence of possible spatial correlation. The most likely example of the correlation is in the neighborhood near the Hope Valley Country Club (north, colored red). Despite the neighborhood's large distance from SPM, its properties are significantly more expensive than properties elsewhere in the SPM region. The results from the clustered regressions Table 2 show a significant positive relationship between price and distance at the 10% level (model 2). However, the other estimates in any of the three clustering models are not significant. The vast disparities in the demographics of the Durham community may explain why the home values are so varied between neighborhoods. Although few other useful conclusions can be drawn from this regression,

[14] Aydin et al. makes Wa similar restriction at 3.5 miles.

the clustering estimates are unbiased. Therefore, at the minimum, controlling for heteroskedasticity may be enough to draw some useful conclusions.

Figure 1:
Distance Rings around Southpoint (Blue)
Yellow-Red (Less Expensive-More Expensive)

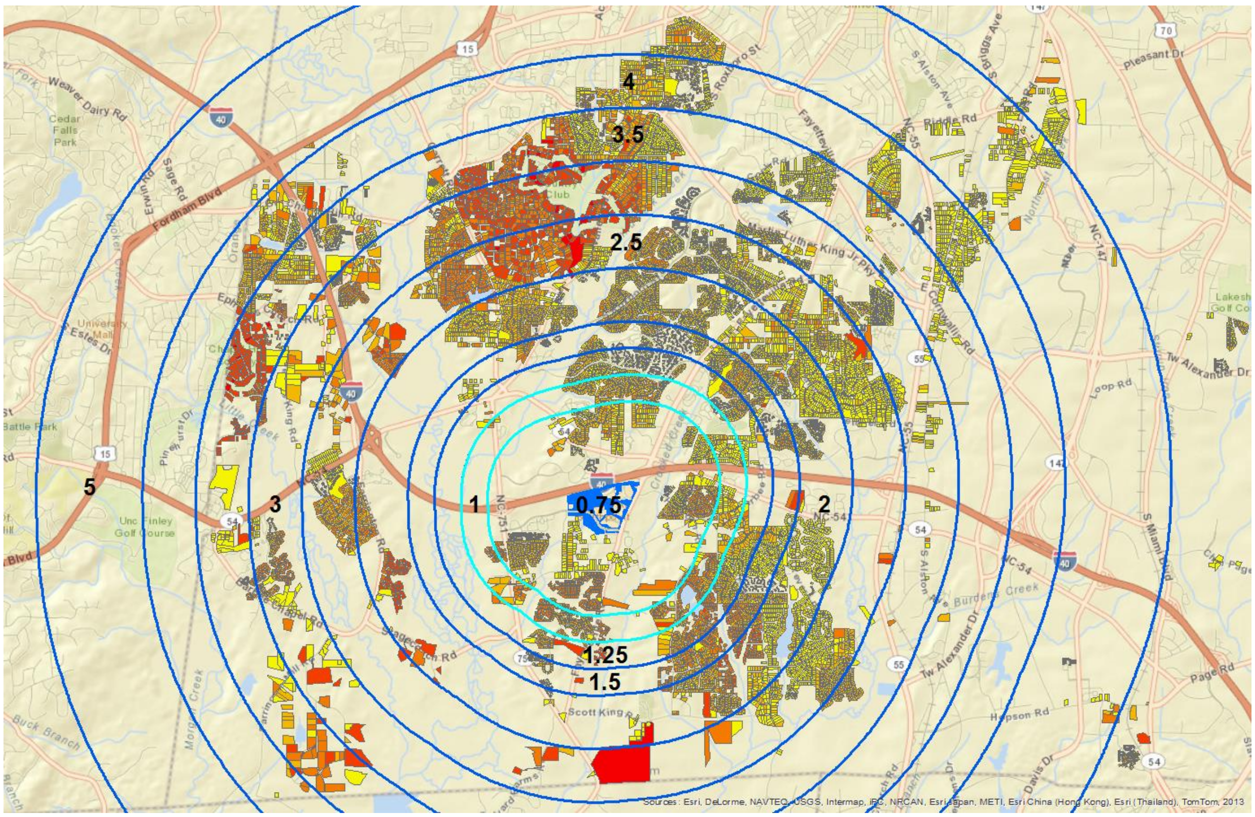

TABLE 1: Unrestricted Distance
OLS REGRESSION RESULTS
DEPENDENT VARIABLE: LOGARITHM OF ASSESSED VALUE

Variables	Model I	Model II	Model III
sqft1000	0.499**	0.503**	0.497**
	(0.012)	(0.013)	(0.012)
sqftsq	-0.022**	-0.022**	-0.022**
	(0.002)	(0.002)	(0.002)
age1	-0.003**	-0.003**	-0.003**
	(0.000)	(0.000)	(0.000)
lnlot	0.091**	0.092**	0.094**
	(0.005)	(0.005)	(0.005)
bath	0.085**	0.082**	0.081**
	(0.004)	(0.004)	(0.004)
bed	-0.031**	-0.031**	-0.032**
	(0.003)	(0.003)	(0.003)
fireplace	0.168**	0.165**	0.170**
	(0.005)	(0.005)	(0.005)
basement	-0.089**	-0.090**	-0.088**
	(0.006)	(0.006)	(0.006)
garage	0.099**	0.096**	0.100**
	(0.004)	(0.004)	(0.004)
dist1	0.009**	0.079**	
	(0.002)	(0.006)	
distsq		-0.016**	
		(0.001)	
d1			0.061**
			(0.012)
d2			0.067**
			(0.012)
d3			0.076**
			(0.012)
d4			0.085**
			(0.012)
d5			0.076**
			(0.011)
d6			0.081**
			(0.012)
d7			0.150**
			(0.012)
d8			0.102**
			(0.013)
d9			0.073**
			(0.013)
_cons	11.257**	11.206**	11.205**
	(0.020)	(0.020)	(0.022)
R^2	0.85	0.85	0.86
N	14,809	14,809	14,809

Note: Numbers in parentheses are standard errors. +-10%; *-5%; **-1%

TABLE 2: Distance Restricted, Clustered
OLS REGRESSION RESULTS
DEPENDENT VARIABLE: LOGARITHM OF ASSESSED VALUE

Variables	Model I	Model II	Model III
sqft1000	0.499**	0.503**	0.497**
	(0.021)	(0.021)	(0.022)
sqftsq	-0.022**	-0.022**	-0.022**
	(0.002)	(0.002)	(0.002)
age1	-0.003**	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)
lnlot	0.091**	0.092**	0.094**
	(0.017)	(0.018)	(0.017)
bath	0.085**	0.082**	0.081**
	(0.014)	(0.014)	(0.012)
bed	-0.031**	-0.031**	-0.032**
	(0.009)	(0.009)	(0.008)
fireplace	0.168**	0.165**	0.170**
	(0.038)	(0.038)	(0.038)
basement	-0.089**	-0.090**	-0.088**
	(0.018)	(0.018)	(0.018)
garage	0.099**	0.096**	0.100**
	(0.022)	(0.022)	(0.021)
dist1	0.009	0.079+	
	(0.017)	(0.045)	
distsq		-0.016	
		(0.010)	
d1			0.061
			(0.075)
d2			0.067
			(0.079)
d3			0.076
			(0.076)
d4			0.085
			(0.074)
d5			0.076
			(0.073)
d6			0.081
			(0.074)
d7			0.150+
			(0.081)
d8			0.102
			(0.093)
d9			0.073
			(0.069)
_cons	11.257**	11.206**	11.205**
	(0.082)	(0.087)	(0.096)
R^2	0.85	0.85	0.86
N	14,809	14,809	14,809

TABLE 3: Heteroskedastic, Non-Clustered
OLS REGRESSION RESULTS
DEPENDENT VARIABLE: LOGARITHM OF ASSESSED VALUE

Variables	Model I	Model II	Model III
sqft1000	0.499**	0.503**	0.497**
	(0.012)	(0.013)	(0.012)
sqftsq	-0.022**	-0.022**	-0.022**
	(0.002)	(0.002)	(0.002)
age1	-0.003**	-0.003**	-0.003**
	(0.000)	(0.000)	(0.000)
lnlot	0.091**	0.092**	0.094**
	(0.005)	(0.005)	(0.005)
bath	0.085**	0.082**	0.081**
	(0.004)	(0.004)	(0.004)
bed	-0.031**	-0.031**	-0.032**
	(0.003)	(0.003)	(0.003)
fireplace	0.168**	0.165**	0.170**
	(0.005)	(0.005)	(0.005)
basement	-0.089**	-0.090**	-0.088**
	(0.006)	(0.006)	(0.006)
garage	0.099**	0.096**	0.100**
	(0.004)	(0.004)	(0.004)
dist1	0.009**	0.079**	
	(0.002)	(0.006)	
distsq		-0.016**	
		(0.001)	
d1			0.061**
			(0.012)
d2			0.067**
			(0.012)
d3			0.076**
			(0.012)
d4			0.085**
			(0.012)
d5			0.076**
			(0.011)
d6			0.081**
			(0.012)
d7			0.150**
			(0.012)
d8			0.102**
			(0.013)
d9			0.073**
			(0.013)
_cons	11.257**	11.206**	11.205**
	(0.020)	(0.020)	(0.022)
R^2	0.85	0.85	0.86
N	14,809	14,809	14,809

In Table 3, the linear model 1 suggests that housing prices decrease with proximity to SPM. This result supports the idea that commercial developments produce some negative externalities. Nonetheless, the magnitude of the effect is very small at only a 1% decrease in value for every mile closer in proximity.[15] As in Table 1, models 2 and 3 in Table 3, suggest a nonlinear relationship with prices initially increasing up to an inflection point then decreasing with distance. Despite this inflection, since distance dummy variables d_i have positive coefficients in model 3, prices do not appear to fall below that of houses in the control areas.

However, the actual locations of the inflection points are difficult to determine. Taking the first-order condition of the expression $\text{Log } P_i = .0785066*DIST_i - .0158695*DIST_i^2$ from model 2 gives an estimated inflection point to at a distance of 2.47 miles from SPM. This inflection point suggests that prices should be increasing in the range from 0 (d1) to 2.5 miles (d6) and decreasing from 3.0 (d7) to 5.0 miles (d10). The results from model 3 are generally consistent with those from model 2. Although prices have small fluctuations between 0 (d1) to 3.0 miles (d7), they increase from a 6% premium to a 15% premium over the prices in the control areas and then begins to decrease beyond 3.0 miles. This inflection point likely exists in the region between 2.5 to 3.0 miles.

These results are similar to the conclusions of Colwell et al. and Aydin et al. It is possible that a counterbalancing of positive and negative externalities exists in the region around SPM. In other words, the negative effects exist at closer distance while the positive effects dominate beyond a certain point. Within the critical distance, it is unclear whether it is the negative effects dominating or simply weakening with distance. In addition, both authors report a closer critical point, with Colwell et al. finding 1500 feet and Aydin et al. finding some point between 1.25 to 1.50 miles. The reason for this discrepancy is uncertain, but possible explanations include the large size and popularity of the SPM (1.3 million square feet) and also the controversial rezoning that occurred to enable the development. The opposition to the rezoning may have been signs from the community that they preferred neighborhoods that conformed to their residential uses and valued peace and quiet over convenience. Instead, residents moving into the area face growing traffic commensurate with the growth of the I-40/Fayetteville Road area and the larger Raleigh-Durham metro area. Perhaps the Hughes and Sirmans' traffic effects do play a role in the housing values immediately around SPM.

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[15] Due to log specification of price, the coefficient represents percentage change in price per mile in distance

CONCLUSIONS

The existing literature provides a conflicted view on the impact of commercial developments on residential housing values. Nevertheless, more recent studies succeed at finding a balance between the negative and positive effects of commercial land use. Studies that look at only an overall region fail to find any significant impact, while studies that account very carefully for proximity to the development find that negative impacts do occur only at close distances. Since the region of impact is relatively small, much of the literature falls into the former category of finding no impact. Furthermore, the literature tends to focus on smaller developments, whereas the negative externalities from larger developments are certainly greater. Therefore, the important questions include how the positive and negative externalities counterbalance and how this dynamic might be differ with development size.

The results of this research support the findings that home values increase up to a certain distance from the shopping center and then begin to decrease. However, this result does not imply that at close distances, shopping centers are bad for housing values. Surprisingly, as the results in this study reveal, the values of houses within the first distance band (<0.75 miles) are still higher than those in the control areas. At the very least, the residential area in the immediate vicinity does not suffer for being located next to the shopping center. Thus, the Southpoint Mall is more an amenity than a disamenity to residents. However, as a shopping center is different from other commercial developments, it would be tenuous to extend the results of this study to all types of commercial developments.

Future improvements to this study may focus on additional types of properties, such as rental units, to determine if different living preferences would have a noticeable impact on the housing values. In addition, a study in a denser area may yield a price gradient with more points and possibly better insights into the inflections points. Ultimately, studies such as this one could aid policy makers in producing better city plans and controlling externalities more efficiently.

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