Micro-Market Determinants of Neighborhood Center Rental Rates

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Abstract

This investigation expands the limited empirical research on retail rental rates by investigating the determinants of neighborhood shopping center rents. Evidence supports primary trade area and property specific characteristics as the primary determinants of neighborhood center vacancy and rental rates. A positive aggregation effect created by higher order shopping opportunities is also found. Community centers and malls generate positive marginal effects on neighborhood center rental rates. However, the marginal effects diminish greatly after two-tenths mile for community centers and one-half mile for malls. Micro-market factors are important determinants of rental rates and by implication property performance.

Introduction

The testing of empirical models of the determinants of retail rent has been limited to relatively few studies. Lack of access to sufficiently detailed data and the aggregation of differing types of retail property within data sets have limited the interpretation and validity of much of the existing empirical research. This small amount of empirical analysis is a concern to both academic and applied real estate researchers interested in testing applied theories of retail activity. Without additional studies, based on detailed, property-specific data, only minimal conclusions and inferences can be made regarding the actual determinants of retail rent. This study, based on data containing much more detail than available in the past, including a relatively large number of observations generated from a single retail category (neighborhood centers) and SMSA (Atlanta), permits additional empirical investigation of the micro-market determinants of neighborhood retail rental rates. It highlights a need for micro-market analysis by investors, appraisers, and market analysts.

Literature Review

As Eppli and Benjamin (1994) point out in their review of shopping center theory and empirical research,[1] much has been hypothesized and debated within the retail

framework. Most of the applied methodologies and underlying theories found in this area of real estate research are traced to questions concerning store sales, store patronage, determinants of store rents and the related topic of property valuation. Central place theory has been empirically tested with at least some support for a spatial component to retail demand, while additional theory development and empirical work have focused on retail aggregation and demand externalities. On an applied basis, multipurpose shopping, suggested by aggregation theory, and shopping center attributes, advanced by demand externality theory, have been incorporated into central place theory to reflect a more complex retail environment. The general applied and empirically testable hypotheses being that complementary shopping opportunities and center specific characteristics will affect store sales, store rents and property value. Although some empirical analysis has provided preliminary confirmation for this expanded theory (Ingene, 1984; Anderson 1985; Eppli and Shilling, 1996; and others), empirical research on store rents has been minimal.

Existing work on retail store rents includes a Sirmans and Guidry (1993) study finding that center square footage, property age and the anchor tenant are the primary factors affecting retail rents. The study, however, used a small sample of hierarchically aggregated retail property types, including unanchored retail strip centers, neighborhood centers, community centers and malls; consequently, the square footage finding may be a spurious indicator of retail hierarchy. In addition, the study did not specifically address the potential for high correlations between many shopping center characteristics while its external validity was threatened by degrees of freedom limitations[2] inherent in its empirical models. Nonetheless, the study provides a foundation for additional research and manifests the complexity required to empirically model retail rental rates.

In related studies, Gatzlaff, Sirmans and Diskin (1994) and Sirmans, Gatzlaff and Diskin (1996) investigate micro-market determinants of retail rent. Using a two-stage model and WLS to control for heteroskedasticity, these studies find that the loss of an anchor tenant substantially reduces rent. However, as the authors themselves point out, the small data set used in these studies compromises the generalizability of the two papers' findings. Additionally, the studies aggregated retail market segments by inclusion of several hierarchies of shopping center and modeled vacancy in terms of nominal vacant square footage, as opposed to a percentage of leasable space, which may have biased the results toward larger shopping centers capable of indicating relatively large vacant square footage at low to moderate vacancy rates.

Ownby, Davis and Sundel (1994) present a study of real estate decision-makers analyzing the actual opinions of practitioners[3] regarding the determinants of neighborhood shopping center rent. Using a one-mile radius as representative of a neighborhood center's primary trade area, they find that practitioners expect accessibility, visibility, household count in the trade area, household income and parking to have a positive impact on rent. These market participants deemed competing centers within a trade area to be detrimental to a neighborhood center's

rental rates. The results of this survey highlight the widely held belief that trade area purchasing power, customer proximity and direct competition are important determinants of neighborhood center performance. It is noteworthy, however, that the decision-makers' responses provide no support for positive aggregation effects.

Benjamin, Boyle and Sirmans (1990) investigate retail lease structure and find that initial lease term, percentage rents and tenant status as a national chain affect base retail rent. Using data from five neighborhood and community centers controlled by a single developer in Greensboro, NC, the study found a trade-off between base rent and percentage rent. Also, a direct relationship was found between the percentage rent threshold and the base rent level. However, because the lease observations were taken from only five actual center locations, a detailed, micro-market-level model was not provided.

In contrast to these prior empirical retail rental rate studies, this investigation employs a relatively large data set composed of a single retail property type, advancing the understanding of micro-market, rent-determining phenomena at the neighborhood shopping center level.[4]

Model

To empirically test the determinants of neighborhood center rent, the models used by Sirmans and Guidry (1993), Gatzlaff, Sirmans and Diskin (1994), and Sirmans, Gatzlaff and Diskin (1996) are modified to address retail aggregation and demand externality constructs while controlling for lease type.[5] In order to control for the possible endogenous relationship between vacancy and rent, one can simultaneously estimate the following two relationships:

$$VACANCY = f(RENT; MARKET, DRAW), \text{ and} \quad (1)$$

$$RENT = f(VACANCY; MARKET, DRAW, LEASE, LOCATION), \quad (2)$$

where *RENT* is the annual per square foot rental rate for shop space, *VACANCY* is the neighborhood center's vacancy rate, *MARKET* is a vector of retail space market-condition variables for a given center and primary trade area,[6] *DRAW* is a vector of center specific variables including accessibility and design characteristics, *LEASE* is a vector of lease types, and *LOCATION* is a vector of demographic and economic variables for a given center. The definitions of the vectors as used in the model and the variables used to test the relationships are discussed below.

The *MARKET* vector variables include each center's primary *trade area vacancy rate*, a count of *trade area neighborhood centers*, the aggregate number of *trade area community centers*, the number of *trade area malls,* and for an alternative

model—the distance to the *closest community center* and the distance to the *closest mall*.[7] The *trade area vacancy rate* and the *trade area neighborhood centers* variables capture the property market's influence on a given property's vacancy rate in Equation (1). Inclusion of the number of primary *trade area community centers* and *trade area malls* in Equation (2) provides a test of the Hanson (1980) and O'Kelly (1981) postulate that multipurpose shopping opportunities will result in patronization of neighborhood centers by customers that would otherwise shop at more convenient locations. A neighborhood center located near higher ordered shopping centers is likely to benefit from the effective extension of the maximum range of potential center patrons. Consequently, rent should be systematically higher in Equation (2) when the *trade area community center* and *trade area mall* variables are non-zero. Substituting the *closest community* and *closest mall* distance variables for the *trade area community center* and *trade area mall* variables permits measurement of the expected marginal benefit of proximity to higher order retail centers. Concurrently, the *trade area neighborhood centers* variable provides a means of testing the benefit of homogeneous retail aggregation. De Palma, Ginsburgh, Papageorgiou and Thisse (1985) suggest that consumers are unwilling to bypass an intervening shopping opportunity in order to purchase a homogeneous product, which characterizes the lower order goods offered at neighborhood shopping centers. A significant negative sign on the *trade area neighborhood centers* variable in Equation (2) would therefore confirm DePalma, et al., and be consistent with practitioner opinions expressed in Ownby, et al. (1994). Conversely, a significant positive sign on the *trade area neighborhood centers* variable would support the concept of neighborhood center aggregation economies.

The *DRAW* variables address center specific characteristics and potential demand externalities. Variables include *center size* in square feet, *center age*, *age squared*, a dummy variable for recent *renovation*, a dummy variable indicating a *dark anchor*, a variable controlling for the amount of available *contiguous space* and the number of *buildings* in the center. Center exterior is captured by dummy variables for shell type including *brick*, *stucco*, *block*, *stucco and brick*, *stucco and block* and *other*. Accessibility is measured by the number of *curb cuts* into the center, the center's number of *parking spaces*, the number of *major roads* abutting the center, a dummy variable for the presence of *traffic lights* serving the center, a dummy variable indicating a *corner location* and a dummy variable for the presence of *left turn lanes*. Center design[8] is captured by dummy variables indicating configuration including *strip*, *L-shaped, U-shaped* and *other design*.

The *LEASE* vector is composed of dummy variables indicating type of lease. Types include g*ross lease*, *net lease*, *net–net lease*, *net–net–net lease* and *other lease*. In the market from which the data used in the study was collected, most shop retail rent is quoted on a *net–net–net lease* basis. This means that the tenant reimburses the landlord for pro rata property taxes, insurance and common area maintenance expenses.

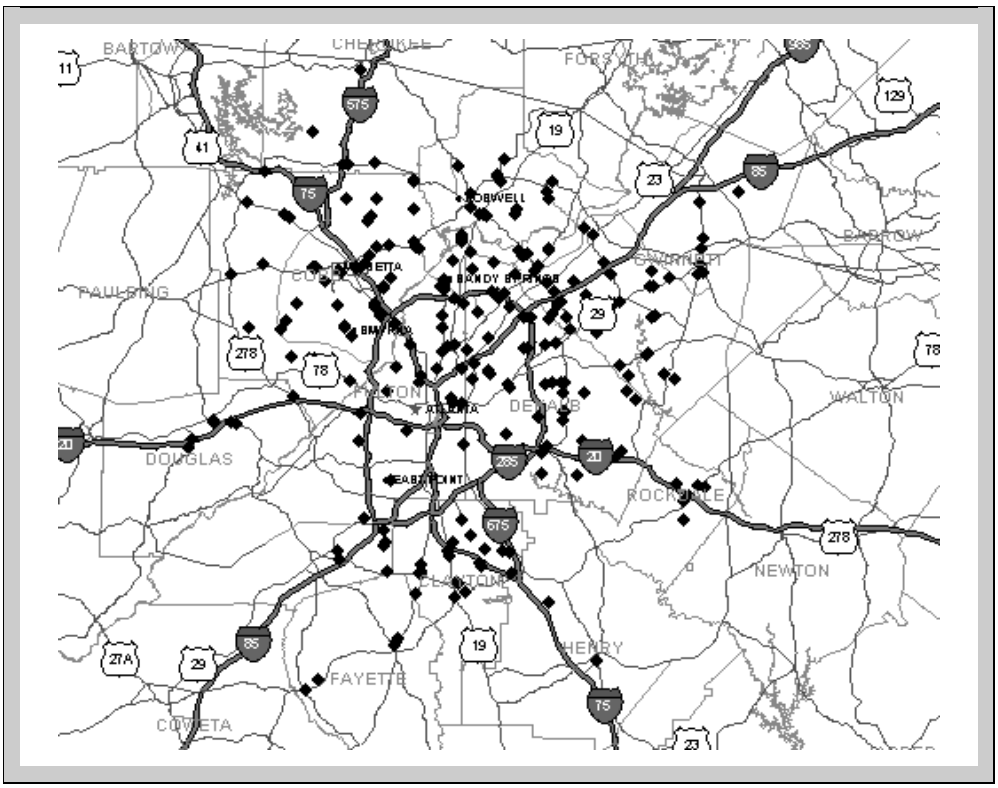
The *LOCATION* vector models purchasing power and includes three variables. The *trade area purchasing power* variable is calculated by multiplying trade area

population by trade area average per capita income. The number of trade area *households on public assistance* in 1990, the most recent available measure, is used to control for the depth of household income levels within the trade area. *Longitude* and *latitude* coordinates for each center are included in the model to control for additional location attributes not specified in the model.

Data

The observations used in this study encompass property specific characteristics and attributes derived from a database composed of neighborhood, community and mall centers in the ten county core Atlanta SMSA. The counties include Fulton, Cobb, Gwinnett, Cherokee, Dekalb, Clayton, Henry, Rockdale, Douglas and Fayette (see Exhibit 1). The database approximates a complete census of all neighborhood-scale and larger retail centers in the market. Property specific 1997 data on rent, center size, parking, vacancy, age and type of anchor tenant are provided by Dorey Publishing and Information Services, Inc., an Atlanta based real estate research firm. Other center specific data are based on actual site visits

Exhibit 1 | Map of Neighborhood Center Locations



to all centers within the database. Demographic and economic data are derived from the 1990 census and a 1997 census update published by Caliper Corporation. Similar to Mills (1992), Gatzlaff, Sirmans, and Diskin (1994) and Sirmans, Gatzlaff and Diskin (1996), the rental rate data is quoted, or asking, rental rate.[9] A total of 248 of the database's 312 neighborhood shopping center observations are used in the analysis due to limitations on the availability of rental rate information.[10] In deriving trade area statistics, the complete database was used so that each derived trade area includes competing neighborhood and community center information.

As shown in Exhibit 2, maximum center rent ranges from $4.00 per square foot to $33.00 per square foot while minimum center rent ranges from $2.00 per square foot to $30.00 per square foot. The highest rental rate observation has a rental rate range between $30.00 and $33.00 per square foot. The lowest rental rate observation has a rental rate range between $2.00 and $4.00 per square foot.

The primary trade area vacancy rate averages 8.66%, ranging from 0.00% to 68.16%. The average neighborhood center competes with 2.29 additional neighborhood centers within a one-mile radius primary trade area, with a range of 0 to 6 competitive neighborhood centers. The mean number of community centers in the primary trade area is 0.689, ranging from 0 to 4; and the mean number of regional malls is 0.069, ranging from 0 to 2. Distance from neighborhood center to closest community center averages 1.70 miles, with a range of 0.01 miles to 10.76 miles. Distance from neighborhood center to closest mall averages 5.09 miles, with a range of 0.03 miles to 17.11 miles.

The mean neighborhood center size is 86,823 square feet with the largest center being 240,000 square feet and the smallest center being 30,000 square feet.[11] The neighborhood center vacancy rate ranges from 0.00% to 81.03% with a mean of 8.40%. Neighborhood center age ranges from 2 to 59 years with a mean of 16.7 years. The oldest center in the data set is the first retail center developed in the Atlanta SMSA. Although renovated, it has the same anchor composition as when it was originally built. The minimum space available for lease averages 1,589 square feet with 32,000 square feet being the largest minimum space available for lease. The maximum contiguous space available for rent averages 5,096 square feet with the largest space available being 60,000 square feet. The anchor tenant space is vacant at 8.1% of the centers.

The average center has frontage on 1.22 major roads with four or more lanes, 3.79 curb cuts and 447 parking spaces. Nearly one-fifth (18.9%) of the centers have been renovated. Traffic lights control access at 27.4% of the centers. Left turn lanes benefit 93.5% of the centers, while 73.8% of the neighborhood centers are at intersections. The most prominent center design is the strip design evidenced by 48.3% of the centers. The second most common design is the L-shaped design encompassing 39.2% of the neighborhood centers. The U-shaped design (5.6%) and other designs (6.9%) round out the design types. Exterior finishes include brick (68.1%), stucco (6.0%), block (9.6%), brick and stucco (14.1%), block and

Exhibit 2 | Descriptive Statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
RENT				
Maximum center rent	12.50	4.04	4.00	33.00
Minimum center rent	11.06	3.82	2.00	30.00
MARKET				
Trade area vacancy (%)	8.66	10.26	0	68.16
Neighborhood centers	2.29	1.33	0	6
Community centers (#)	0.689	1.074	0	4
Closest com. center (miles)	1.698	1.421	0.007	10.760
Malls (#)	0.069	0.311	0	2
Closest mall (miles)	5.089	3.529	0.025	17.111
DRAW				
Center vacancy (%)	8.40	13.60	0	81.03
Dark anchor	0.081	0.273	0	1
Center size (ft)	86,823	30,075	30,000	240,000
Occupied space (ft)	79,362	29,878	15,317	237,300
Center age (years)	16.7	10.25	2.00	59.00
Max. contiguous (ft)	5,096	9,180	0	60,000
Min. contiguous (ft)	1,589	2,733	0	32,000
Access on major road	1.22	0.522	0.00	2.00
Recent renovation	0.189	0.393	0.00	1.00
Parking	447.6	176.7	100	1,195
Curb cuts (number)	3.79	1.48	1	9
Traffic light	0.274	0.514	0	4
Left hand turn lane	0.935	0.543	0	1
Number of buildings	1.04	0.244	1	3
Corner location	0.738	0.441	0	1
U-shaped design	0.056	0.231	0	1
L-shaped design	0.391	0.489	0	1
Strip design	0.482	0.500	0	1
Other design	0.068	0.253	0	1
Brick exterior	0.681	0.466	0	1
Stucco exterior	0.060	0.238	0	1
Block exterior	0.096	0.296	0	1
Stucco/brick exterior	0.141	0.348	0	1
Stucco/block exterior	0.020	0.141	0	1
Other exterior	0.008	0.089	0	1

Exhibit 2 | (continued)
Descriptive Statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
LEASE				
Gross lease	0.020	0.141	0	1
Net type lease	0.125	0.331	0	1
Net-net type lease	0.012	0.110	0	1
Net-net-net type lease	0.810	0.393	0	1
Other type lease	0.032	0.177	0	1
LOCATION				
Trade area pop.	7,089	3,545	1,063	19,791
Per capita inc.	24,761	10,314	7,292	104,330
Public assistance	85.59	128.75	0	1,114
Longitude (000,000)	−843.4	1.776	−847.7	−839.3
Latitude (000,000)	338.4	1.627	334.0	342.1

Note: $N = 248$.

stucco (2.0%), and other exteriors (0.7%). Lease rates are quoted on a net–net–net basis at 81% of the centers, 1.2% are quoted on a net–net basis, 12.5% are net leases, 2.0% are gross leases and 3.2% are unspecified.

Primary trade area population averages 7,089 with a maximum of 19,791 and a minimum of 1,063. Average 1997 trade area per capita income is $24,761, ranging from $7,292 to $104,330; and the 1990 mean number of households in the trade area receiving public assistance is 85.

Empirical Results

Due to the problems with heteroskedasticity found in prior retail rent models, White's (1980) test is run on separate, single-equation regression models with the natural logs of *center maximum RENT* and *center minimum RENT* as regressands.[12] The White's test null hypothesis of homogeneity cannot be rejected for either model (p-values were .696 and .684, respectively). This homoskedastic result is attributed to confining the study to neighborhood centers only. Variance inflation factors (VIF) were also derived to test for multicollinearity. The models evidenced minimal multicollinearity other than the expected correlation between *center age* and *age squared*.[13]

Simultaneous, two-stage least squares models are developed. The first stage of both models has *VACANCY* as the endogenous dependent variable. The second

stage has either the natural log of *maximum center RENT* or *minimum center RENT* as the endogenous dependent variable. The only difference in the two models is the use of the minimum contiguous space variable in the *maximum center RENT* equation and the maximum contiguous variable in the *minimum center RENT* equation, thereby recognizing that higher rents are associated with smaller suites and lower rents are associated with larger suites, all else equal.

Regression results from the *maximum center RENT* model are provided in Exhibit 3 and are as expected. In the first-stage *VACANCY* equation, *trade area vacancy* and the presence of a *dark anchor* are statistically significant and positively signed indicating that vacancy is a function of the condition of the trade area's retail property market and the existence of a *dark anchor*. The model has an adjusted R^2 of .517 indicating a reasonably good fit.

The second stage, *maximum center RENT* regression results are also as expected and the model fit is reasonably good, given an adjusted R^2 of .500. The endogenous *VACANCY* variable is not statistically significant, indicating that aggregation effects, center-specific characteristics, and trade area demographics are more important determinants of maximum rent. Both of the *MARKET* aggregation variables, number of *trade area community centers* and *trade area malls*, are statistically significant and positive. This result is consistent with an extension of neighborhood center trade area range due to nearby higher ordered centers attracting multipurpose shoppers from a relatively larger geographic area. As consumers become aware of additional shopping opportunities in close proximity to higher order retail centers, they incorporate these into their shopping patterns. Also, with specific reference to malls, the large number of employees at a mall may significantly influence demand for a neighborhood center's array of lower order products and services. As before, the *trade area neighborhood center* variable is not significant, providing no evidence of any impact of homogeneous retail aggregation on neighborhood shopping center rent.

The *DRAW* variable results are also as generally expected. The *center age* variable is negative and statistically significant, and the *age squared* variable is positive and statistically significant evidencing the expected negative, but decreasing in rate, obsolescence effect. The *center size* variable is positive and statistically significant, indicative of a possible on-site aggregation effect as centers increase in size. The coefficient on the variable, however, indicates a small impact on rent. The *minimum contiguous space* variable is statistically significant and negative, indicating that smaller spaces do seem to garner higher rents. With respect to accessibility and design characteristics, the presence of *left turn lanes* has a positive rent effect. The *strip design* dummy variable is statistically significant and negative, leading to speculation that the addition of square footage to the far end of a center provides diminishing returns since the added space is less visible and less convenient to an anchor-tenant shopper. Exterior finish does not seem to affect maximum rental rate. The relative inability of center specific externalities to substantially impact rent is not too surprising given the constraints on neighborhood retail center development. With governmental regulatory controls

Exhibit 3 | Base Aggregation Model

Variable	First Stage *Vacancy* (%)	Second Stage Log of *Max. Center Rent*
Intercept	0.012 (0.19)	−15.347 (−1.95)***
Log of max. rent	−0.005 (−0.19)	
Vacancy (center)		−0.267 (−1.62)
MARKET		
Trade area vacancy	0.811 (12.88)*	
Trade area neigh. centers	0.003 (0.65)	0.004 (0.78)
Trade area comm. centers		0.042 (2.46)**
Trade area malls		0.115 (2.12)**
DRAW		
Dark anchor	0.124 (5.30)*	
Center size (1,000's ft)		0.001 (2.73)*
Center age (years)		−0.024 (−5.41)*
Age squared		<0.001 (3.32)*
Min. contiguous space (1,000's ft)		−0.011 (−1.90)***
Major road access		−0.036 (−1.18)
Recent renovation		0.007 (0.16)
Left hand turn lane		0.065 (2.24)**
Number of buildings		0.071 (1.07)
U-shaped design		−0.077 (−1.18)
Strip design		−0.079 (−2.31)**
Other design		−0.042 (−0.64)

Exhibit 3 | (continued)
Base Aggregation Model

Variable	First Stage *Vacancy* (%)	Second Stage Log of *Max. Center Rent*
Stucco exterior		−0.046 (−0.71)
Block exterior		−0.043 (−0.81)
Stucco/brick exterior		0.064 (1.33)
Stucco/block exterior		0.095 (0.82)
Other exterior		−0.212 (−1.26)
LEASE		
Gross lease		−0.072 (−0.67)
Net lease		−0.038 (−0.81)
Net-net lease		−0.250 (−1.86)***
Other lease		0.044 (0.51)
LOCATION		
Trade area purchasing power (1,000,000's)		0.001 (6.32)*
Households on public assistance		<−0.001 (−1.03)
Center longitude (100,000)		−0.010 (−1.28)
Center latitude (100,000)		0.025 (2.46)**
R^2	.525	.555
Adj. R^2	.517	.500

Notes: Table incorporates the natural log of *max. rent.* This is a two-staged least squares regression. *t*-Statistics are in parentheses. $n = 248$.
*Significant at the .01 level.
**Significant at the .05 level.
***Significant at the .10 level.

on accessibility, parking and building codes, coupled with an anchor tenant's influence over site plans, most neighborhood centers are similar in design and functionality. With the exception of the dummy variable for *net–net lease* terms, lease structure does not significantly affect rent. The negative *net–net lease* coefficient may imply that a lack of common area maintenance reimbursements signals that minimal services may not be provided by the landlord. The small number of *net–net lease* observations, however, limits interpretation.

The *LOCATION* vector variable signs are as expected. *Purchasing power* in the primary trade area is positive and highly significant. The number of *households receiving public assistance* is not statistically significant, although the sign is negative. The positive sign on the *latitude* variable captures the strong economic performance and potential found on the north side of the Atlanta market.

As shown in Exhibit 4, the *minimum center RENT* model results are similar. As in the *maximum center RENT* model, *trade area vacancy* and the presence of a *dark anchor* are statistically significant and positively signed in the first-stage *VACANCY* model. The model's adjusted R^2 of .520 again indicates a reasonable fit.

The second-stage regression results are also mostly similar with a model adjusted R^2 of .556. In the *minimum center RENT* model, the endogenous *VACANCY* variable is negatively signed, as before, but is now highly significant. This implies that centers with lower vacancy rates are in a position to post higher quoted rents, while those with large amounts of vacant space must compete more aggressively on price. As was the case in the *maximum center RENT* model, the *MARKET* multipurpose shopping variables, *trade area community centers* and *trade area malls*, are statistically significant and positive, whereas the *trade area neighborhood center* variable remains insignificant.

With respect to the *DRAW* variables, the *maximum contiguous space* variable is statistically significant and negative, again demonstrating the inverse relationship between suite size and rent. Similar to the *maximum center RENT* model, *center age* is negative and statistically significant and *age squared* is positive. *Center size* is not statistically significant in this model, however. The presence of *left turn lanes*, the use of a *strip design* and use of a *net–net lease* are statistically significant and appropriately signed as in the *maximum center RENT* model. Finally, although the *other exterior* finish variable is statistically significant and negative, it has little external valid because there are only two observations having this characteristic.

The *LOCATION* vector results are similar to those found in the *maximum center RENT* model. The primary *trade area purchasing power* variable is again positive and significant while the *latitude* variable indicates higher rent as one moves northward within the market. The number of *households receiving public assistance* variable is negative, but not significant.

Because the base *maximum* and *minimum center RENT* models show positive multipurpose shopping effects due to the presence of higher order retail centers

Exhibit 4 | Base Aggregation Model

Variable	First Stage *Vacancy* %)	Second Stage Log of *Min. Center Rent*
Intercept	0.029 (0.50)	−15.924 (1.82)***
Log of min. rent	−0.012 (−0.50)	
Vacancy (center)		−0.793 (−3.95)*
MARKET		
Trade area vacancy	0.799 (11.77)*	
Trade area neigh. centers	0.003 (0.73)	0.018 (1.15)
Trade area comm. centers		0.049 (2.66)*
Trade area malls		0.142 (2.36)**
DRAW		
Dark anchor	0.124 (5.23)*	
Center size (1,000's ft)		0.001 (1.33)
Center age (years)		−0.033 (−6.67)*
Age squared		<0.001 (4.23)*
Max. contiguous space (1,000's ft)		−0.007 (−3.20)*
Major road access		0.010 (0.31)
Recent renovation		−0.008 (−0.15)
Left hand turn lane		0.050 (1.56)
Number of buildings		−0.007 (−0.10)
U-shaped design		0.012 (1.16)
Strip design		−0.079 (−2.16)**
Other design		−0.075 (−1.02)

Exhibit 4 | (continued)
Base Aggregation Model

Variable	First Stage *Vacancy %*)	Second Stage Log of *Min. Center Rent*
Stucco exterior		0.068
		(0.95)
Block exterior		0.061
		(1.05)
Stucco/brick exterior		0.047
		(0.88)
Stucco/block exterior		0.114
		(0.88)
Other exterior		−0.325
		(−1.75)***
LEASE		
Gross lease		0.024
		(0.20)
Net lease		−0.035
		(−0.68)
Net-net lease		−0.284
		(−1.91)***
Other lease		0.075
		(0.78)
LOCATION		
Trade area purchasing power (1,000,000's)		0.001
		(5.69)*
Households on public assistance		<−0.001
		(−1.43)
Center longitude (100,000)		−0.014
		(−1.48)
Center latitude (100,000)		0.019
		(1.72)
R^2	.527	.606
Adj. R^2	.520	.556

Notes: Table incorporates the natural log of *min. rent.* This is a two-staged least squares regression. *t*-Statistics are in parentheses. $n = 248$.
* Significant at the .01 level.
** Significant at the .05 level.
*** Significant at the .10 level.

Exhibit 5 | Hierarchical Distance Model

Variable	First Stage *Vacancy* (%)	Second Stage Log of *Min. Center Rent*
Intercept	0.016 (0.24)	−15.659 (−1.99)**
Log of max. rent	−0.007 (−0.24)	
Vacancy (center)		−0.290 (−1.77)***
MARKET		
Trade area vacancy	0.810 (12.87)*	
Trade area neigh. centers	0.003 (0.66)	0.022 (1.84)***
Inverse comm. center distance		0.003 (2.42)**
Inverse mall distance		0.018 (2.97)*
DRAW		
Dark anchor	0.124 (5.30)*	
Center size (1,000's ft)		0.001 (2.70)*
Center age (years)		−0.023 (−5.23)*
Age squared		<0.001 (3.14)*
Min. contiguous space (1,000's ft)		−0.012 (−2.05)**
Major road access		−0.027 (−0.89)
Recent renovation		−0.002 (−0.052)
Left hand turn lane		0.066 (2.31)**
Number of buildings		0.054 (0.81)
U-shaped design		−0.089 (−1.33)
Strip design		−0.090 (−2.68)*
Other design		−0.059 (−0.89)
Stucco exterior		−0.032 (−0.50)

Exhibit 5 | (continued)
Hierarchical Distance Model

Variable	First Stage *Vacancy* (%)	Second Stage Log of *Min. Center Rent*
Block exterior		−0.041
		(−0.77)
Stucco/brick exterior		0.069
		(1.37)
Stucco/block exterior		0.069
		(0.57)
Other exterior		−0.248
		(−1.48)
LEASE		
Gross lease		−0.067
		(−0.62)
Net lease		−0.047
		(−0.99)
Net-net lease		−0.249
		(−1.85)***
Other lease		0.049
		(0.57)
LOCATION		
Trade area purchasing power (1,000,000's)		0.001
		(6.01)*
Households on public assistance		<−0.001
		(−0.78)
Center longitude (100,000)		−0.010
		(−1.19)
Center latitude (100,000)		0.028
		(2.75)*
R^2	.525	.556
Adj. R^2	.518	.500

Notes: Table incorporates the natural log of *max. rent*. This is a two-staged least squares regression. *t*-Statistics are in parentheses. $n = 248$.
*Significant at the .01 level.
**Significant at the .05 level.
***Significant at the .10 level.

Exhibit 6 | Hierarchical Distance Model

Variable	First Stage *Vacancy* (%)	Second Stage Log of *Min. Center Rent*
Intercept	0.027 (0.47)	−15.674 (−1.78)***
Log of min. rent	−0.012 (−0.48)	
Vacancy (center)		−0.832 (−4.12)*
MARKET		
Trade area vacancy	0.800 (11.77)*	
Trade area neigh. centers	0.003 (0.73)	0.040 (2.93)*
Inverse comm. center distance		0.002 (1.21)**
Inverse mall distance		0.023 (3.43)*
DRAW		
Dark anchor	0.123 (5.23)*	
Center size (1,000's ft)		0.001 (1.39)
Center age (years)		−0.031 (−6.38)*
Age squared		<0.001 (3.89)*
Max. contiguous space (1,000's ft)		−0.007 (−3.19)*
Major road access		0.023 (0.67)
Recent renovation		−0.021 (−0.040)
Left hand turn lane		0.050 (1.55)
Number of buildings		−0.032 (−0.44)
U-shaped design		0.006 (0.08)
Strip design		−0.091 (−2.45)*
Other design		−0.080 (−1.08)

Exhibit 6 | (continued)
Hierarchical Distance Model

Variable	First Stage *Vacancy* (%)	Second Stage Log of *Min. Center Rent*
Stucco exterior		0.086 (1.20)
Block exterior		0.058 (0.98)
Stucco/brick exterior		0.044 (0.82)
Stucco/block exterior		0.063 (0.47)
Other exterior		−0.376 (−2.00)
LEASE		
Gross lease		0.026 (0.22)
Net lease		−0.044 (−0.82)
Net-net lease		−0.281 (−1.87)***
Other lease		0.080 (0.83)
LOCATION		
Trade area purchasing power (1,000,000's)		0.001 (5.46)*
Households on public assistance		<−0.001 (−1.19)
Center longitude (100,000)		−0.013 (−1.37)
Center latitude (100,000)		0.021 (1.86)***
R^2	.528	.599
Adj. R^2	.520	.547

Notes: Table incorporates the natural log of *min. rent*. This is a two-staged least squares regression. *t*-Statistics are in parentheses. $n = 248$.
* Significant at the .01 level.
** Significant at the .05 level.
*** Significant at the .10 level.

in a primary trade area, two alternative *maximum* and *minimum RENT* models are generated to better quantify the effect of proximity to higher order retail centers. Variables measuring the inverse of distance to *closest community center* and *closest mall* are added to the prior models in place of the *trade area mall* and *trade area community center* variables. These alternative variables measure the relationship between neighborhood center rent and proximity to higher order retail centers.

Results for the alternative *maximum* and *minimum center RENT* models are found in Exhibit 5 and Exhibit 6 and are as generally expected.[14] The results for the new *maximum center RENT* model are similar to those from the base *maximum center RENT* model. The inverse distance to *closest community center* and the inverse distance to *closest mall* variables are statistically significant and signed as expected. Interestingly, the only *maximum center RENT* model variable that differs from the base model is the *trade area neighborhood center* variable. A slight positive homogenous aggregation effect is evident, whereas no indication of such an impact is shown in the initial model. Proximity to malls and community centers provides a positive effect on local tenant rental rates. Proximity to community centers, however, does not impact minimal rental rates. The initial model results generally hold for the *minimum center RENT* model, except the community center distance variable, which is not significant.

Exhibit 7 | Marginal Rent Impact—Community Centers and Malls

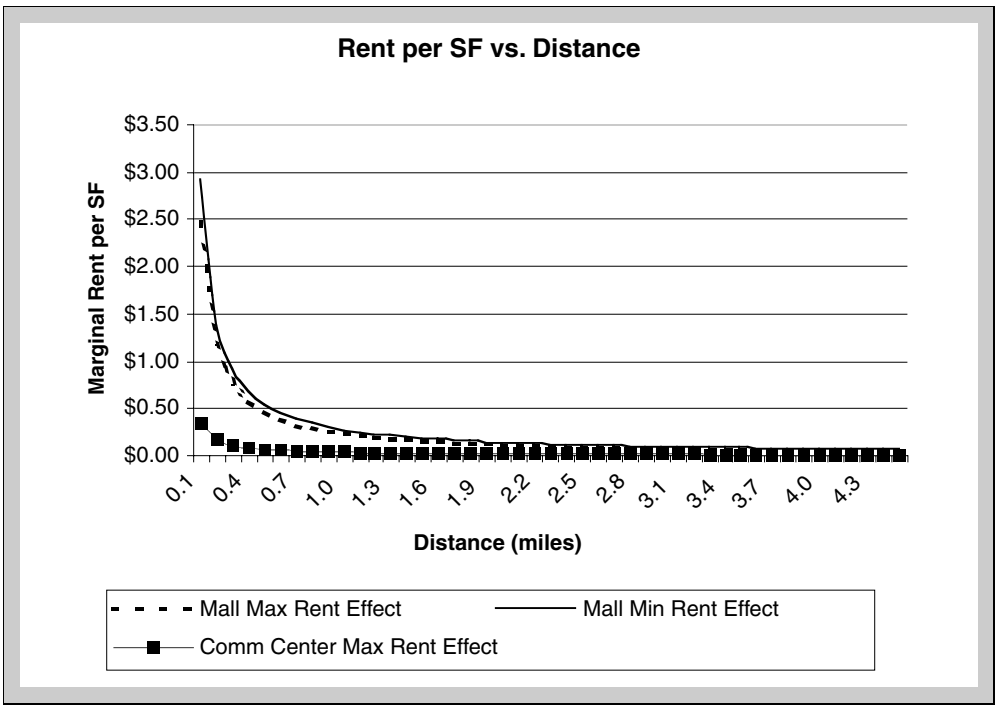


Exhibit 7 provides a graph of the marginal impact of distance to multipurpose shopping opportunities on neighborhood center rent. As one would expect, proximity to a mall has a greater marginal effect on rent than proximity to a community center. The benefit of mall proximity also persists over a greater distance. As Exhibit 7 also shows, the mall proximity effect diminishes sharply over the first one-half mile and the community center effect diminishes sharply over the first two-tenths mile.

Conclusion

Prior empirical analysis of retail rent has been minimal, with the small amount of extant research being handicapped by insufficient data. This study extends prior investigations through the use of a more extensive data set, a concentration on one property type and modeling aggregation effects. Support for several of the various retail theories is provided. Insight into applied decision making is also evidenced.

As theoretically driven economic base analysis would suggest, primary trade area characteristics including income and population are important determinants of retail rent. Past empirical studies have been silent on the issue of sub-market specific economic analysis whereas this investigation offers substantial support for a sub-market economic impact on retail rent. In short, primary trade area purchasing power matters greatly. Concurrently, effects implied by demand externality theory, generated by property specific characteristics, are also found to be determinants of neighborhood center rents. The demand externality effects may be less than one might have thought, since private and public development constraints work together to create a relatively undifferentiated product. Finally, the study confirms the hypothesized multipurpose shopping effect of nearby higher order shopping nodes. It also finds some evidence of a positive effect on rent due to aggregation of direct competitors, counter to practitioner expectations. The marginal effect of proximity to malls diminishes greatly within one-half mile of a mall, continuing outward from there at only a modest level. A similar, but smaller, marginal effect of community centers diminishes greatly over the first two-tenths mile. What remains unclear is the extent to which this so-called multipurpose shopping ‘‘halo effect’’ is captured by land rents, as neighborhood centers are developed in close proximity to extant malls.

On an applied basis, the study provides insight into local market analysis and the use of SMSA level data for decision-making purposes. Analysts and appraisers will best serve their respective clients by obtaining and analyzing center-specific data. Data used in analysis must be reflective of the sub-market. The questions of interest should be focused on what factors will effect the actual market from which tenants and customers are drawn. The selection of comparables for appraisal and market analysis must be drawn from similar locations. Perhaps, in partial answer to the results of a study by Eppli, Shilling and Vandell (1998), who used appraisal based returns at the SMSA level and found that macroeconomic variables had

little effect on aggregate retail returns, this investigation implies that market characteristics at the center level may be important determinants of rent and returns. There will be good and bad locations within even the top performing SMSAs.

For the institutional investor, this research highlights two contentious issues. The first issue is whether a top-down portfolio approach is an optimal approach to portfolio construction and the second issue is whether traditional return benchmarks are sensitive enough to measure potential return benefits at the property level. Although not the foundation for this investigation, the ability to model rents using center-specific data when juxtaposed against a limited ability to model aggregate returns using macroeconomic variables indicates the complexity of modeling space and financial markets. Investment opportunities may be masked by the use of aggregated SMSA data to filter investment opportunities. Institutional investors need to be cognizant of the fact that with regard to neighborhood retail center investments, they are assuming a good deal of neighborhood risk. Situs issues remain important determinants of neighborhood center rents.

Perhaps most importantly, much remains to be investigated regarding retail market activities. Even with the larger data set used in this study, the results reflect the patterns of a single SMSA and a single retail property type at one point in time. At a minimum, additional study is needed to refine the interaction between retail property types and various local market structures. For example, this study indicates a positive marginal effect of proximity to higher order retail centers. Do the marginal effects differ by property sub-type, and are they hierarchical? Do they persist in different cities and/or cultures? Other important issues include determining who, or what entity, captures aggregation effects, understanding first mover effects, the interaction of development and acquisition costs with rents and returns, and the link between rents and retail sales. Although much has been hypothesized concerning the expected strong correlation between sales, rents and returns; only minimal empirical work has been done. All of the foregoing would, of course, be facilitated by access to more detailed, less aggregated, retail data.

Endnotes

[1] Eppli and Benjamin (1994) provide a broad and detailed review of the literature concerning retail real estate. The review provides an overview of the substantial amount of literature among disciplines having an interest in retail sales, development, and investment. Competing theories including central place theory, aggregation theory, and demand externality theory are presented. This investigation concerns the determination of retail rental rates, which is of interest to many areas especially investors, property managers and appraisers.

[2] Hair, Anderson, Tatham and Black (1992) indicate a need for a minimum ratio of six observations per independent variable.

[3] The sample was taken from the Denver market and included investors, developers, lenders, appraisers, and commercial leasing agents and brokers.

[4] Many of the studies of retail activity use the generic term "retail" to encompass the aggregate retail market without acknowledging that there are several hierarchical retail segments including unanchored strip centers, neighborhood centers, community centers, power centers, specialty retail, and malls. A good basic primer on retail sub-markets can be found in Vernor and Rabianski's (1993) *Shopping Center Appraisal and Valuation*. See also, West, Von Hohenbalken and Kroner (1985).

[5] Market rent is generally quoted on a triple net basis in the Atlanta market. Local shop space leases normally have escalation clauses for rent renewals and are for initial terms of thirty-six months or less. In the Atlanta market, percentage rental clauses are very unusual for this type property and tenant profile.

[6] The primary trade area is defined as a one-mile radius encircling the shopping center site. Support for the use of a one-mile primary trade area range comes from Vernor and Rabianski (1993), Gatzlaff, Sirmans and Diskin (1994), Ownby, Davis and Sundel (1994) and others. A one and one-half mile radius was also modeled with similar results.

[7] Primary trade area data were derived for each center by geo-coding the center and then creating the additional variables using basic GIS techniques. For example, for each neighborhood center, a one-mile radius was constructed and all competing centers within the radius are included as competing centers.

[8] For the purpose of this study, *strip design* indicates that all space is parallel and facing the primary street. *L-shaped* centers are those that form an L indicating that part of the center does not face the primary access street. The *U-shaped design* defines those centers where two portions of the center do not face the primary access street. Any other design is classified as *other design*.

[9] Dorey's provides data on maximum and minimum quoted rent at each shopping center. The majority of the centers have one quoted rate. Quoted or asking rental rates are reflective of the marginal value of each unit of space. As Mills (1992) points out, effective rental rate would be the best measure of economic performance. However, as this data is normally proprietary, it is generally not available for analysis at the property level. Although there are limitations to most available rental data, available data provides insight into retail market activities.

[10] The total database included 312 neighborhood centers. Sufficient rental data was available for 248 of the centers. The entire data set was geo-coded and used to calculate trade area competition and vacancy rate variables. Community centers and malls were also geo-coded and used to generate trade area statistics and distances.

[11] The smallest center is anchored by a local grocery entity. Kroger is the anchor of the largest center.

[12] After the initial OLS modeling, several of the non-statistically significant *DRAW* specific variables, including those for *traffic lights*, *curb cuts*, *parking* and *corner location* were dropped from the models. A lack of significant variation among these variables indicates that the centers are generally accessible. Given land use constraints in the zoning and permitting process, this is not a surprising result.

[13] The highest VIF in either the *maximum center RENT* model or the *minimum center RENT* model is 2.81, which is indicative of a modest correlation between vacancy and maximum *available contiguous space*. No other variable in either model had a VIF greater than 1.60.

[14] The additional models and model variables were subjected to White's test and new variance inflation factors were generated. No troubling modeling issues were evident.

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