# Longitudinal Analysis of Big Box Store Construction on Nearby Home Values

Over the past decade, increasing competition among big box stores to increase market share has necessitated their need to penetrate further into urban areas (Rowell 2003, Reuters News Service 2003, Curs, Stater, and Visser, 2004). As a result, recent years have seen an increase in stakeholder activism concerning possible externalities exerted onto nearby areas resulting from big-box developments. Proponents of big box developments assert that nearby areas experience positive externalities, including easier access to shopping, increased sales tax revenue, and improved area infrastructure. Opponents contend that proliferation of big box development into urban areas produce negative externalities by creating inequitable competition for local business, environmental degradation and debasement of neighborhood characteristics and area amenities (Howie 2003, DeFao 2003, Reuters News Service 2003, Garrison and Linn, 2004, Curs, Stater, and Visser, 2004). As big box developments continue to execute their business plans of expanding further into residential neighborhoods (Wal-Mart Facts), nearby homeowners speculate on the impact such developments have on their house values. This paper empirically measures the impact that distance and construction phase have on home values in proximity to the development. The study utilizes a unique real estate data set from a neighborhood in Maricopa County Arizona undergoing planning and construction of a Wal-Mart Supercenter from 2000 to 2003 and full operation through 2005. Initial findings indicate a U shaped relation between house price and proximity to the Wal-Mart Supercenter. Additionally, proximity is significant for the year construction was completed, and then dissipates in later years. The implications of this study seem to indicate that house values are influenced by a combination of perceived positive and negative externalities associated with proximity and construction phase of the Wal-Mart Supercenter.

**Melvin Corlija, University of Missouri-Columbia[1]**
**Emilian Siman, University of Missouri-Columbia[2]**
**Michael S. Finke, University of Missouri-Columbia[3]**

## Introduction

Increasing competition among "big box" retailers (Wal-Mart, Target, K-Mart, Lowe's, and Home Depot) for market share has made it necessary for them to penetrate further into urban areas (Rowell 2003, Curs, Stater & Visser, 2004, Heaster 2005). Over the past decade, construction of big box developments in urban residential areas has been a tempestuous socio-economic issue among stakeholders. Opponents of big box development contend that large discount retailers strangle local economies by forcing local enterprises to close or relocate (Stone 2001, DeFao 2003, Garrison and Lin, 2004, Charleston Gazette 2004). Infrastructure changes needed to accommodate increased traffic flow, elimination, or redistribution of space, and environmental impact accompany large-scale construction. Environmental concerns include increased traffic congestion, garbage accumulation, air, and noise pollution (Emrath 2002, Rowell 2003). Construction of large commercial developments permanently alters the surrounding landscape. A newly constructed Wal-Mart Supercenter averages 187,000-sq.ft.of floor space and occupies on average six football fields of total development (Ritter 2002).

Nearby homeowners voice concern of possible deleterious effects on house values caused by degradation of neighborhood attributes and amenities.

Proponents of big box development assert that urban areas improve with development through "increased sales taxes, increased construction, more jobs, and more money pumped back into the economy" (Jordan 2001, Howie 2003, Curs, Stater & Visser, 2004, Basker 2004).

In 2004, Wal-Mart opened several stores in downtown locations, including in New Orleans and Salt Lake City, and has plans to open more in Chicago and Boston. For 2005, Wal-Mart's annual business plan called for opening an additional 240 – 250 Supercenter stores in urban areas throughout the United States. Approximately 90 of the additional stores are considered new operating units with the remainder comprising same store expansions and relocations (WMT Facts, Yahoo. Finance WMT).

For homeowners and potential home purchasers' perceived or actual commercial development can exert positive or negative externalities effecting nearby house prices. These externalities may be considered as independent variables that impinge on nearby house values. Collectively, these independent variables represent a collection of area amenities and neighborhood characteristics that deposit an implicit price on the house. Positive externalities can be manifested through relative convenience and ease of shopping, where consumers' time and travel costs are minimized compared to another area (Dubin 1988, Barker 1998). Negative externalities include environmental and aesthetic deterioration manifested through air and landscape pollution, increased noise, excessive lighting, and traffic congestion (Emrath 2002, Curs, Stater & Visser, 2004).

Empirical studies on the impact of Wal-Mart stores on urban areas have focused on socio-economic issues of employment levels, worker compensation, local business sustainability, and employer practices (Rosen 2004, Basker 2004, and Curs et al, 2004). Early studies examined the economic impact of commercial development on house prices concentrated on shopping centers, and may have overlooked possible effects of multiple vendors within the development exerting greater significance to price changes (Curs et al, 2004). Previous studies utilizing hedonic pricing considered shopping centers with smaller total development size, and may or may not have considered consider the relation of proximity to nearby houses (Des Rosiers, Lagana, Theriault, Beaudoin, (1996). Some current studies, which couple hedonic pricing with spatial effect, concentrate on present house values compared to a control area absent of a development, therefore avoiding longitudinal effects of development construction on nearby house prices (Haider & Miller, 1999). Finally, few studies longitudinally examine the impact on house values that commercial developments exert pre- during and post-construction on nearby houses (Barker 1998).

We chose a single geographic area to test our models ability in accurately predicting the impacts of construction that a commercial development exerts both proximally and temporally on nearby house prices.

The purpose of this research is to contribute to existing knowledge regarding the effects that big box commercial developments have on nearby residential home prices. Utilizing hedonic pricing theory we empirically measure changes in house prices within proximity to a Wal-Mart Supercenter development during its pre-, during and post-completion construction phases.

## Case Study

In March 2003, Wal-Mart opened its newest 204,000+ square-foot Supercenter in Maricopa County, adding to 17 existing Supercenters and 42nd overall Wal-Mart discount store in Arizona (Walmart Stores Inc, 2003). At the time of study, this particular Wal-Mart Supercenter development is not considered a power center store. It is unaccompanied by any "category killer" stores or freestanding external vendors on the same premises (International Council of Shopping Centers, 1999). In addition, availability of housing stock data and similar demographic composition to national census data made Maricopa County, Arizona, a good selection for our study.

Maricopa County government records reveal in 2003 a total population of 3.5, with > 70% over age 30 compared to > 65% over age 30 nationwide. Population compositions for Maricopa County are similar to those nationwide consisting of 77.4 % white, 3.7% black, and 18.9% other, approximately 25% include Hispanic heritage as part of their race. In 2000, twenty-seven percent of the population nationally and in Maricopa County possessed a Bachelors degree or higher. Median household income within 2- and 4- mile radii of the new Wal-Mart Supercenter was $50,102 and $45,573 respectively, with per capita income of $16,165 and $15,143 respectively. Nationally, in 2000 median household income was $42,257, with a per capita total of $21,231 (U.S. Census American FactFinder 2004, and Maricopa County Profile, 2004).

From 1990 to 2000 owner occupied housing within 2- and 4- mile radii of the Supercenter increased by 81.6% and 61.8% respectively. Owner occupied median house values within a 4- mile radius of the new Wal-Mart were $93,557, with 40 homes valued at over $500,000. From Q2 2004 through Q2 2005 home values appreciated approximately 30% within the same geographical area while nationally home prices appreciated 13.4% over the same period (Maricopa County Profile, 2004).

Table 1
Descriptive statistics

| | Maricopa County, Arizona | United States (2004) |
|---|---|---|
| Total Population | 3,500,000** | 285,691,501 |
| White | 77.4%** | 75.6% |
| Black | 3.7%** | 12.2% |
| Hispanic & Other | 18.9%** | 12.2% |
| Over age 30 | > 70%** | > 65% |
| Bachelor's Degree or higher | 27%** | 27% |
| Median Household income | $50,102*** | $44,684 |

2003**
2004***

**Literature Review**

The interaction of different geographic entities was described in 1970 by Waldo Tober's First Law of Geography (TFL) which states, "everything is related to everything else, but near things are more related than distant things" (Anselin 1988, Miller 2004). This fundamental notion of spatial correlation is especially true in the housing market where area amenities and neighborhood attributes can influence housing preferences similar to the impact that a house's physical characteristics influence price. Tober's First Law can be applied to the housing market by identifying a consumers' ability to purchase a house with varying characteristics, and price, in any location (Straszheim, 1975). Housing markets can be further segmented into sub-markets where supply and demand, structural features, neighborhood attributes and amenities, household income and race produces price differentials within a geographic location (Thibodeau, 1998). According to Thibodeau a sub-market is defined by "geographic areas where price per unit of housing is constant", and "individual housing characteristics are available for purchase".

Similarly, (Fisher and Winnick, 1952 and Grigsby 1963) define a housing sub-market as potential homebuyers having a choice of dwellings to purchase within a certain price range and among different geographical locations.

Spatial relations between area amenities and neighborhood characteristics to housing preference at the very least provide evidence of a positive, negative, or indifferent correlation to housing preference.

Early research by Reilly (1929) proposed a relation between commercial development sizes to nearby housing preference. Reilly's hypothesis of retail gravitation later adopted by Ellwood (1954) postulated that size of a shopping center positively affects preferences for nearby housing. Later studies by Berry and Bednarz (1979) hypothesized proximity between shopping center and neighborhoods produce externalities that contribute to nearby housing prices. Assuming shopping center size can be viewed as a positive externality in terms of convenience, entertainment selection, and travel cost, nearby homes will evince positive household preference lending support to the retail gravitation hypothesis. However, houses in too close proximity are affected by negative externalities generated by traffic congestion, excessive lighting, air and noise pollution and therefore will experience negative household preference.

The development of hedonic pricing models Lancaster (1966), Rosen (1974) and MacLennan (1977) allowed for empirical analysis of utility generating characteristics that constituted implicit prices among houses with in a geographical area. Hedonic pricing models combined with TFL provides a mechanism to empirically test price differentials within similar housing markets and determine the extent, any anticipated or present area amenities, neighborhood attributes exert on nearby house prices.

Housing preference then is borne out of consumer willingness to pay for utility generating characteristic bundles, which include geographical location, house features, area amenities, and neighborhood characteristics. Cross-influences derived from numerous features, attributes and geography affect implicit property value (Des Rosiers, 1996). Hedonic pricing models have made it possible to analyze marginal utility of rent paid by consumers for each preference (Sirmans and Benjamin, 1991).

Haider and Miller (1999) demonstrate further evidence that a correlation exits between area attributes and characteristics to household preferences. Their analysis of cross sectional sales data of real properties in Toronto, at various distances from public transportation and central business district concluded that proximity (within a 5-km radius) increased mean house prices $4,000 compared to properties outside of ring trade sample. In the same study, proximity to sub-way systems was viewed as a positive externality and increased property values while neighborhoods in proximity to a highway were viewed as having a negative externality and decreased in property value.

Similarly, Correl, Lillydahl, and Singell (1978) studied single-family home values as a function of distance from a greenbelt area in Boulder Colorado. Using the hedonic price model they found a decrease of $10.20 in sales price per foot the house was removed from the greenbelt. Brown and Pollackowski (1977) consider sales price as a function of distance from lakes in Seattle Washington. Using two separate regression models for separate lake houses, they conclude the greater the distance from the lakes the lower the selling price of the houses.

Several hypotheses are offered to account for implicit prices of area amenities and characteristics as contributors to household preferences and ultimately being translated into explicit house price. Rothenberg, Galster, Butler and Pitkin (1991) suggest that changes in housing market composition produce changes in housing stock within an area, and that sub-markets are a function of hedonic qualities that alter house values in that area.

Grigsby (1963), Bourassa, Hamelink, Hoesli, and MacGregor (1999) hypothesize that an unstable dynamic interaction exists between a neighborhoods features, attributes and amenities in relation to location causing price differentials to appear in housing markets.

Jones, Leishman, and Watkins (2002) argue sub-markets are created by imperfect markets in failing to clear price differences through arbitrage and inelastic supply due to legal restrictions and construction lags.

Hedonic price theory provides a mechanism for empirically measuring a shopping center as a potential externality (Colwell, Gujral, and Coley 1985).

Increasingly exhaustive research using hedonic pricing combines house features of lot size, number of bedrooms and bathrooms, stories, age, and date of last sale, along with neighborhood attributes of distances to parks, elementary schools and main intersections to radial house distance from various sized shopping centers. Using hedonic pricing Sirpal (1994) incorporates house features and neighborhood attributes, from nine residential areas throughout Florida by house's distance from a shopping center (within a maximum of 3,000 ft), with various sized shopping centers (16,749 - 80,350 sq ft). Sirpal concludes that an optimal distance exists in household preference, which coincides with increased house value, where house values rises, subsequently reaches a zenith, and then dissipates relative to shopping center size.

Previous studies mainly addressed proximity and shopping center size as externalities, which contribute to household preferences. Subsequent, research by Kokkelenberg and Kiel as reported by Barker (1998) attempt to answer temporally the impact that shopping center development has on nearby residential areas when compared to areas without immanent construction plans. During the time prior to announcing, the intent to construct a shopping mall Lynnhurst enjoyed a premium in house price over homes in surrounding Vestal Township New York. Immanently it was announced that there is intent to build a shopping center in Lynnhurst. Any price premium Lynnhurst had held over Vestal Township eroded. When actual construction of the shopping center started and the character and features of the shopping mall became evident, a rebound in Lynnhurst house prices started to occur. The study follows house prices during a two-year period post-construction and finds homes in Lynnhurst increased 5% in value prior to construction values when compared to surrounding Vestal home prices. Kokkelenberg and Kiel conclude that an initial, but short-lived statistically significant decrease in nearby home values at announcement of the intent to build a 50,000-sq.ft development. This decrease is reversed through time of construction and a new house price premium is reached in the now developed residential area compared to the non-development area. Kokkelenberg offers several possible explanations for the positive effect the shopping mall exerted on nearby home values. Houses in Lynnhurst may be experiencing positive externalities in the form of a convenience factor due to their proximity to the new mall. Other explanations include increased in sales tax revenue collected in Lynnhurst because of the mall, allowing for lower homeowner property taxes resulting in greater disposable income for residents.

## Methods

<u>Identification of Housing Sub-market</u>

The National Association of Home Builders of the United States (NAHB) and American Housing Survey publish which features, attributes and amenities influence house values. According to NAHB, single-family house value is highly dependent upon geographic location, lot size, number of bedrooms and bathrooms, and neighborhood amenities and aesthetics (Emrath 2002).

American Housing Survey (AHS) follows Census Bureau and Department of Housing and Urban Development guidelines to define typical house features and representative neighborhood attributes and amenities. AHS identifies four principal locale regions within each state: central city, suburb, non-metro and urban. The impact on house price for typical house features and neighborhood attributes are categorized in their desirability by potential homebuyers and current homeowners (Emrath, 2002).

Positive features, which influence price, include increasing square feet of living space, larger lot size, presence of a garage, and number of total rooms and bathrooms. Positive neighborhood attributes, amenities and aesthetics include proximity to body of water, nearby open spaces or "green areas", public transportation, and satisfactory shopping (Emrath, 2002).

The AHS defines negative features, attributes, amenities and aesthetics anything which may detract from consumer housing preference in that area, this includes abandoned buildings, bars on windows, crime, isolation from nearby conveniences and emergency facilities, trash and/or litter accumulation (Emrath 2002)

Previous studies (Sirpal (1994), Des Rosiers et al. 1996, and Benson, Hansen, Schwartz, and Smersh, 1998, Haider and Miller 1999) have utilized public real estate transaction records, including multi-listing service (MLS), appraisal documents, and county government property assessment records to acquire house feature and neighborhood attribute information for previous studies involving house prices and housing preferences.

The database used in this study is an enhanced multi-listing service database compiled from a publicly available register containing approximately 20,000 real estate transactions in Maricopa County, Arizona, from March 2000 through March 2005.

Computerized files from DataQuick, Inc. contain detailed information about residential house features, tax rate, market and assessed property values, sale date, selling price, number and type of outbuildings, latitude and longitude spatial location, zoning district and parcel and legal definitions.

Sample selection mirrored previous trade area analysis (ring area) studies where house samples were selected extending in a straight line from the Wal-Mart Supercenter.

Distance from sampled houses to the Wal-Mart Supercenter were calculated utilizing given sample (x,y) coordinates corresponding to latitude and longitude given in the database.

Dollar denominated data points were adjusted to 2005 price levels using the CPI index for urban consumers. House age was computed by subtracting the year it was built from year 2005.

To capture the impact on existing home prices the sample was limited to houses built prior to 1995, with an assessed value of less than $1,000,000, and within a 6-mile radial distance from the Wal-Mart Supercenter development. The final sample dataset contains 9,096 observations. Descriptive sample statistics are illustrated in Table 2.

Table 2
Descriptive Sample Statistics

| **Variable** | **Mean** | **Std Dev** | **Maximum** | **Minimum** |
|---|---|---|---|---|
| Sales Price ($) | 126,455 | 43,409 | 868,623 | 26,241 |
| Baths | 2.13 | 0.62 | 5.50 | 0.75 |
| Distance (mi) | 2.55 | 0.86 | 5.96 | 0.66 |
| Lot Size | 7546 | 5565 | 189281 | 1783 |
| Rooms | 5.78 | 1.09 | 13.00 | 3.00 |
| Stories | 1.09 | 0.29 | 2.00 | 1.00 |
| Sq. Feet | 1474.28 | 407.94 | 4462.00 | 660.00 |
| Age (yrs) | 23.82 | 9.55 | 44.00 | 10.00 |
| Tax ($) | 1167 | 317 | 3865 | 52 |

A general hedonic model (Griliches 1960, 1990; Goodman and Thibodeau 1997, 1998; and Moulton 2001) was utilized to illicit house price from linear combinations of variables among numerous categories (Equation 1).

$$P(X) = P(L, S, R, t_1, t_2). \tag{1}$$

Where house price P(X), was determined as a function (P), of its features:
*L* - lot characteristics: lot size, lot shape, and/or landscaping
*S* - structural characteristics of the house: total living area, number of bathrooms, total number of rooms, garage, and/or swimming pool
*R* - proximity to externalities: distance to a neighboring big-box store, amount of noise and air pollution
$t_1$ - house age

$t_2$ - year sold

To facilitate the interpretation of the parameter estimates, the econometric model used here has a log-log specification where: $Z = \ln P(X) = X \cdot b + e$ .

*P(X)* is the market price of the owner-occupied housing units, X is the vector of housing characteristics, b is the vector of unknown hedonic coefficients, e is the random error term (e~N(0, v)), and v is a non-constant diagonal matrix.

Chow's testing has been used on the reduced equation (2), to improve the specification of the functional hedonic model:

$$\begin{aligned} \ln(SALESPRICE) &= b_0 + b_1 AGE + b_2 SQAGE + b_3 \ln(LOTSIZE) + b_4 \ln(SQFEET) + b_5 BATHS \\ &+ b_6 \ln(TAX) + b_7 DIST + b_8 SQDIST + b_9 GARAGE + b_{10} POOL + b_{11} ZONING + e \end{aligned} \qquad (2)$$

Where:
*SALESPRICE* - CPI adjusted house sales price,
*AGE* - house age (difference between 2005 and year built),
*SQAGE* - squared age of the house,
*LOTSIZE* - lot size,
*SQFEET* - livable square feet,
*BATHS* - number of bathrooms,
*TAX* - annual property taxes,
*DIST* - calculated straight-line distance from the Wal-Mart Supercenter to house,
*SQDIST* - square of distance from Wal-Mart Supercenter to house,
*GARAGE* - dummy variable; 1= yes or 0= no,
*POOL* - dummy variable; 1= yes or 0= no,
*ZONING* - dummy variable indicating single family residence =1 or other zoning = 0,
*e* – random error.

Parameter stability test (Chow's Test) indicates significant structural change of the data by year sold at p = 0.001. Similar testing, using breaking points based on distance to the big box development, also shows significant structural changes of the data at p < 0.001.

The improved model specification facilitates clarity in testing the hypothesized externalities that Wal-Mart Supercenters exert in combination of distance and time (equation 3).

$$\begin{aligned} \ln(SALESPRICE) &= b_0 + b_1 AGE + b_2 SQAGE + b_3 \ln(LOTSIZE) + b_4 \ln(SQFEET) + b_5 BATHS \\ &+ b_6 \ln(TAX) + b_7 DIST + b_8 SQDIST + b_9 GARAGE + b_{10} POOL + b_{11} ZONING + b_{12} SALE00 \\ &+ b_{13} SALE01 + b_{14} SALE02 + b_{15} SALE03 + b_{16} SALE04 + b_{17} SALE00*DIST + b_{28} SALE01*DIST \\ &+ b_{19} SALE02*DIST + b_{20} SALE03*DIST + b_{21} SALE04*DIST + b_{22} SALE00*SQDIST \\ &+ b_{23} SALE01*SQDIST + b_{24} SALE02*SQDIST + b_{25} SALE03*SQDIST + b_{26} SALE04*SQDIST \\ &+ e, \end{aligned} \qquad (3)$$

Where:
*SALE00* – a dummy indicating that the house was sold in year 2000 (code 1) or not (code 0),
*SALE01* – a dummy indicating that the house was sold in year 2001 (code 1) or not (code 0),
*SALE02* – a dummy indicating that the house was sold in year 2002 (code 1) or not (code 0),
*SALE03* – a dummy indicating that the house was sold in year 2003 (code 1) or not (code 0),
*SALE04* – a dummy indicating that the house was sold in year 2004 (code 1) or not (code 0),
and
*SALE0?*DIST* – are the interacting variables corresponding to the year sold and the distance from the Wal-Mart,
*SALE0?*SQDIST* – are the interacting variables corresponding to year sold and the squared distance from the Wal-Mart.
*?* - The eight interaction terms were collapsed in two generic ones, *SALE0?*DIST* and *SALE0?*SQDIST*. This indicates the last digit of the year sold, 0 for 2000 up to 4 for 2004.

## Results

Sixty four percent (Adj. R-Sq = 0.6429) of variance in *ln(PRICE)* is explained by independent variable changes. Parameter estimates and significance are provided in Table 3.

All variables are centered to eliminate multicollinearity problems inherent in quadratic equations, which led to estimated equation parameters with variance inflation factor (VIF) <10 (Gujarati, 2003). Interpretation of the estimated coefficients should consider the mean centered data.

White and Breusch-Pagan tests suggest controllable heteroskedasticity levels (Pr > ChiSq at 0.001) (Gujarati, 2003).

Study results indicate significant quadratic effect of *AGE* on house price. Goodman and Thibodeau (1997) suggest that due to the improvements applied to houses at various ages there will be a nonlinear effect of age on housing price. *AGE* and *SQAGE* parameters indicate a U-shape effect whereby the price decreases as the age of the house increases. This effect persists reaches a low, at which the price of the house will start to increase in price again. Furthermore, lot size, number of bathrooms, livable square feet, and tax rate are positive and significant contributors to house price.

A significant negative quadratic affect on house price is observed for more proximal houses to the Wal-Mart Supercenter development. Parameter signs indicate a U-shape effect where house price increases as distance increases from the Wal-Mart Supercenter development to a certain distance corresponding to a climax in house prices; thereafter as the distance to the Wal-Mart increases, the house price decreases. These effects are consistent with the hypothesis that big box store developments exert positive and negative externalities on nearby house prices. Consumers perceive greater negative externalities from being in close proximity to this particular big box development. The results being that housing prices are adversely affected the closer they are to a big-box store development. Possible reasons can include perceptions of increased noise, air pollution, excessive lighting, and traffic.

House prices increase as distance from the big box development increases, at a certain distance an optimum price level is reached, thereafter house prices start to decrease. The first order condition helps to identify the maximum point. According to equation (4), if we hold sale date constant $(\overline{SALE0?} = const.)$ then,

$$\frac{\partial \ln(PRICE)}{\partial DIST} = b_7 + 2b_8 DIST = 0 , \tag{4}$$

Home prices will reach an optimal level approximately 0.469 miles of the mean distance from the big-box development.

Calculating optimal price concerning distance becomes more difficult to estimate when year sold is considered (equation 5).

$$\begin{aligned} \frac{\partial \ln(PRICE)}{\partial DIST} &= b_7 DIST + 2b_8 DIST + b_{17} SALE00 + b_{28} SALE01 + b_{19} SALE02 \\ &+ b_{20} SALE03 + b_{21} SALE04 + 2b_{22} SALE00 * DIST + 2b_{23} SALE01 * DIST \\ &+ 2b_{24} SALE02 * DIST + 2b_{25} SALE03 * DIST + 2b_{26} SALE04 * DIST = 0, \end{aligned} \tag{5}$$

Further results indicate that having a garage and/or a pool increases the price of the house. Depending on the type of zoning ordinance, a positive or negative externality can be exerted on the house price. Year sold has decreasing effects on house price as we regress from years 2005 to 2000.

Finally, a significant interaction occurs in quadratic term *SALE03*SQDIST*, which corresponds to the year the Wal-Mart Supercenter development, was completed. Results indicate neighborhood externalities both positive and negative were more pronounced by the construction of a big-box retailer in that particular area.

Table 3
Summary of Log-Log Regression Estimates

| Variable | Parameter Estimate | Standard Error | Pr > \|t\| | Variance Inflation |
|---|---|---|---|---|
| *AGE* | -0.00565 | 0.00034234 | <.0001* | 3.31076 |
| *SQAGE* | 0.00005934 | 0.00001972 | 0.0026* | 1.29003 |
| *LN(SIZE)* | 0.17015 | 0.00705 | <.0001* | 1.47748 |
| *BATHS* | 0.03568 | 0.00528 | <.0001* | 3.31847 |
| *LN(SQFEET)* | 0.19250 | 0.01603 | <.0001* | 5.34877 |
| *LN(TAX)* | 0.30734 | 0.02120 | <.0001* | 8.69212 |
| *DIST* | 0.01792 | 0.00660 | 0.0067* | 9.91715 |
| *SQDIST* | -0.01911 | 0.00656 | 0.0036* | 9.64499 |
| *GARAGE* | 0.01043 | 0.00479 | 0.0293* | 1.51221 |
| *POOL* | 0.02550 | 0.00456 | <.0001* | 1.17030 |
| *ZONING* | -0.03415 | 0.00502 | <.0001* | 1.95896 |
| *SALE00* | -0.41486 | 0.00961 | <.0001* | 3.71432 |
| *SALE01* | -0.35444 | 0.00934 | <.0001* | 3.96879 |
| *SALE02* | -0.32185 | 0.00943 | <.0001* | 3.91463 |
| *SALE03* | -0.25907 | 0.00909 | <.0001* | 4.07207 |
| *SALE04* | -0.19474 | 0.00908 | <.0001* | 4.06564 |
| *SALE00*DIST* | -0.00090435 | 0.00851 | 0.9153 | 2.46202 |
| *SALE01*DIST* | 0.00050165 | 0.00822 | 0.9513 | 2.74433 |
| *SALE02*DIST* | -0.00333 | 0.00823 | 0.6855 | 2.71927 |
| *SALE03*DIST* | 0.00596 | 0.00809 | 0.4617 | 2.90078 |
| *SALE04*DIST* | -0.00402 | 0.00807 | 0.6183 | 2.92830 |
| *SALE00*SQDIST* | 0.01335 | 0.00837 | 0.1109 | 4.01600 |
| *SALE01*SQDIST* | 0.00508 | 0.00819 | 0.5352 | 4.40275 |
| *SALE02*SQDIST* | 0.01155 | 0.00828 | 0.1635 | 4.37459 |
| *SALE03*SQDIST* | 0.02642 | 0.00814 | 0.0012* | 4.51161 |
| *SALE04*SQDIST* | 0.00730 | 0.00815 | 0.3701 | 4.55237 |

* significant at p < .05 level.

## Conclusions

Our hypothesis that house value is influenced by a combination of perceived positive and negative externalities associated with the proximity to a big-box retailer is empirically supported. A U-shape relation exists where house price raises in value as distance from a big box store increases, reaches a maximum, and then dissipates as distance increases from the development. These effects suggest that perceived negative externalities (aesthetics, noise, traffic, pollution, and lighting) override perceived positive externalities (convenience to shopping area, travel cost, and access to specialty shops) for houses within a certain proximity to the big-box stores. Our initial study for

Maricopa County indicates that maximum effect on house price is optimal at a distance 0.469 miles from the big-box store.

Additionally, result data suggest that perceived house proximity is significant in the year the big-box retailer was built (2003), and then it dissipates in following years. Therefore, the year in which the house was sold influences the maximum house-selling price relative to the distance from the big box store. However, the reached maximum house value at completion of the big box development is not sustained post construction of the big box development.

Our results indicate that consumer's perception of externalities associated with big box development is influenced with proximity and time (distance and construction phase) on nearby house prices.

Limitations of the study include utilizing data sets restricted to houses in Maricopa County, Arizona. Radial measurement of proximity neglects to take into account natural boundaries or distance in street length.

The study provides evidence gleaned from a large existing community absent any previous retail development proximal to the housing data set that allows for better understanding of consumer housing preference in light of perceived externalities exerted by big-box developments.

Importance of further research is helpful to potential homebuyers, current homeowners, and real estate practitioners and municipal governments.

## References


Anselin, L. (1998) GIS Research Infrastructure for Spatial Analysis of Real Estate Markets. Journal of Housing Research (9) Issue 1, Fannie Mae Foundation

Barker, S. (1998) The price of development: Mall boosts neighbors' property values. Retrieved November 23, 2004, http://inside.binghampton.edu/May-June/21MAY98/mall.html

Basker, E. (2005). Job Creation or Destruction? Labor Market Effects of Wal-Mart Expansion, The Review of Economics and Statistics 87 (1) pp.174-183

Behemoth: Wal-Mart Steamroller (2004, May 10). Charleston Gazette/West Virginia, Editorial

Benson, E. D., Hansen, J. L., Schwartz, Jr., A. L., and Smersh, G. T., (1998) Pricing residential amenities: the value of a view, Journal of Real Estae Finance and Economics Vol 16, No.1, p.55-73

Berry, B.J.L. & Bednarz, R.S. (1979) "The Disbenefits of Neighbourhood and Environment to Urban Property", in Segal, D (Ed.) The Economics of Neighborhood, Academic Press, New York, NY, pp. 219-252

Bourassa, S. C., Hamelink, F., Hoesli, M., & MacGregor, B., (1999) Defining Housing Submarkets, Journal of Housing Economics. Vol. 8., p.160-184

Brown, Jr., G. M., & Pollakowski, O. H., (1977) Economic Value of Shoreline, Review of Economics and Statistics 59, p.272-278

Census Trend 1980 to 2000 Comparision Report, Free Demographics. Retrieved September 7, 2005 http://www.freedemographics.com/AllocateOnline.srct

Colwell, P., F., Gujral, S., S., & Coley, C., 1985. The Impact of a Shopping Centre on the Value of Surrounding Properties", Real Estate Issues, 7 (1) pp. 35-39

Correll, M. R., Lillydahl, J. H., & Singell, D. L., (1978) "The Effects of Greenbelts on Residential Property Values: Some Findings on the Political Economy of Open Space", Land Economics 54, P.207-217

Curs, B., Stater, M., & Visser, M., 2004 How much will uncle Sam pay for land? The Locations of Big Box Retailers and Local Land Values" mimeo

DeFao, J., Oakland Bans Mega-Grocers (2003, October 23) The San Francisco Chronicle. Retrieved May 17, 2005, http://web.lexis-nexis.com

Des Rosiers, F., Lagana, A., Theriault, M., & Beaudoin, M., (1996) Shopping centres and house values: an empirical investigation. Journal of Property Valuation & Investment. Bradford: Vol. 14, Iss. 4; p. 41

Dubin, R.,A., (1988) "Estimation of Regression Coefficients in the Presence of Spatially Autocorrelated Error Terms", Review of Economics and Statistics,: Vol 70 (3), p.466-474

Ellwood, L.W. (1954) Estimating Potential Volume of Proposed Shopping Centers. The Appraisal Journal, Vol. XXII No. 4, October, p.583

Emrath, P., Housing Economics: Explaining house prices, Washington: Jan 2002. Vol. 50, Iss. 1; pg. 9, 5 pgs

Fisher, E. & Winnick, L., (1952) The reformulation of the filtering concept, Journal of Social Issues, 7, p. 47-85

Garrison, J., & Lin, S., "Wal-Mart vs, Inglewood a Warm-Up for L.A. Fight" (2004, April 2) The Los Angeles Times, Retrieved May 17, 2005, http://web.lexis-nexis.com

Goodman, A. C., & Thibodeau, T. G., (1998) Housing Market Segmentation. Journal of Housing Economics 7: p.121-143

Goodman, A.C., & Thibodeau, T. G. (1997), "Dwelling-Age-Related Heteroskedascity in Hedonic house Price Equations: An Extension," Journal of Housing Research, Vol.8 (2), 299-317.

Grigsby, W.R. (1963) Housing Markets and Public Policy, University of Pennsylvania Press, Philadelphia

Griliches, Z. (1960), "Hedonic Price index for Automobiles: An Economic Analysis of Quality Change. In The Price Statistics of the Federal Government, 173-196. NBER Staff Report no.3, General Series, no.73, New York: NBER.

Griliches, Z. (1990), "Hedonic Price Indexes and the Measurement of Capital and Productivity: some historical Reflections. In Fifty Years of Economic Measurement: The Jubilee of the Conference on Research in Income and Wealth ed. Ernst R. Brendt and jack E. Triplett, 185-202. NBER Studies in Income and Wealth, vol.54 Chicago: University of Chicago Press.

Gujarati, D. N. (2003), "Basic Econometrics. Fourth Edition," Mc-Graw Hill, New York.

Haider, M., & Miller, E. 1999. Effects of Transportation Infrastructure and Locational Elements on Residential Real Estate Values. Application of Spatial Autoregressive Techniques. University of Toronto, Ontario M5S 1A4

Heaster, R., Ill Wind for Wal-Mart (2005, January 26). Kansas City Star. Retrieved February 22, 2005, http://kansascity.com/mld/kansascity/business/10

Howie, B., "Conroe Residents Embrace Addition of Retail Superstore" (2003, May 8) The Houston Chronicle, Retrieved May 17, 2005, http://web.lexis-nexis.com

Internation Council of Shopping Centers, Shopping Center Definitions. Basic Configurations and Types. Retrieved March 12, 2006, http://www.icsc.org/srch/sct1102/page38.php?region=

Jones, C. ,Leishman, C., and Watkins, C., Examining the persistence of housing submarket price differences, Presented at the Pacific Rim Real Estate Society Conference, Christchurch, New Zealand, January 2002

Jordan, S., "Wal-Mart to Create 600 Jobs in N.Platte", The Omaha World Herald, (2001, September 19) Retrieved May 17, 2005 http://web.lexis-nexis.com

Kaiser, E., "Some Cities Resisting Wal-Mart Expansion", CommonDreams News Center (2003, July 12) Retrieved February 22, 2005 http://www.commondreams.org/headlines03/0712-06htm

Lancaster, K., 1966. "A New Approach to Consumer Theory". Journal of Political Economy, 74, pp.132-157

Maclennan, D., 1977. "Some Thoughts on the Nature and Purpose of Hedonic Price Functions". Urban Studies 14 pp. 59-71

Maricopa County Profile, GPEC Information Center. Retrieved September 6, 2005 http://www.gpec.org/eresponse/maricopa.htm

Miller, H., J., 2003. Tobler's First Law of Spatial Analysis, Annals of the Association of American Geographers, 94 (2) pp. 284-289

Moulton, Brent R. (2001), "The Expanding Role of Hedonic Models in the Official Statistics of the United States," Bureau of Economic Analysis, U.S. Department of Commerce, Retrieved 09/07/2005 from www.bea.gov/bea/about/expand3.pdf

Newman Development Group, LLC., 2002. Host Communities. Retrieved November 23, 2004, http://www.newmandevelopment.com/host.html

Reilly, W.J. (1929) Methods for the Study of Retail relationships. Austin Bureau of Business Research. University of Texas.

Ritter, I., 2002. "Wal-Mart Rolling Out Smaller Urban Format", International Council of Shopping Centers, Retrieved September 26, 2005, http://www.icsc.org/srch/sct1102/page38.php?region=

Rosen, R., "Wal-Mart vs Contra-Costa County", (2004, February 22) The San Francisco Chronicle, Retrieved May 17, 2005, http://web.lexis-nexis.com

Rosen, S., 1974. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition" Journal of Political Economy, 82 pp. 34-55

Rothenberg, J. Galster, G. Butler, R., & Pitkin, J. (1991) The Maze of Urban Housing Markets: Theory, Evidence and Policy, Chicago: University of Chicago Press

Rowell, A., 2003. Welcome to Wall-World: Wal-Mart's inexhaustible march to conquer the globe, Retrieved November 23, 2004, http://www.thirdworldtraveler.com/Corporations/Welcome_Wal_World.html

Sirmans, G., & Benjamin, J., D., 1991. "Determinants of Market Rent", Journal of Real Estate Research, 6 (3) pp. 357- 379

Sirpal, R. (1994) Empirical modeling of the relative impacts of various sizes of shopping centres on the value of surrounding residential properties. Journal of Real Estate Research, Vol. 9 No. 4

Stone, K., & Artz, G., M., "The Effect of Big Box Building Materials Stores on Host Towns and Surrounding Counties in a Midwestern State," Presented at the National Meeting of the AAEA Chicago, Ill August 5-8, 2001

Straszheim, M. R., (1975) An Econometric Analysis of the Urban Housing Market. National Bureau of Economic Research: New York.

Thibodeau, T. G., 1998. Marketing Single-Family Property Values to Market, Cox School of Business, Southern Methodist University, Dallas, TX 75275-0333

Tobler, Waldo. 1979. Cellular Geography, Philosophy in Geography, ed. Steven Gale and Gunnar Olsson, 379-86. Dordrecht, Netherlands: Reidel

U.S. Census Bureau, American FactFinder Retrieved March 5, 2006. http://factfinder.census.gov/servlet

Wal-Mart Facts, Community Impact, Nationwide Impact. A Driving Force in the U.S. Economy. Retrieved February 13, 2005, http://walmartfacts.com/community/nationwide-impact

Wal-Mart Stores, News: Glendale (W), AZ. Retrieved September 6, 2005, http://www.walmartstore.com/wmstore/wmstores/Mainnews.jsp

Yahoo Finance: Quotes & Info Wal-Mart Stores, Inc. (WMT). Retrieved November 24, 2004, http://finance.yahoo.com/q/pr?s=WMT

Endnotes

[1] Doctoral student at University of Missouri-Columbia, Department of Personal Financial Planning, College of Human Environmental Sciences, 240 Stanley Hall, Columbia, MO 65211-7700, (573) 882-6370, mcr2f@mizzou.edu

[2] Doctoral student at University of Missouri-Columbia, Department of Personal Financial Planning, College of Human Environmental Sciences, 240 Stanley Hall, Columbia, MO 65211-7700, (573) 882-6370, es54a@mizzou.edu

[3] Ph.D., Assistant Professor at University of Missouri-Columbia, Department of Personal Financial Planning, College of Human Environmental Sciences, 239E Stanley Hall, Columbia, MO 65211-7700, (573) 882-9343, FinkeM@missouri.edu