EVERYDAY LOW MARKET VALUES? THE EFFECT OF WAL-MART STORES AND RESIDENTIAL PROPERTY VALUES

A THESIS

Presented to

The Faculty of the Department of Economics and Business

The Colorado College

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Arts

By

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April/2007

EVERYDAY LOW MARKET VALUES? THE EFFECT OF WAL-MART STORES AND RESIDENTIAL PROPERTY VALUES

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April 2007

Economics

Abstract

This paper examines the effects of Wal-Mart stores on single family residential property values from 1994 to 2004 in Colorado Springs, Colorado. Two Wal-Mart sites, which opened in 1993 and 1996, were chosen and data were gathered from the El Paso County Assessors Office. The study uses a hedonic pricing model to determine the effects not only on the market value differences over ten years, but also the change in market values from 1995 to 1997, which studies the pre-Wal-Mart effect for one of the sites. As a result, a property next door to Wal-Mart is not valued as high as a property one mile away. However, market values are not worth as much if they are located over one mile away. Therefore, a property is valued the highest just under one mile away.

KEYWORDS: (Wal-mart, property values, hedonic modeling)

ON MY HONOR, I HAVE NEITHER GIVEN NOR RECEIVED
UNAUTHORIZED AID ON THIS THESIS

Matthew Brown

TABLE OF CONTENTS

LIST OF TABLES

LIST OF MAPS

ACKNOWLEDGMENTS

I would like to recognize and thank Professor Dan Johnson for his support, guidance and advisement throughout the senior thesis process. If he had not offered me this paper as a thesis I would not be writing this paper today. His ability to question my decisions pushed me further than I thought possible and I am forever grateful.

Without the support of the El Paso County Assessors Office, specifically Stephen Fischer, this project would not have been made possible. Thank you for answering all of the many questions I had and providing me with all the data necessary to complete this project.

I would also like to thank Wei-Hsin Fu, who created the beautiful maps of the properties, because she taught me everything I know about ARC software. Thank you for being patient with me as I learned and taking the time to help.

Lastly, I would like to thank my parents, Jan and Tom Brown, for their advice, positive criticisms and assistance during my college experience.

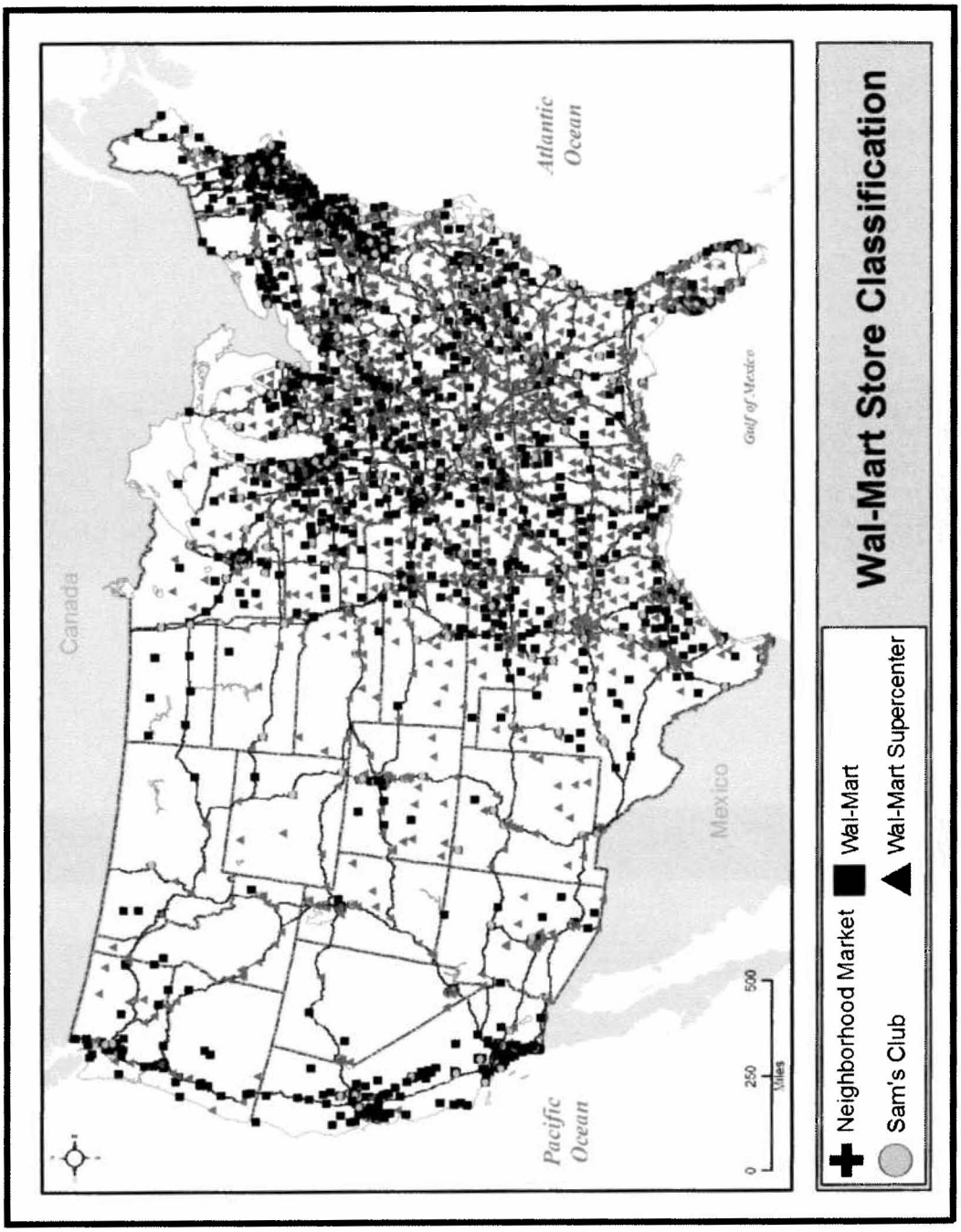
CHAPTER 1

INTRODUCTION

Wal-Mart, Target, and Sam's Club are some of the largest companies in the world. They also have incredibly large properties to accommodate their customers and maintain adequate inventory, with many stores taking up over 200,000 square feet, and even larger lot square footage, when taking into consideration parking and access roads. These companies' stores and their "big box" concept can be found in over 100 countries, in every state and many cities of varying population size.

Sam Walton founded Wal-Mart in 1962 with a single store in Rogers, Arkansas. Since then, it has grown into the world's largest retailing company. When Wal-Mart went public in 1969, it had expanded beyond Arkansas into the neighboring states of Missouri and Oklahoma, building new stores and distribution centers at an increasing rate. By 1998, Wal-Mart had grown to approximately 2,400 stores, encompassing all 50 states and employing close to 1 million people. On the previous page is a Wal-Mart distribution map by store type labeled as Figure 1.[1]

[1] Emek Basker. "Job Creation or Destruction? Labor Market Effects of Wal-Mart Expansion." *Review of Economics and Statistics* 87 (2005): 177



(Map 1)[2]

[2] http://info.zooknic.com/Wal-Mart/Figure2-2-US-distribution-by-store-type.jpg

Wal-Mart operates each store independently with no franchising options and invokes an appealing, but very direct marketing strategy with respect to all segments of their business operations: "everyday low prices". The *Financial Times* have called Wal-Mart "an operation whose efficiency is the envy of the world's storekeepers"[3] Wal-Mart is heavily invested in its "cross-docking" inventory system. It has allowed Wal-Mart to achieve economies of scale, which reduces its cost of sales. With this system, products are continuously delivered to the store that needs them, thus allowing Wal-Mart to restock their shelves faster than the competition. The system also provides for "real time" inventory, allowing Wal-Mart to maintain lower levels of inventory, which reduces the amount of time inventory is sitting in their distribution centers across the country. This saves hundreds of millions of dollars annually, which reduces its cost of goods sold. [4]

Wal-Mart faces close scrutiny by investors and is one of the world's most heavily watched companies in the world. "Between 1997 and 2001, the company's stock value increased by over 500 percent, rising by 70 percent in 1997 alone...Between 1996 and 1999, sales increased by 78 percent while inventory rose only 24 percent, a feat *Fortune* lauded as 'mind-bending."[5]

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[3] Andrew Edgecliffe-Johnson. "A Friendly Store from Arkansas." *Financial Times*, 19 June 1999

[4] Emek Basker. "Job Creation or Destruction? Labor Market Effects of Wal-Mart Expansion." *Review of Economics and Statistics* 87 (2005): 178

[5] T.A. Frank. "A Brief History of Wal-Mart." *Washington Monthly*, April 2006, 1-6

Today, Wal-Mart employs 1.8 million workers and it has more than 6,100 stores worldwide, where more than 127 million people shop each week.[6] During fiscal year 2006, Wal-Mart created 125,000 new jobs in the United States. As of January 21, 2006, the company had 3,289 stores in the U.S., opening 267 supercenters (including converting 166 existing stores into supercenters) in 2006 alone. Wal-Mart is expected to open 305 new stores over the next fiscal year (including new construction of 20-30 supercenters and the conversion of 270-280 current stores). This amounts to an increase of approximately 39 million square feet.

Wal-Mart is continuing to grow at astronomical rates, introducing themselves in markets that have not been tapped or putting multiple stores in the same market area. From 1996 to 2006, sales at Wal-Mart increased from $89.1 billion to $312.4 billion, averaging annual increases of 13%. For any company to maintain annual sales growth rates in excess of 13% over a ten year period of time is unique. The company has a huge economic impact on every community in which it builds a store, bringing both positive and negative consequences/effects to each community. [7]

Many towns and cities face fiscal issues every year and almost always are facing budget cuts. Big box retail is often the solution to part of their problems, fiscally speaking. "These projects are described as needing little in the way of public services

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[6] http://www.walmartfacts.com/FactSheets/8292006_Economic_Benefits.pdf

[7] Wal-Mart 2006 Annual Report. Pg 1-29

yet generating enormous sums of sales taxes, a substantial part of which goes directly into the city's general fund."[8]

However, many towns and cities do not account for the loss in tax revenue from stores that Wal-Mart will put into bankruptcy and are forced to close their doors. Therefore, the new tax revenue will simply reflect a loss of sales to existing businesses in the community. Tax rebates and other tax incentives reduce this revenue stream further.

Wal-Mart's high-profile image has been both helpful and hurtful to the company. There is enormous public interest anytime Wal-Mart chooses to build a store in any community. However, there has been little independent research done on the impact of Wal-Mart or other big-box stores and their impact on local property values. The focus of this study will be to determine if residential property values increase or decrease when a Wal-Mart store is constructed in an area. The luxury of having a 24-hour store that has everything may be seen as a positive, except within a certain distance of the store. Negative effects of traffic, pollution, etc. might hurt the market value of a property.

There are also certain points when the property value will be affected. Many of the larger retail companies scout potential store sites then utilize local real estate firms, which are sworn to secrecy, in locating and acquiring sites. This is done to get some

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[8] Marlon Boarnet and Randall Crane. "The Impact of Big Box Grocers on Southern California." pg 80

protection against over paying for a site. In this case the local firm would acquire the site with funds provided by the retailer under an innocuous corporation and at some point later would be converted to the retailer.[9]

The announcement effect period is when there are unconfirmed rumors in the community about a "big-box" retailer evaluating or having acquired a new site, but there has been no official release from the company, only in the media. Once a big box store is approved by the city to construct a store, it takes enormous amounts of planning and construction before the store actually opens. This process can take many months, if not years, to complete. There are many groups that have been formed in previous years to fight the expansion of Wal-Mart into communities, because in many cases it has a significant impact on the revenues of smaller, local family-run businesses.

I hypothesize that property values surrounding a Wal-Mart store in Colorado Springs will decrease within one mile from the store and then increase again after the one mile mark. This study also focuses on pre- and post- Wal-Mart store construction, using data that from the El Paso County Assessor's office dating from 1994 to 2004. The data are single family, residential property values with a market value assessment.

The remainder of this paper is organized as follows: Chapter 2 examines previous research on Wal-Mart, property valuation evaluation and other studies on related subjects. Chapter 3 details the methodology used in this study. In chapter 4, the

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[9] Thomas Brown, personal conversation

data is presented and analyzed. Lastly, chapter 5 consists of conclusions and implications of the results.

CHAPTER 2

LITERATURE REVIEW AND THEORY

There has been a great deal of research on environmental externalities and the effect they have on property values. For example, Ridker and Henning (2001) studied the effects of air pollution on residential property values in St. Louis. They conclude, using regression analysis, that air pollution does reduce the value of residential property values. However, they used data from 1960, which cannot be guaranteed accurate, especially since technology has improved our precision in gathering data in the last 40 years.[1]

McDonough (2003) examines the values of residential property and their relationship to the proximity of wireless telephone towers. She concludes that wireless towers decrease property values because of health concerns and unpleasant views. She states, "the Supreme Court of New Mexico awarded damages for the perceived decline in property value resulting from a source of stigma, even when no objective evidence

[1] Ronald G. Ridker and John A. Henning. "The Determinants of Residential Property Values with Special Reference to Air Pollution." 246-257

demonstrated that the perceived nuisance was unsafe, and when market loss was not proven by comparable sales data."[2]

Another environmental study discusses the effects of open space on residential property values. Open space surrounding a property or residential area is often seen as a positive, but is there an effect on property values? Do only negative aspects, such as something that causes health effects, unsightly views affect property values? Irwin (2002) concludes that there is a premium involved with permanently preserving open space, which she considers to be developable agriculture and forested lands. The financial benefits are from $994 to $3,307 per acre of farmland that is preserved, depending on the location and whether it is privately or publicly owned.[3]

Some research has also been conducted on the consumer's willingness to pay for an aspect that they consider to be a positive effect on their property. For example, Beasley, Workman and Williams (1986) study the consumer's willingness to pay to preserve an acre of quality farmland when it is proposed to place high-density development versus low density. They discovered people are willing to pay $70 to preserve the land when low density is proposed, but it increases to $144 per acre when high-density development is proposed on an area.[4]

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[2] Carol C. McDonough "The Impact of Wireless Towers on Residential Property Values" pg 25
[3] Elena G. Irwin "The Effects of Open Space on Residential Property Values." Pg. 479

[4] Steven D. Beasley, William G. Workman, and Nancy A. Williams "Estimating Amenity Values of Urban Fringe Farmland: A Contingent Valuation Approach." Pg. 75

This study will differ from previous studies involving property values, because it will include the analysis of data before the externality has evolved, whether that is the construction of a big-box store or an environmental externality. Jud and Winkler (2006) study the effects of an airport expansion in North Carolina and the effects of the announcement that the airport is expanding on property values. Previous research on airports has focused on using the noise or air pollution, before the expansion and after the expansion to determine property values. However, Jud and Winkler use property values before the construction begins and compare them with the values of property after the announcement. It has the advantage of measuring the change in housing prices *ex ante* instead of *ex post*. This is important because neighborhood and locational attributes often change substantially after an airport expansion is operational.[5]

Jud and Winkler use two distances for their data: anything less than 2.5 miles from the airport is one data group and another data group is property values greater than 2.5 miles, but less than 4.0 miles from the airport. In their study of pre- and post-expansion, the number of bedrooms became significantly less important, but the number of bathrooms became much more significant, which was measured by the impact on selling price.

Prior to the announcement of the airport, properties within 2.5 miles were subject to a 0.2% discount. Following the announcement, these properties sold at a

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[5] G. Donald Jud and Daniel T Winkler. "The Announcement Effect of an Airport Expansion on Housing Prices." Pg 98

9.4% discount. Properties that were between 2.5 and 4.0 miles from the airport had a 2.7% discount before the event and an 8.4% discount after the event, which is a 5.7% total discount.[6] These findings suggest close proximity to the airport has a strong effect on housing values. There is also evidence that an announcement can have a detrimental impact on housing prices for properties nearest an airport, as property markets anticipate the negative consequences which will follow.

In addition, Jud and Winkler discuss spatial autocorrelation as a major issue in any hedonic pricing model, specifically using housing values. Spatial autocorrelation, which occurs when similar values cluster in geographical area, is common in hedonic pricing models. The large data set used in this study is similar to previous studies. Spatial autocorrelation was an issue in previous studies of this nature, so it is expected to be a problem. To correct for this problem, the simultaneous autoregressive (SAR) model is used in hedonic pricing models. In the SAR model, house prices are assumed to be dependant on surrounding house prices and the independent variables (property characteristics) are assumed to be correlated with housing characteristics of surrounding houses.[7]

Thayer, Albers and Rahmatian (1992) analyze the effects of waste site proximity to housing prices in the Baltimore, Maryland area. They conclude that consumers do consider the proximity of a waste site when buying a house, but the price effects level

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[6] Ibid. pg 100

[7] Ibid. Pg 98

off after a certain distance from the site. Their study differs from other studies because rather than choosing one environmental externality, they use variables representing water, air and land. They determine that access to a water feature, such as an ocean, lake, river, etc. is valued at $33,000 over the life of the home. A 6% improvement in air quality increases the value of the house $3841 over the life of the home, therefore for each mile a house is located from the site, $1,349 could be added to the price of the home.[8]

Kiel, a leading pioneer using hedonic analysis in determining property values based off an externality, states that hedonic modeling "is used to estimate economic values for ecosystem or environmental services that directly affect market prices. It is most commonly applied to variations in housing prices that reflect the value of local environmental attributes."[9]

Knowing the price of an environmental variable allows the researcher to estimate the demand function for the good. If we know the demand curve, it allows the researcher to estimate the benefits from a reduction of the externality (the relevant area under the demand curve).[10] Hedonic regressions can be used to measure the consumer's willingness to pay for a house given the proximity from the contaminated site or other

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[8] Mark Thayer, Heidi Albers and Morteza Rahmatian. "The Benefits of Reducing Exposure to Waste Disposal Sites: A Hedonic Housing Value Approach." Pg. 272

[9] http://www.ecosystemvaluation.org/hedonic_pricing.htm

[10] Katherine Kiel. "Environmental Contamination and House Values" pg. 1

negative externality, while holding all other characteristics of the house constant (square footage, age, number of rooms, etc.)[11]

Kiel describes the typical hedonic model as the following:

$$P_i = \beta_o + \beta_1 H_i + \beta_2 N_i + \beta_3 ENV_i + \varepsilon_I$$

where P_i is the sales price of the *i*th house, H_i contains information on the characteristics of the house, N_i contains information on the neighborhood in which the house is located, ENV_i contains information on the local environmental and ε_I is the unobservable stochastic random error.[12]

Hedonic studies that examine the impact of undesirable land uses on property values are reviewed in Farber (1998) and Boyle and Kiel (2001). Farber analyzes twenty-five studies where the impact is generally measured as 'distance from the site' and reports that there is "considerable agreement"[13] on the price effects, which range from $3,000 to $15,000 per mile in 1993 dollars. The landfills and coal-fired electric utility had an impact of $14,000 per mile. Chemical plants and nuclear power plants decreased property values by $200 to $300 per mile.[14]

Boyle and Kiel (2001) appraise sixteen studies of locally undesirable land uses and find that the increase in house prices by enlarging the distance from the site by one mile ranges from $189.77 to $11,452 in 1982-84 dollars. Obviously this price variation

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[11] Ibid. pg. 2

[12] Ibid. pg. 2

[13] Stephen Farber. "Undesirable facilities and property values: a summary of empirical studies." Pg. 11

[14] Ibid. pg. 2-6

is quite large, but Boyle and Kiel conclude that the price effects are impacted by changes in information about the site. Thus, it is important for studies to control both for distance from the site and changes in information available to the public.[15]

Kiel and Williams (2003) conduct a meta-analysis of house price regressions where the environmental variable of interest is the distance from the nearest Superfund site. Their data set consists of single-family house sales prices in thirteen U.S. counties where there are a total of fifty-seven Superfund sites. Hedonic regressions were estimated for different time periods based on when the site was discovered, when it was listed among other factors. For the regressions based on the period just after the site was listed by the Environmental Protection Agency (EPA), they find that eighteen sites were viewed as having negative externalities. Therefore as distance from the site increased, house values also increased. Seven other sites were found to increase local house prices, while the regressions on the remaining sites did not yield statistically significant results.[16]

Kiel and Williams then determine what might cause the differences in house price responses. They run a regression where the dependent variable takes on a value of 1 if the original hedonic regression found that the site was viewed as a negative externality, and a value of zero otherwise. Kiel and Williams find that larger superfund sites are more likely to be viewed as negative externalities, while sites in counties with

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[15] Melissa A. Boyle and Katherine A. Kiel "A Survey of House Price Hedonic Studies of the Impact of Environmental Externalities." Pg. 141

[16] Katherine A. Kiel and Michael Williams. "The Impact of Superfund Sites on Local Property Values: Are all Sites the Same?" pg. 1-16

a higher percentage of blue-collar workers are less likely to be viewed as negative externalities.[17]

Along with environmental externalities, economists have studied transportation systems and athletic stadiums to determine their effect on both residential and commercial property values. Gatzlaff and Smith (1993) analyze the impact of the Miami transit system on property values surrounding stations on the Metrorail, the city's public transportation system. The study is unique because although it is written in 1993, the Miami Metrorail was finished just before the study was completed, which could not be done with other large cities such as Boston and New York. Using the hedonic regression model, they find inadequate evidence that there was an effect on property values. This discovery supports Gatzlaff and Smith hypothesis that the Metrorail only weakly affected property values within close proximity to a station.[18]

Tu (2005) uses a difference-in-difference analysis to determine FedEx Field in Washington D.C. affects property values. He gathers data on every residential property in the county and uses a one, two and three mile radius to separate the data. He analyzes the data at three different time periods: pre-development, development and post-development. Tu concludes that properties located near the stadium site were already valued at a decreased rate, even before the site was considered for the stadium. After

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[17] Ibid. pg 1-16

[18] Dean H. Gatzlaff and Marc T. Smith. "The Impact of the Miami Metrorail on the Value of Residences near Station Locations." Pg. 54-66

the site was announced and upon completion of the facility, the prices increased considerably, an average of 10.66%.[19]

There has been a considerable amount of research completed on housing valuation and a number of different externalities and variables. My study will focus on Wal-Mart and its effect on property values during the years before the Wal-Mart was constructed as well as how the values changed after the construction.

[19] Charles C. Tu. "How Does a New Sports Stadium Affect Housing Values? The Case of FedEx Field."

CHAPTER 3

METHODOLOGY

This study will follow previous research and relate certain aspects of previous models to the models in this study. In the hedonic pricing model, a property is composed of a variety of physical attributes, including distance from the Wal-Mart store, site and improvement characteristics and market characteristics. The number and type of attributes distinguish it from others and determine the market value of the property.

Hedonic price models assume that a good can be described by its quality characteristics. The price of a good is determined by the monetary value that consumers place on those characteristics. Therefore, the price of a good is a function of its implicit quality characteristics. The price of this good can be represented as: Price= $(X_i,\ldots,X_n)$.[1]

However, the price of the good can be affected by the overall market. A perfectly competitive market is defined as having "many buyers and sellers, so that no single buyer or seller has a significant impact on price."[2]

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[1] Rosen Sherwin. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." Pg. 34-55

[2] Robert S. Pindyck and Daniel L. Rubinfeld. "Microeconomics" 6th Edition Pearson Education 2005 pg 8

Ideally, all attributes that matter to homeowners when purchasing a house, such as safety and schools, would be included. However, it is practically impossible to include non-physical aspects that are factored into a homeowner's decision. Therefore, model specification is often influenced by data availability. This study uses a broad dataset that includes housing attributes that are commonly found in previous research. Using many housing attributes in the model helps reduce variable bias, but inclusion of highly correlated variables leads to another problem. Highly correlated variables with a value of 0.7 or higher were fixed by omitting one variable.

Data were gathered from the El Paso County Assessors office in Colorado Springs, Colorado with every property value (commercial and residential) within a two-mile radius of every big-box store in Colorado Springs. The properties, if they were constructed, have assessed values for 10 years starting in 1994. Initially, the study was focusing on big-box stores including Wal-Mart, Target and Best-Buy. However, due to computational constraints, the current study is limited to single family residential property values surrounding two Wal-Mart's. The commercial data were eliminated because it was inconsistent with many variables, including number of rooms and bathrooms. Another factor in the decision to limit this study to single family residential properties was many of the other types of residential properties did not match in the mapping software and also did not provide accurate data for each variable.

Two different models, although very similar, were used in the study:

1995-1997 Model

Change in Market Value from 1995 to 1997= β_1Dist + β_2SqFt + β_3IACT + β_4IM + β_5B122 + β_6BBBST + β_7BlGrd + β_8Age + β_9Bdrms + β_{10}BthBd + β_{11}FrFlr + β_{12}HFlr + β_{13}TBsmt + β_{14}FinBst + α + ε

(Table 3.1)

Less Than 1 Mile and Over 1 mile

Market Value= β_1Dist + β_2SqFt + β_3IACT + β_4IM + β_5B122 + β_6BBBST + β_7BlGrd + β_8Age + β_9Bdrms + β_{10}BthBd + β_{11}FrFlr + β_{12}HFlr + β_{13}TBsmt + β_{14}FinBst + β_{14}Year + β_{14}StNum α + ε

(Table 3.2)

Following Kiel, this study will use the property market value as the dependent variable and include many different independent variables. The dependent variable is represented in current dollars. Variables that were evaluated as predictors of price were chosen based on previous hedonic models and personal experience. These variables include:

DESCRIPTION OF VARIABLES	
Variable Name	**Description**
Above First Floor	Square feet above the first floor area
Age	Year of construction
Bathrooms	Number of bathrooms

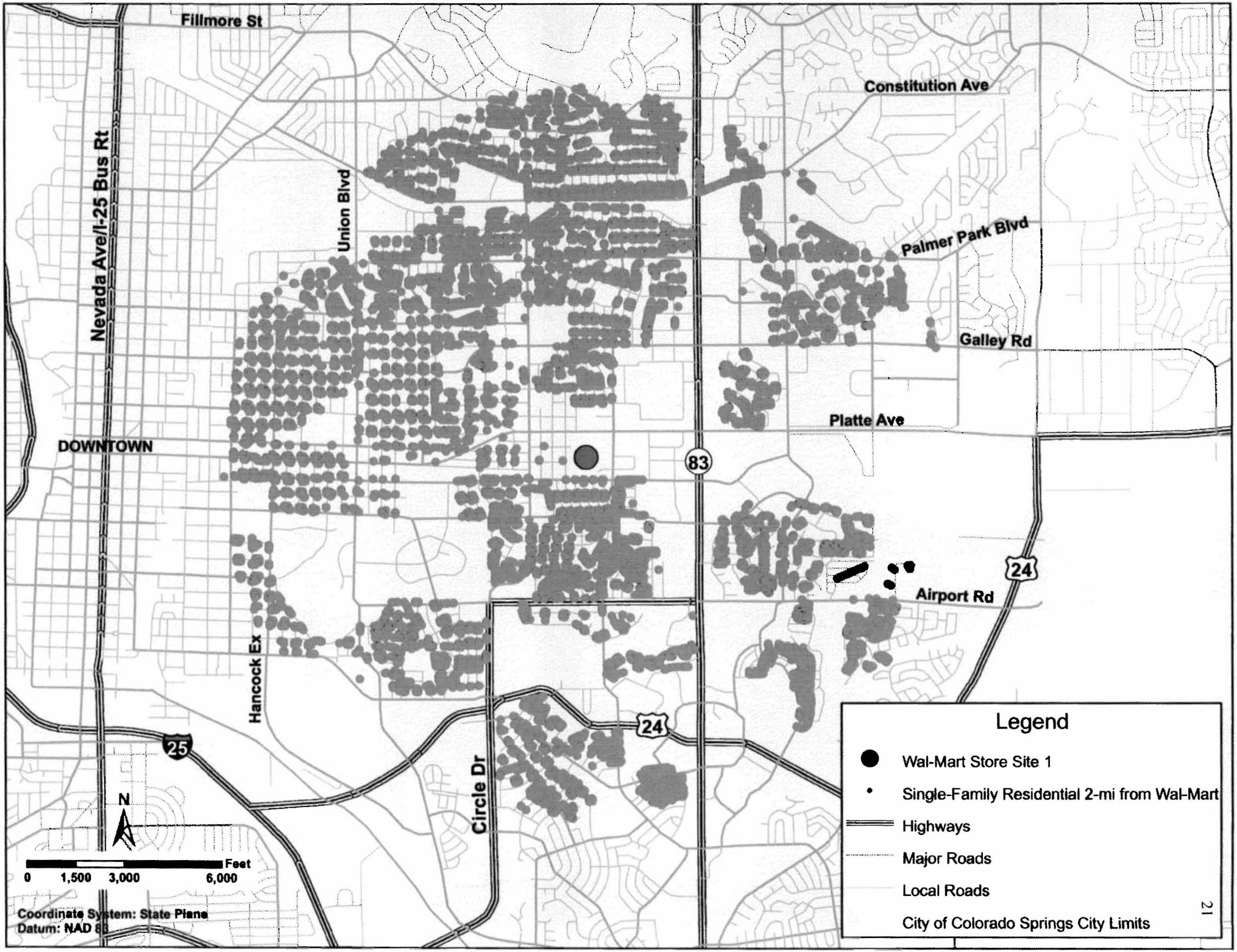
Bedrooms	Number of bedrooms
Building Grade	Quality of the building. The higher number the better
Building Style Dummy Variables	See chart in Chapter 4
Distance (miles)	Distance from Wal-Mart store
Finish Basement	Finished basement area (square feet)
First Floor	Square feet on first floor
Half Floor	Square feet in between the standard floors
Improvement Area	Footprint of the building
Improvement Use Dummy Variables	See chart in Chapter 4
Market Value	Values of the property from 1994-2004
Parcel Number	Unique parcel number assigned by the county assessor. It was used to organize the data
Rooms	Number of rooms
Square Feet	Total lot square feet
Total Basement	Total basement area (square feet)
Year	Year associated with the market value

(Table 3.3)

The Wal-Mart at 3201 E. Platte Avenue, known as site 1 for this study, opened in the latter half of 1996. It is shown on page 21, labeled as Map 3.1. The application was received by the City Planning Department on April 5, 1995 and was approved on July 11, 1995. The building permit was issued on November 7, 1995.

The Wal-Mart at 8250 Razorback Drive, known as site 2 for this study, opened in 1993. It is shown on page 22, labeled as Map 3.2. The application was received by the City Planning Department on November 21, 1991 and was approved on December 20, 1991. The building permit was issued on August 17, 1992.

The two Wal-Marts are strategically located in different parts of the city with site 1 located centrally, while site 2 is located in the northern part of the city. A map of the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Nevada Ave/I-25 Bus Rt
Union Blvd
Palmer Park Blvd
Galley Rd
Platte Ave
DOWNTOWN
83
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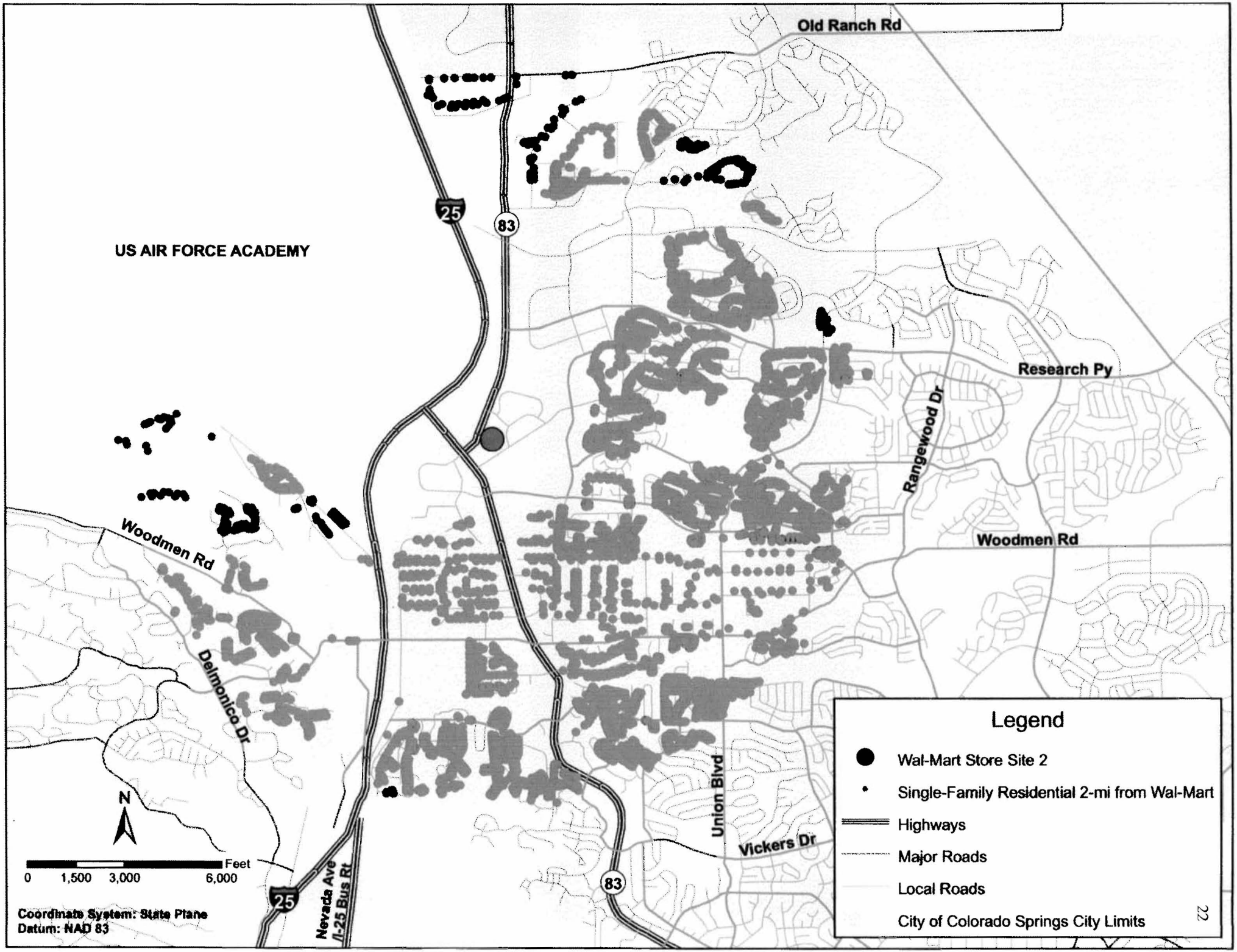
Airport Rd
Hancock Ex
25
24
Circle Dr
N
Feet
0 1,500 3,000 6,000
Coordinate System: State Plane
Datum: NAD 83
Legend
Wal-Mart Store Site 1
Single-Family Residential 2-mi from Wal-Mart
Highways
Major Roads
Local Roads
City of Colorado Springs City Limits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83
Research Py
Rangewood Dr
Woodmen Rd
Woodmen Rd
Delmonico Dr
Union Blvd
Vickers Dr
Nevada Ave
I-25 Bus Rt
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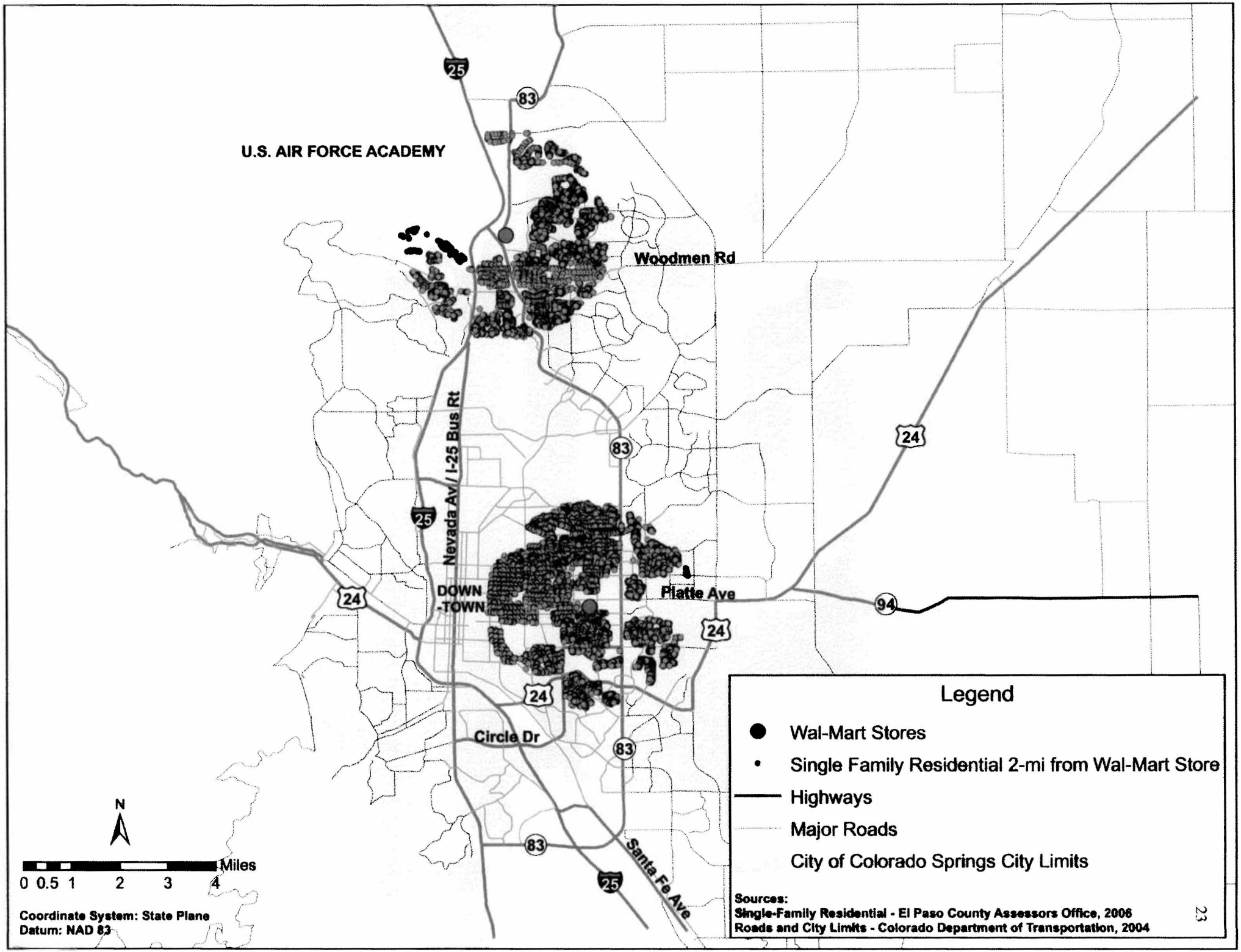
Wal-Mart Store Site 2
Single-Family Residential 2-mi from Wal-Mart
Highways
Major Roads
Local Roads
City of Colorado Springs City Limits


U.S. AIR FORCE ACADEMY
Woodmen Rd
Nevada Av/ I-25 Bus Rt
DOWN -TOWN
Platte Ave
Circle Dr
Santa Fe Ave
25
83
24
94
N
0 0.5 1 2 3 4 Miles
Coordinate System: State Plane
Datum: NAD 83
Legend
Wal-Mart Stores
Single Family Residential 2-mi from Wal-Mart Store
Highways
Major Roads
City of Colorado Springs City Limits
Sources:
Single-Family Residential - El Paso County Assessors Office, 2006
Roads and City Limits - Colorado Department of Transportation, 2004

two sites is shown on page 23, labeled as Map 3.3. Site 1 is comprised of many economic areas as defined by the El Paso County Assessors Office. Economic area III, which contains approximately 6% of the properties in site 1, is an area of low to moderate priced housing. The median sale price as of June 2002 was $101,200 and many of the properties are non- owner occupied and serve as rentals. This area also has one of the higher crime rates in the city.[3]

Economic area IV contains 37% of the properties within site 1. The median sale price as of June 2002 was $132,900. This area has numerous rentals, including a majority held by the Colorado Springs Housing Authority for low-income housing assistance. This group has contributed to varied real estate values and several demographic problems, such as high crime rates.[4]

Economic area VI has approximately 8% of the properties within site 1. The median sale price as of June 2002 was $143,500. This is the oldest housing area in Colorado Springs, envisioned by founder William J. Palmer. It is also an area with low crime rates. [5]

Approximately 40% of properties in site 1 are located in economic area VII. It is a stable, well-maintained market and is comprised of mostly middle class families. The median sale price as of June 2002 was $140,000. Economic area XI, with a median sale

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[3] El Paso County Assessors Office

[4] Ibid.

[5] Ibid.

price of $160,000, represents approximately 10% of properties in site 1. This area has been developed over the past 30 years and is well-maintained with a continuity of style and quality. It has a healthy market turnover and good resale value.[6]

Site 2 has fewer property values because of its location near the United States Air Force Academy (USAFA). There are no single family residential properties located in this portion of the Academy. However, this area is highly commercialized and includes a Wal-Mart store. Economic area IX has 9% of the properties in site 2. Lots of high end commercial growth has sparked a boom in housing in this area, which has a median sale price of $255,000 as of June 2002. Economic area X, which has a median sale price of $203,500, represents approximately 11% of the properties in site 2. This area is stable, well-maintained and consists of new construction, mostly custom/semi-custom homes.

Economic area XIV contains 51% of the properties in site 2, which has a median sale price of $221,250. It is the first "planned" community in El Paso County. Development began in the 1980's and it is still continuing to grow today. Economic area XIII, which contains 23% of properties in site 2, has a median sale price of $186,000.[7]

In conclusion, the methodology used in this study will be a two-part hedonic price model. The data will analyze the effect of Wal-Mart stores on market values from 1994 to 2004, as well as, the pre-Wal-Mart effect from 1995 to 1997 on site 1.

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[6] Ibid.

[7] Ibid.

CHAPTER 4

DATA AND ANALYSIS

The decision to limit the analysis to single-family residential properties was made because the level of detail in the data was more complete. Commercial data were very difficult to map because of the multiple addresses for commercial properties, such as 1000-1100 N. Cascade Ave, 1230-1245 N. Cascade Ave, etc. The location cannot be exactly pinpointed by the mapping software, thus it was characterized as "unmatched".

Most commercial properties lacked comparable data such as bedrooms, bathrooms and square footage. Properties such as condominiums and city/state owned buildings were characterized as "unmatched", because of multiple address values and also because they lacked sufficient data. Therefore, single-family buildings were the logical option, because they were "matched" in the mapping software and provided adequate data to run a test.

The matching software in ArcGIS uses Street Map USA 2000, which assigns a location for every property within 2 miles of the Wal-Mart. According to the software documentation, "U.S. Streets represents detailed streets, interstate highways, and major

roads within the United States."[1] For site 1, there was a 90% matching rate, while site 2 had a matching rate of 89%.

The remaining 10% of properties that were not matched were removed from the data. It was impossible to add them into the dataset because the distance was such an important part of the model. Originally, there were five Wal-Mart sites in Colorado Springs that were to be included, but the other sites came back with matching rates below 60%. Since the newest available matching software is from the year 2000, it does not account for new construction or new subdivisions since 2000, leading to an inadequate matching rate on the other three Wal-Mart sites.

After running pairwise correlation tests to determine whether variables were highly correlated, there were many variables that needed to be removed from the original equation. Building styles and improvement use codes were combined into three dummy variables each.

A dummy variable that included whether the building was 1.5, 2, or 2.5 stories in height was highly correlated with the above first floor variable, which provided square feet above the first floor. The variable, ABVFRSFL, was eliminated from the regression. Another variable, ROOMS, which indicated the number of rooms, was highly correlated with number of bedrooms and bathrooms. Once this variable was removed, the correlation subsided to an adequate level.

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[1] U.S Streets 2000 software

Total basement indicated the number of square feet in the basement of the property, while finish basement indicated the amount of finish basement area in the home. These two variables were highly correlated, so finish basement was made into finish basement area as a percentage of the total basement area and the correlation value was reduced.

Site 1 had ten dummy variables for improvement use codes, which explain the footprint of the building on the property, that were then broken down into three, after a correlation test indicated many codes were highly correlated. The most common structure found within the two-mile radius of the Wal-Mart's is a frame structure. Wood is a very common product to build houses and the frame structures represent over 76% of the properties in site 1.

SITE 1- IMPROVEMENT USE VARIABLES

CODE[2]	DESC.	DUMMY VARIABLES	# OF OBSERVATIONS
A2	Duplexes-Triplexes	ImpUseACT	7,517
CU	Condominium Unit		
TH	Townhouse		
F0	Frame Lowest Quality	ImpUseF	118,370
F1	Frame Substandard		
F2	Frame Tract Quality		
F3	Frame Custom		
M1	Masonry Substandard	ImpUseM	29,225
M2	Masonry Tract Quality		
M3	Masonry Custom Quality		

(TABLE 4.1)

[2] El Paso County Assessors Office

Although all of the properties are described as "single-family residential" by the county assessor's office, the properties can be broken down even further into the categories listed above in Table 4.1. Another set of descriptive characteristics are building styles. They further describe the physical characteristics of the building on the property. For site 1, there were thirteen dummy variables used, which were broken down into three variables. Properties described as a condominium unit, duplex, modular home, ranch, triplex or a townhouse, contained 71% of the properties.

SITE 1- BUILDING STYLE VARIABLES

CODE[3]	DESC.	DUMMY VARIABLES	# OF OBSERVATIONS
1.5	1.5 Stories	BldgSty122	7,827
2.5	2.5 Stories		
2 ST	2 Stories		
BIL	Bi-Level	BldgStyBBST	36,773
BSM	Basement Level		
SPL	Split Level		
TPX	Triplex		
CU	Condominium Unit	BldgStyCDMRTT	110,512
DUP	Duplex		
MOD	Modular		
RAN	Ranch		
TRI	Triplex		
TWH	Townhouse		

(TABLE 4.2)

Site 2 had fewer observations because of the physical location of the property. It is located in a heavily commercialized part of the city with the north-western border intersecting with the United States Air Force Academy (U.S.A.F.A.). This major

[3] Ibid.

landmark takes up approximately 25% of the land in site 2; however there are no properties in this study located in the U.S.A.F.A.

Improvement use codes described as framing were also the most popular in site 2 as well, describing 83% of the properties in site 2. The improvement use codes were:

SITE 2- IMPROVEMENT USE VARIABLES

CODE[4]	DESC.	DUMMY VARIABLES	# OF OBSERVATIONS
A2	Duplexes-Triplexes	ImpUseACT	9,046
CU	Condominium Unit		
TH	Townhouse		
F1	Frame Substandard	ImpUseF	54,930
F2	Frame Tract Quality		
F3	Frame Custom		
F4	Superior Quality Residence		
M2	Masonry Tract Quality	ImpUseM	2,385
M3	Masonry Custom Quality		
M4	Masonry Superior Quality		

(TABLE 4.3)

Site 2 contained fewer building style codes, which is probably the result of fewer properties. Again, along with site 1, property described as a condominium unit, duplex, modular home, ranch, triplex or a townhouse, described 39% of the properties found in site 2.

[4] Ibid.

SITE 2- BUILDING STYLE VARIABLES

CODE[5]	DESC.	DUMMY VARIABLES	# OF OBSERVATIONS
1.5	1.5 Stories	BldgSty122	23,493
2.5	2.5 Stories		
2 ST	2 Stories		
BIL	Bi-Level	BldgStyBBST	17,269
SPL	Split Level		
CU	Condominium Unit	BldgStyCDMRTT	25,599
DUP	Duplex		
MOD	Modular		
RAN	Ranch		
TRI	Triplex		
TWH	Townhouse		

(TABLE 4.4)

Within the improvement use variables, there were approximately 100 sites that were characterized as single family residential, but had improvement use codes that categorized them as service garages, storage and exempt religious structures, so those sites were also removed from the data set because they did not provide a full set of data and also because they would not typically be identified as single family properties.

The tables below describe the minimum and maximum market values, as well as averages, of the market value based on the year. Site 1 increased in value over the 10 year period 77.38%, while site 2 increased 68.59% over the same period.

Market Value- Site 1			
Year	Minimum	Maximum	Average
1994	$11,100	$300,919	$79,910
1995	$11,300	$300,919	$79,809
1996	$14,662	$372,936	$95,339
1997	$6,000	$372,936	$95,614
1998	$5,000	$378,727	$107,165
1999	$5,000	$378,727	$107,277

[5] Ibid.

2000	$9,600	$398,768	$122,119
2001	$9,600	$398,768	$122,127
2002	$11,356	$406,800	$128,008
2003	$21,000	$406,800	$128,252
2004	$41,481	$460,456	$141,745

(Table 4.5)

Market Value- Site 2			
Year	Minimum	Maximum	Average
1994	$7,900	$580,794	$133,303
1995	$5,300	$661,825	$133,806
1996	$17,125	$731,523	$150,125
1997	$22,150	$731,523	$151,127
1998	$3,748	$746,871	$163,614
1999	$10,000	$746,871	$164,919
2000	$19,811	$853,261	$189,233
2001	$10,847	$853,261	$190,781
2002	$31,185	$869,640	$199,530
2003	$31,185	$869,640	$200,071
2004	$56,661	$1,172,400	$224,741

(Table 4.6)

However, according to the tables above, site 2 is comprised of more expensive properties based on averages and maximum prices for market value. Although all of the data represents single-family residential properties, minimum values of less than $10,000 were investigated further. The dataset revealed that these properties have average numbers of bedrooms, bathrooms and most were newer homes.

A White test was completed for heteroskedasticity for every regression analysis; it was found to be a problem in every test, indicating that the variance of the error term was different for different values of the independent variables. The problem was solved using a White correction for heteroskedasticity-consistent coefficient variances.

Initially, the Jarque-Bera (JB) statistic was enormous, which meant that the error terms did not follow normal distribution. The graph indicated that the "outliers" were not following a normal distribution, therefore increasing the JB statistic. Numerous corrections were made to the JB statistic, which caused it to decrease, but a significant gap still remains in comparison to the Chi-squared critical value of 5.99 or less. Obviously, this is a problem and every effort was made to correct for normality, but it could not be corrected in this study.

Next, the Durbin-Watson statistic, which detects first order autocorrelation between consecutive residuals in a time series, was very low in every regression. Positive first order autocorrelation existed and was corrected by using the Prais-Winsten model.

For site 1, which opened in 1996, it was possible to use the market values from 1995-1997 to analyze the effect on pre- and post- Wal-Mart values. However, site 2 opened in 1993, so it was not possible to produce pre-Wal-Mart values. Rather than taking the market value in each year, this regression was done by taking the change in market value from 1995 to 1997. Taking the market value by itself would tell you very little about the effect before the Wal-Mart was opened, but rather it would conclude whether or not Wal-Mart is located in a more expensive or less expensive area of the city.

Initially two separate regressions were completed on changes in market value from 1994 to 1997, alongside, changes in market value from 1995 to 1997. However,

the results concluded the years were contradictory of each other. Another regression analysis was completed, this time consisting of change in market value from 1994 to 1995. A further look at the data set revealed that only 43 properties changed in market value from 1994 to 1995 (approximately 0.33% of the data set). All of the other values were assessed as a zero change in market value. Therefore, it was decided that the data from 1994 could not be significant and data from 1995 to 1997 would be used instead.

Change in Market Value from 1995 to 1997 in Site 1

The first regression used the change in market value from 1995 to 1997 as the dependent variable. The change in market value versus the actual market value was used to determine if there was an effect on property values two years before the Wal-Mart opened and one year after it opened.

All the above problems (heteroskedasticity, multicollinearity, autocorrelation) were corrected during the regression of the dataset. The regression analysis is reflected in Table 4.7, on the following page. The adjusted R^2 value of 0.449 indicates a moderate fit of a linear relationship between the independent variables and the dependent variable, which is the change in market value from 1995 to 1997. This analysis included 13,656 observations over the three year period. After autocorrelation was corrected, it increased the Durbin-Watson statistic to 2.331. The high f-statistic, 736.487, is also a strong indicator of the significance of the analysis.

Change in Market Value (1995-1997) for Site 1

Number of Observations: 13,656

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable Name	Coefficient	T-Statistic	Significance
Constant	4,233.844	4.382	***
Distance (miles)	192.563	0.829	
Lot Sq. Ft.	0.188	4.920	***
Impr. Use- Duplexes, Condos, Townhouse	-2,187.607	-2.614	***
Impr. Use- Masonry	-89.526	-2.662	***
Building Style- over 1 story	1,611.786	2.492	**
Building Style- Bi-level, split level	-61.967	-0.932	
Building Grade	1,652.512	4.191	***
Age of Property	-65.490	-7.652	***
Bedrooms	833.263	7.256	***
Bathrooms per Bedroom	1,506.757	6.937	***
First Floor	3.951	8.067	***
Half Floor	2.092	1.500	
Total Basement	1.199	7.555	***
Finish Basement Percentage	360.124	1.727	*

KEY STATS

Adjusted R-squared	0.449
Durbin-Watson	2.331
F-statistic	736.487

(Table 4.7)

Table Note: If significant at the 10% level, one asterisk' two asterisks for the 5% level; and three asterisks for the 1% level

From 1995-1997, the biggest decrease in market value was $70,083, while the biggest increase was $124,559, with the average change in market value being $15,502. If the top 20 and lowest 20 properties were deleted, the average would change to

$15,417. The relatively small difference, $86, between the averages, shows overall that the average is a strong average with a majority of the properties being consistent. The estimated constant of $4,233 is significant because it is approximately 30% of the average change from 1995 to 1997. Regardless of property location, age, number of bathrooms or any of the other attributes factored into the analysis, the property automatically increased over $4,000 value.

The regression concludes that for every mile from the Wal-Mart, the change in market value increased approximately $193. Therefore, the farther away the property is located from the Wal-Mart, the greater the change in market value, to a maximum of $386, at a distance of two miles. The t-statistic is low, valued at 0.829, which means the distance is statistically indistinguishable from zero. However, this data is from 1995 to 1997, which is measuring two years prior to Wal-Mart opening and one year after the opening.

Another interesting statistic is that age of the home decreased the change in market value by $65. For site 1 in 1997, the average age of the properties was 37 years old, which calculates to an average decrease of $2,405 for the three year period. Therefore, it is assumed that older houses appreciate less rapidly than new homes. As shown in Chapter 3, the location of this Wal-Mart is in a well-established part of the city and there is not a large amount of growth. A lot of the properties are undergoing renovations or adding new space to the home because of the high average age (37 years)

of the properties. This could account for the large difference in the change in market values of $124,559 over a three year period.

Also, during the period of time from 1995 to 1997, the larger the square footage of the property lot, the higher the change in market value. The average lot size was 7,944 square feet from 1995 to 1997; therefore the average change in market value was $1,493. However, larger lots become disproportionally more valuable as they increase in size. The t-statistic is very significant for this variable as well and it is significant at the 1% level.

Single family properties that are considered duplexes/triplexes, condominiums, townhouses or masonry construction had a negative effect on the change in market value. They dropped in relative market value compared to single family properties. The improvement use code of duplexes/triplexes, condominiums, townhouses decreased the change in market value $2,187, while masonry decreased the value by $89.

If the property was classified as a one, two or two and one half story building, it increased the value by $1,612. Each additional bedroom increased the change in market value by $833, which is not surprising because the number of bedrooms can be linked to the first floor and half floor variables, which also showed positive values. If you have more bedrooms, you are most likely going to increase the size of the first floor or half floor or also have a two story structure.

The building grade, which displays the quality of the building, is very significant in this regression. The properties were ranked on a scale from zero to four, with four being the highest quality. An increase of $1,652 is expected to be achieved for each increase in the level of building quality.

In conclusion, the change in market value from 1995 to 1997 was positive in site 1. The time period measured two years prior to the Wal-Mart opening and one year after it opened, thus it allowed the study to measure the effect Wal-Mart had on before it opened and right after. Although, it produced a value of $192.56 for every mile the property is located from Wal-Mart, the value was not significant.

The larger properties, which includes more bedrooms, bathrooms, larger lot and home square footage, were disproportionally increased in market value more than smaller homes. However, this is common because of the lack of larger properties in the sample. There is a large supply of moderate size homes, but the few larger properties are in higher demand, therefore they command a larger price, which affects market value over time.

Market Value of Properties Less Than One Mile from Wal-Mart

The next two regressions that were performed, included observations from both site 1 and site 2, and examined market values from 1994 to 2004. This was done to explain them as a function of the attributes started earlier. The table on the next page,

Table 4.8, is the regression table for this model. The number of observations increased to 42,225 from 1994 to 2004, which represents 19% of the total data set. The adjusted

Market Value of Properties Less Than One Mile from Wal-Mart

Number of Observations: 42,225

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable Name	Coefficient	T-Statistic	Significance
Constant	-41,745.100	-27.315	***
Distance (miles)	10,958.425	16.995	***
Lot Sq. Ft.	0.611	21.228	***
Impr. Use- Duplexes, Condos, Townhouse	-4,021.472	-3.931	***
Impr. Use- Masonry	82.928	1.599	
Building Style- over 1 story	22,116.219	39.491	***
Building Style- Bi-level, split level	359.662	4.222	***
Building Grade	16,820.006	29.715	***
Age of Property	-127.999	-6.339	***
Bedrooms	2,866.905	16.796	***
Bathrooms per Bedroom	7,139.162	19.622	***
First Floor	37.836	68.701	***
Half Floor	-43.821	-10.031	***
Total Basement	12.879	48.206	***
Finish Basement Percentage	7,549.804	24.154	***
Year	6,232.956	123.482	***
Site Number	29,273.302	44.735	***

KEY STATS

Adjusted R-squared	0.905
Durbin-Watson	2.230
F-statistic	23,650.9

(Table 4.8)

Table Note: If significant at the 10% level, one asterisk' two asterisks for the 5% level; and three asterisks for the 1% level

R^2 value of .905 indicates a very strong, positive linear of the dependent variable with the independent variables. The Durbin-Watson statistic, 2.230, was drastically improved once autocorrelation was solved. Also a strong f-statistic indicates a strong significance in the data set.

The constant value of -$41,745 represents a large decrease in value living one mile or les from Wal-Mart. This also was significant at the 1% level. However, distance was very significant in this regression and the t-statistic was very high, which indicates that distance is very important for properties one mile or less from Wal-Mart. The coefficient value of $10,958.43 indicates that a property located exactly one mile away would be valued at $10,958. As a result, it is best to be located exactly at one mile away versus being right next to the Wal-Mart. Therefore, when distance is the only variable considered a property located closer to the Wal-Mart is worth less than a property located one mile away from Wal-Mart.

The size of the lot is also significant at the 1% level and also has a very high t-statistic. A value of $0.611 correlates to an average market value of $5,008 for Site 1 and $10,046 for Site 2 based on average lot sizes of 8,197 square feet and 16,442 square feet, respectively.

Compared to the previous regression, the average property coded as a duplex, condominium, or townhouse also decreased in market value by approximately $4,021. The p-value is also significant at the 1% level.

Properties characterized as over one story increased dramatically in value compared to buildings such a bi-level, split level, or basement level. Average properties over one story increased $22,116, however it was not significant. The t-statistic was comparatively low, valued at 39.49. Properties identified as bi-level, split level, or basement level properties increased $360, which was significant at the 1% level.

The half floor variable, which measured any significant area in between the standard floors, had a value of -$43.82 per square foot. Although, the building style variable of any building over one story includes one and one-half story buildings, it is concluded that the strong coefficient for that building style must be strongly linked to buildings that are one story or two stories and not one and one-half story buildings.

For site 1 the average building grade, which quantifies the quality of the property from 0 to 4, with 4 being the highest quality, was approximately 1.97. For site 2 the average building grade was 2.31. Therefore the average property in site 1 and site 2 increased in value approximately $33,135 and $38,854, respectively.

The average age of properties less than one mile away from Wal-Mart was 37.65 for site 1 and 16.29 for site 2. The age of the property, which was significant at the 1% level and had a t-statistic value of -6.339, decreased $127.99 for each year of age. Therefore, the average property in site 1 decreased $4,819 and the average property in site 2 decreased $2,085. The age of the property is based on the year of the market value minus the year of construction, so it is the exact age of the property.

The number of bedrooms and bathrooms in the property depended on the site number. The average number of bedrooms for site 1 was three bedrooms, while site 2 had one extra bedroom comparatively. However, site 1 averaged 0.68 bathrooms per bedroom, while site 2 average 0.78 bathrooms per bedroom. Consequently, the average three bedroom property with 0.68 bathrooms per bedroom was valued at $13,455, while an average four bedroom property with 0.78 bathrooms per bedroom was valued at $17,036. Both variables were statistically significant at the 1% level and also had high t-statistics.

Interestingly, an increase from one year to the next had an increase of $6,232. From 1994 to 2004, an 11 year period, the average property increased $68,562 in market value. A t-statistic value of 123.482 is very strong and this variable was significant at the 1% level as well.

The site number, which was given a 0 value for site 1 and a 1 value for site 2, produced a coefficient of $29,273. Therefore a property in site 2 had a significantly higher market value automatically because of its location. It was worth $29,273 more than a property in site 1 because of its location. However, all this concludes the Wal-Mart in site 2 is located in a more affluent area than site 1, but this does not conclude that Wal-Mart positively influenced market values from 1994-2004.

In conclusion, a property located further from the Wal-Mart was valued higher than a property next door to the Wal-Mart store. A property located 0.99 was valued

$10,848 higher than a property located adjacent to the Wal-Mart. It also was significant at the 1% level. Along with the previous regression the larger the property, the larger market value in proportion to the smaller properties. Lot square feet, buildings over 1 story, building grade, number of bedrooms, bathrooms per bedroom, and total basement all produced positive coefficients and were significant at the 1% level.

Market Value of Properties Over One Mile from Wal-Mart

This regression included observations from both site 1 and site 2, and included market values from 1994 to 2004. The number of observations was significantly larger, including 179,248 observations. This represents over 80% of the total observations in site 1 and site 2. The entire table, identified as Table 4.9, is shown on the next page.

The adjusted R^2 value, 0.885, concludes that there is a strong explanatory power to the hedonic linear relationship between the dependent variable, market value, and the independent variables. The Durbin-Watson statistic of 2.241 indicates that autocorrelation has been solved. An extremely high f-statistic of 81,184.9 indicates the significance of the results is very strong.

The average distance away from the Wal-Mart (only properties over one mile away) was 1.63 miles. Therefore, the average property benefited approximately

Market Value of Properties Over One Mile from Wal-Mart

Number of Observations: 179,248

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable Name	Coefficient	T-Statistic	Significance
Constant	-74,405.597	-54.213	***
Distance (miles)	2,731.997	8.104	
Lot Sq. Ft.	0.469	17.743	***
Impr. Use- Duplexes, Condos, Townhouse	-2,193.978	-4.520	***
Impr. Use- Masonry	-37.899	-0.987	
Building Style- over 1 story	24,764.285	59.397	***
Building Style- Bi-level, split level	-433.239	-6.215	***
Building Grade	30,036.010	56.249	***
Age of Property	-92.400	-10.162	***
Bedrooms	3,002.581	18.524	***
Bathrooms per Bedroom	8,620.850	18.334	***
First Floor	45.818	93.878	***
Half Floor	-10.881	-9.209	***
Total Basement	15.100	74.248	***
Finish Basement Percentage	8,637.489	39.558	***
Year	6,964.527	213.727	***
Site Number	21,601.981	52.672	***

KEY STATS

Adjusted R-squared	0.885
Durbin-Watson	2.241
F-statistic	81,184.9

(Table 4.9)

Table Note: If significant at the 10% level, one asterisk' two asterisks for the 5% level; and three asterisks for the 1% level

$273.20 for every tenth of a mile over one mile away. For example, the average property 1.1 miles away increased $3,005.20 from 1994-2004. However, it was determined from the previous regression, a property 0.99 miles away increased in value

approximately $10,848 from 1994-2004. Therefore, a property is worth more money just under one mile away, than it is two miles away.

The average size lot in site 1 over one mile away from the Wal-Mart was 7,873.89 square feet. Consequently, the average increase based on lot square feet was $3,692.85. For site 2, the average property lot size was significantly higher at 16,321.09 square feet. Therefore, the average increase in value for the ten year period was $7,654.59, which is more than double the value in site 1.

Once again, compared to the first and second regressions, a property considered a duplex, condominium, or a townhouse was a negative effect on property values. This amounted to a decrease of $2,194, which was also significant at the 1% level. However, compared to the analysis for less than 1 mile, masonry was a negative, although it was not significant.

The average age of properties over one mile in site 1 was 37 years old and 16 years old in site 2. The age was established by the difference of year of construction and the year of the market value. Obviously site 1 is a more established area and site 2 has newer properties.

The site number produced a coefficient of $21,601.981, which was significant at the 1% level, also had a t-statistic of 52.67. A property in site 2 was worth $21,601 more than a property with the same attributes in site 1. This value is less than the

coefficient in the previous regression, which was $29,273 for a property located in site 2.

Therefore, a property was valued more if it was close to one mile away versus right next to the Wal-Mart. However, a property located close to two miles away did not increase in value as much as a property located just below one mile away. Age of the property had more of an effect on properties located less than one mile away. The average age of the two sites changed very little for properties less than one mile away and over one mile away. The coefficient values differed by over $32,000, which is a large difference in a ten year study. Both were significant at the 1% level as well.

CHAPTER 5

CONCLUSION

During the 1990s and early part of this decade house prices reached record levels and demand was at an all-time high. Mortgage rates were at prime levels, so it was easier for homeowners to afford a larger house than they would be able to normally. Along with record prices during this time period, massive housing projects, planned communities and renovations of current structures were completed. To compensate for the growth in residential properties, commercial properties were built surrounding these communities to provide the new housing growth with goods and services. Stores such as Wal-Mart opened supercenters at alarming rates.

This study was aimed to examine the effects of a Wal-Mart store on residential single family property values. Over the ten year period, property values increased both nationally and locally, so it was not surprising that the market values of the properties in the data increased as well. However, when examining certain independent variables, certain aspects of a property increased the market value more than others.

Distance from the Wal-Mart store was an aspect that was very critical in the success of this study. It is concluded that property values are increased the farther it is located from a Wal-Mart store. However, at a certain distance, one mile in this study, it

is perceived to be too far from Wal-Mart, and market values do not increase at the same rate.

The negative effects such as traffic, pollution (car and light) can damage the market value of a single family residential property when it is located right near the Wal-Mart. However, being too far away from a retail site, such as Wal-Mart has a negative effect on property values as well. Consumers like to be near a large retail site that can provide them with any type of goods they can imagine. However, living next to the site or living too far away has a negative effect on their property values.

My hypothesis proved to be wrong because I thought property values would decrease within one mile from the Wal-Mart then increase again. Property values increased for every property, but the rate at which they increased varied, especially in distance.

In conclusion, Wal-Mart cannot be directly linked to the increase in market values from 1994 to 2004. However, it can be concluded that a property of the same attributes has a higher market value further away from a Wal-Mart store than it would right next to the store. However, one mile away is an adequate distance from the retail site and is also the location of the maximum value of the property, if comparing a property of similar attributes.

For site 1, which also compared the change in market value from 1995 to 1997, it cannot be concluded that Wal-Mart alone decreased or increased market values over the three year period. The period was a period of high commercial and residential

growth and many other factors could have contributed to the increased change in market values.

Future Research

There were several problems with the data and the data analysis that were unsolvable for many reasons. In the previous research, spatial autocorrelation was a problem in almost every study using geographical data. Spatial autocorrelation is an evaluation of the "correlation of a variable in reference to spatial location of the variable"[1], which means it is the relationship of a variable to itself. It measures the level and strength of interdependence between the variables. In this study, it also proved to be a problem, but in the interest of time it could not be corrected.

Another problem with the data that could have impacted the data over a longer time period was market values did not change from year to year. In the data set provided, for example, market values did not change from 1994 to 1995 and from 1996 to 1997. This could be from an error in the mass assessment system or possibly properties were not assessed every year.

Previous research has focused on using sale prices as the dependent variable, rather than the market value. Although the data contained thousands of properties, some properties did not complete a sale in the ten year period. If this study had been over a

[1] Natural Resources Canada. http://www.pfc.forestry.ca/profiles/wulder/mvstats/spatial_e.html

longer period of time, in theory more properties would have been included in the data set. However, the time period in this study was too short to include a large and comprehensive data set of property sale prices.

The location of Colorado Springs, Colorado was the chosen as the focus city in this study because of the author's familiarity with the locations of the Wal-Mart stores and also because of the ease of data collection. The El Paso County Assessors Office provided data at no cost and was very helpful in explaining the data. The data were very detailed and complete in all aspects of collection. Ideally, using more cities in different areas of the country and different size cities would be more beneficial. Using a control site that did not include a Wal-Mart or large retail site would also help the validity of the analysis, as this would control for any spike in prices because of another local issue.

Future research would also study different lengths of time. A ten year data set, although it may appear large, is not large enough for a complete analysis. Combing a longer time period, more sites, a control site and more independent variables would be an ideal study in the future. Analysis would be more in-depth and the findings might be more significant. One problem with increasing the time length is the availability of a detailed data set. Electronic data only has been produced for the last ten to fifteen years with the latter not providing comprehensive, quality data that is available today. The age of technology has greatly increased our accuracy in providing precise property attributes that might of varied fifteen years ago.

Commercial property data was not included in this study because of a variety of factors. First, it was extremely difficult to "match" the data in ARC Map, using the U.S. Streets 2000 software. The software only included roads and highways built before the year 2000. For both sites, many roads and new properties have been constructed during the real estate boom of the late 1990s and through the first half of this decade. The real estate bubble subsided in 2004 and is currently still in decline.

Secondly, when a property is "matched" it corresponds to an exact address on the map. Many commercial properties, because they are sometimes much larger than residential properties, have multiple addresses or include a range of addresses, such as 1000-1010 N. Cascade. Therefore it was extremely difficult to "match" these properties with a specific address. There must be a way to "match" these properties with a single number address through a different software program. It is seemingly impossible to go through thousands of commercial properties to locate a single address.

Commercial property and residential property would be interesting to compare because of the difference in use. In theory, residential properties would be against a Wal-Mart store residing right next to their property. However, a commercial property might value a Wal-Mart store next door. Increased traffic and more visibility would increase business to the commercial property. However, although a commercial property might increases sales because of the Wal-Mart next door, assuming they are

not competing with Wal-Mart, it cannot be concluded that the value of the commercial property would increase or decrease.

The El Paso County Assessors Office provided the data for this study, including market values and assessed values for each property and year. Assessed values were much lower than market values and did not represent the actual value of the property. Assessed values, which are usually conducted by a mass assessing system, are placed on a property for tax purposes. A property owner pays taxes only on the assessed value of the property and not the market value of a property.

In this study, one distance was used to separate the properties, which was the one mile mark. In a future study, using more distance limits such as a tenth of a mile would be more useful. The distance would become more significant in certain areas and finding the exact distance for prime location and a high increase in market value would be easier.

In conclusion, this study did prove that a property located further from a large retail site, Wal-Mart, is worth more than a property located extremely close to a large retail site. Consumers have the right to be concerned when a large retail site is built in their area because, depending on their distance from the site, it may increase or decrease their market value and profit accordingly.

APPENDIX A

CORRELATION TABLES

	MARKET_VALUE	DIS_MILES	SQFT	IMPUSEACT	IMPUSEM	BLDGSTY122	BLDGSTYBBST
MARKET_VALUE	1.000	0.189	0.398	-0.078	-0.001	0.395	-0.029
DIS_MILES	0.189	1.000	0.040	0.035	0.004	0.106	0.042
SQFT	0.398	0.040	1.000	-0.145	0.042	0.068	0.004
IMPUSEACT	-0.078	0.035	-0.145	1.000	-0.116	-0.115	-0.160
IMPUSEM	-0.001	0.004	0.042	-0.116	1.000	-0.118	-0.065
BLDGSTY122	0.395	0.106	0.068	-0.115	-0.118	1.000	-0.231
BLDGSTYBBST	-0.029	0.042	0.004	-0.160	-0.065	-0.231	1.000
BLDGRADE	0.645	0.125	0.228	0.057	-0.083	0.412	-0.089
AGE	-0.339	-0.031	-0.067	-0.260	0.154	-0.323	-0.096
BDROOMS	0.535	0.122	0.185	-0.166	0.089	0.294	0.125
BTHROOMS	0.601	0.176	0.184	0.092	0.015	0.418	0.098
FRSTFLR	0.596	0.128	0.398	-0.203	0.160	-0.013	0.018
HLFFLR	0.007	0.057	0.007	-0.025	-0.008	0.215	-0.051
TOTBSMT	0.526	0.121	0.224	-0.143	0.162	0.048	0.075
FINSHARE	0.207	0.018	0.052	-0.135	0.078	-0.070	0.354
YEAR	0.409	0.014	0.005	0.019	-0.011	0.027	-0.017
SITENUMBER	0.541	0.141	0.238	0.153	-0.199	0.400	0.024

	BLDGRADE	AGE	BDROOMS	BTHROOMS	FRSTFLR	HLFFLR	TOTBSMT	FINSHARE	YEAR	SITENUM
MARKET_VALUE	0.645	-0.339	0.535	0.601	0.596	0.007	0.526	0.207	0.409	0.541
DIS_MILES	0.125	-0.031	0.122	0.176	0.128	0.057	0.121	0.018	0.014	0.141
SQFT	0.228	-0.067	0.185	0.184	0.398	0.007	0.224	0.052	0.005	0.238
IMPUSEACT	0.057	-0.260	-0.166	0.092	-0.203	-0.025	-0.143	-0.135	0.019	0.153
IMPUSEM	-0.083	0.154	0.089	0.015	0.160	-0.008	0.162	0.078	-0.011	-0.199
BLDGSTY122	0.412	-0.323	0.294	0.418	-0.013	0.215	0.048	-0.070	0.027	0.400
BLDGSTYBBST	-0.089	-0.096	0.125	0.098	0.018	-0.051	0.075	0.354	-0.017	0.024
BLDGRADE	1.000	-0.450	0.382	0.486	0.403	-0.020	0.366	0.079	0.038	0.501
AGE	-0.450	1.000	-0.341	-0.512	-0.103	0.189	-0.235	-0.139	0.126	-0.590
BDROOMS	0.382	-0.341	1.000	0.610	0.455	0.016	0.542	0.494	0.017	0.334
BTHROOMS	0.486	-0.512	0.610	1.000	0.366	-0.018	0.460	0.376	0.031	0.499
FRSTFLR	0.403	-0.103	0.455	0.366	1.000	-0.008	0.440	0.083	0.017	0.218
HLFFLR	-0.020	0.189	0.016	-0.018	-0.008	1.000	-0.031	-0.059	-0.001	-0.044
TOTBSMT	0.366	-0.235	0.542	0.460	0.440	-0.031	1.000	0.482	0.023	0.217
FINSHARE	0.079	-0.139	0.494	0.376	0.083	-0.059	0.482	1.000	-0.007	0.072
YEAR	0.038	0.126	0.017	0.031	0.017	-0.001	0.023	-0.007	1.000	0.021
SITENUMBER	0.501	-0.590	0.334	0.499	0.218	-0.044	0.217	0.072	0.021	1.000

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