A HEDONIC MODEL FOR

OFF-CAMPUS STUDENT HOUSING:

THE VALUE OF LOCATION, LOCATION, LOCATION

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ABSTRACT

THESIS: A Hedonic Model for Off-Campus Student Housing: The Value of Location, Location, Location

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This study presents a hedonic model for off-campus student housing, using a semi-logarithmic model, with the natural log of unit rent as the dependent variable. Implicit values for select structural and locational characteristics were estimated, with a special emphasis on the variable of proximity to campus. Variable data for off-campus student housing in six university markets was collected. The results indicate a nonlinear relationship between rent and distance from the academic center of campus. Within one mile of campus, there is a significant premium for proximity, but between one and four miles from campus, the marginal value levels off before decreasing again beyond the four mile mark. The premium for being within one mile of campus ranged from 16.3% to 17%, and the discount for being outside four miles from campus equaled 13%. Other noteworthy characteristics and coefficients include the marginal value of an additional bedroom with a positive coefficient of roughly 21% and the inclusion of internet and cable with a premium of 12.4% to 15%.

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CHAPTER 1

INTRODUCTION

Housing exists in multiple forms. Detached single-family houses, apartments, townhomes, condos, flats, manufactured houses, prefabricated houses, barracks, dormitories, cooperatives, cabins, and assisted living facilities are just a few of the many housing options consumers have to choose from in today's diverse society. The characteristics and perceived benefits of these options dictate their value to the consumer. For example, the number of bedrooms in a house, the age of an apartment, or how close a cabin is to a desirable body of water impacts the perceived utility, and therefore the monetary value of the property.

What if one wanted to know the worth of each characteristic? What is the marginal contribution of an additional bedroom? How much does one year of age increase or decrease the value? If the same cabin is 50 feet, 1,000 feet, or 3 miles from the lake, how does the value change? Sirmans, Macpherson, and Zietz (2005) state that, "Hedonic regression analysis is typically used to estimate the marginal contribution of these individual characteristics" (p. 3). The hedonic model assumes that consumers attach certain values to characteristics based on a derived utility for them, so that price equals a function of the attributes (Rosen, 1974).

When the consumer's mindset varies, do the implicit values change as well? Do those looking for residential housing (long-term mindset) value characteristics differently than those seeking more transient housing (short-term mindset)? Previous research indicates that the answer is "yes." Regression models for single-family houses, apartments, and vacation rentals indicate differing coefficient values for the attributes that comprise the housing option (see Sirmans et al., 2005; Sirmans & Macpherson, 2003; Nelson, 2009; Guntermann & Norrbin, 1987; and Jaffe & Bussa, 1977 for some examples).

Like vacation rentals, privately owned off-campus student housing is a more transient accomodation (to be explained further in the following section). Thus, the results of a hedonic regression model should indicate unique coefficients for this multifamily submarket. This study will use the hedonic pricing model to analyze off-campus student housing in six college markets and estimate the marginal contribution of the characteristics offered. A special emphasis will be placed on the locational attribute of proximity to the campus.

Research Problem

When most people think of student housing, they are inclined to think of on-campus dormitories or residence halls. However, according to the National Center for Education Statistics, in 2007-08, only 14.2% of undergraduate students lived on campus, while 54.0% lived in off-campus housing (U.S. Department of Education, 2007-08). With nearly 21 million students enrolled in the fall of 2009, serving the off-campus population (which includes over 11 million students) has created a strong niche market in the multifamily housing industry that is sure to continue benefiting from projected enrollment trends (Knapp, Kelly-Reid, & Ginder, 2011, Table 1). Additionally, the resilience of the student housing market during the recent recession, coupled with increased consolidation and sophistication of the often regional and fractured business, has many investment players interested in this real estate niche (Apartment Realty Advisors, 2010).

From a physical standpoint, student housing shares many of the same characteristics with residential housing options. Both are heterogeneous goods that typically offer a bundle of bedrooms, bathrooms, square footage, a physical and relative location, and potentially a set of community amenities (i.e. a swimming pool, fitness center, and/or a business center). However, there are three distinct differences between student housing and residential properties: (1) certain physical features/services, (2) the leasing and management process, and (3) the way in which the characteristics are perceived.

Features and services -- Because student housing caters to a specific market, it should not be surprising that certain features and services are offered that are not seen at most traditional communities. Some of these features include private bathrooms connected to every bedroom (multiple master suites), high occurrences of furnished units and utilities included in the rent, roommate matching programs, and shuttle/bus services to and from campus (Preiss, 2010).

Leasing and management -- The leasing and management of student housing communities can vary greatly from residential multifamily management. While a traditional community might experience a small percent of resident turnover each month, student housing sees a mass exodus of residents, up to 70%, in the months of May and July. Similarly, residential communities are typically leasing to fill vacancy for a 30-60 day window, while student housing generally leases year round signing residents to a waiting list to be moved-in in August – coinciding with the beginning of the school year. While managers of traditional housing are likely to adjust their rents and renewal amounts on a monthly basis, student housing managers usually develop more annual strategies (Preiss, 2010).

Due to the commonality of roommate situations, many communities offer individual leases (by-the-bed) as opposed to a joint lease (Preiss, 2010). Individual leases allow each roommate to be contractually responsible for their own bedroom and a portion of the common areas. Students then rent by the bedroom, not the apartment as a singular unit. When students do not have enough roommates to fill a unit, a roommate matching program is typically in place to fill the vacant bedrooms. Individual leases are popular among students and co-signing parents, compared to a joint lease, because of the limited contractual responsibility. With a joint lease, each roommate (and co-signer) is legally responsible for the adherence of the entire lease for the entire apartment. So, if a roommate fails to pay rent or skips town, the remaining parties are still responsible for the entire rent amount.

Perceptions -- While residential housing tailors to a wide range of residents -- from young professionals, to families, and elderly -- student housing targets a much more concentrated market of consumers. The overwhelming majority of residents at student housing communities is between 18-24 years of age and chooses to live at the property because they are students at a nearby university. The lifestyle priorities of this more concentrated age group may indicate stronger perceived value for certain amenities. For example, interviews with property managers suggested that 80-90% of students take advantage of their access to high-speed internet, compared to just 22% of all U.S. households with a high-speed account (National Multi Housing Council, 2004).

When location is analyzed as a perceived benefit or weakness, it is relative to the lifestyle priorities of the prospective occupant. For example, the location may be close to work for one individual but not another. The housing option may be in a good school district, but if the residents do not have any children, the perceived benefit will be lower than a family with young children (Sirmans et al., 2005).

Hypotheses

Students spend a good portion of their time on-campus, and because of commuting costs and convenience factors it can be hypothesized that the lifestyle priority of a student would be to live in a location that is close to campus (Preiss, 2010; Kashian, 2009; Guntermann & Norrbin, 1987; Jaffe & Bussa, 1977). Therefore the perceived benefit of location, in regard to its proximity to campus, should decline as distance from the university increases.

Multiple studies have been conducted to analyze how individual characteristics contribute to pricing for single-family houses, but little has been studied about apartment communities, and even less has specifically addressed off-campus student housing (See Sirmans et al., 2005 for a review of recent single-family house studies; see Sirmans & Benjamin, 1991 for a review of rental studies; and see Kashian, 2009; Guntermann & Norrbin, 1987; Jaffe & Bussa, 1977; and Ogur, 1973 for student housing-related studies) It is also hypothesized that students will value certain housing characteristics – namely bedrooms and technology – differently than other residents in previous studies.

Rationale

Today's college student population is a sampling of the 75 million "Echo Boomers" that were born between 1976 and 1994, creating demand and making student housing one of the apartment industry's most enticing niche opportunities (NMHC, 2004). Each year, investors and developers pour millions of dollars into building and/or acquiring privately owned student housing. In 2010, over $1 billion was spent on student housing transactions, and cap rates – a common measure for valuation, for which a lower percentage indicates a stronger value – fell from 7% to 6% (ARA, 2010).

Publicly traded student housing management companies, like Education Realty Trust (EDR) and American Campus Communities (ACC), have conducted multiple billions of dollars' worth of transactions over the last 15 years. The lack of off-campus student housing research makes assessing these opportunities unnecessarily challenging. The National Multi Housing Council (NMHC) states, "For years, off-campus student housing lenders and investors have been challenged by a relative lack of industry data. While operating benchmarks are plentiful for the conventional apartment industry, little is available for firms trying to evaluate student housing investment opportunities" (NMHC, 2010, para. 1).

Several trends point to a promising future for student housing. Ted Rollins, owner of Campus Crest (a publicly traded student housing company), notes that college enrollment is up, current occupancies are high, more foreigners are enrolling in U.S. universities, students are taking longer to graduate, and budget cuts are causing states to turn to private developers for adequate student housing (Real Estate Journal Online, 2011). Additionally, a 2009 study by the NMHC examined 2003, 2008, and 2009 college application data for 63 universities, and found that student housing is "recession-resistant" (Tucker, 2009). Postsecondary education continues to be a popular and demanded trend. Institutional Project Management (IPM) states that, "15 million additional degreed workers will be needed nationwide through 2012 to replace retiring Baby Boomers, and this should further stimulate demand for higher education and, in turn, student housing (IPM, 2009, para. 1). As student housing developers and management companies continue to build and acquire assets to meet the current and projected demand, more research regarding this niche market will be valued to assess investment opportunities.

Definitions

Off-Campus Student Housing – When used in this paper, off-campus student housing refers to apartments and townhomes, not financially affiliated with a university or subsidized in anyway, that have a resident mix composed of 90% or more students.

Apartment – When used in this paper, an apartment refers to an attached, single-level housing unit, also known as a flat.

Townhome – When used in this paper, a townhome refers to an attached, multi-level housing unit.

Unit Rent – For this study, rent or unit rent refers to the total monthly amount charged for the entire unit, based on a twelve-month lease. Many student communities charge by-the-bed, but the rent referenced in this paper is the summation of rent for every bedroom in the unit. For example, a three-bedroom unit at $300 per bed would have a unit rent of $900.

Furnished – An apartment or townhome is considered furnished if unattached items like chairs, a table, a couch, beds, or televisions are provided by the management company and included in the rent.

Residential Housing – For this paper, residential housing refers to a primary residence with the purchase being to live there long-term (more than five years). Residential housing could be in attached, detached, single-, or multifamily structures that are either rented or owned.

Transient Housing – For this paper, transient housing refers to short term housing, typically meant to serve a specific purpose. Transient housing could be in attached, detached, single-, or multifamily structures, and is typically rented.

Hedonic Regression – A group of differentiated products can be described by the characteristics that compose it. A hedonic regression is used to observe the implicit or "hedonic" prices associated with specific amounts of the characteristics (Rosen, 1974).

Academic Center of Campus – The academic centers of campus were used as anchors for the distance measurements in this study. The academic center was subjectively determined by Ken Danter of The Danter Company as the area with the highest concentration of classroom buildings and/or the student library.

Summary

The intent of this quantitative study is to evaluate the marginal contribution of the individual characteristics that comprise off-campus student housing properties with a special emphasis on the variable of proximity to the academic center of campus. In the study, variable data for off-campus student housing in six college markets was collected and analyzed using a hedonic regression model to single out marginal contributions.

The remainder of this paper will progress as follows: Chapter 2 (Review of Literature) will discuss previous studies and findings regarding hedonic valuation of physical and locational characteristics for residential and transient housing, as well as review student housing and previous studies involving a university market. The means for collecting and analyzing the data for this study will be outlined in Chapter 3 (Methods). Chapter 4 (Results) will review the outcomes and findings of the research, while Chapter 5 (Discussion) will discuss the findings and compare them to previous studies. Conclusions, limitations from the study, and recommendations for future research will be briefly discussed in Chapter 6 (Conclusions and Recommendations).

CHAPTER 2

REVIEW OF THE LITERATURE

The review of the literature is designed to provide a brief background on the hedonic model, discuss previous uses of the hedonic model for housing amenities and locational attributes, and review previous studies that focus directly on student housing or a university market. The review will cover studies for both owned and rented housing, as well as residential and more transient options.

The Hedonic Model

The hedonic model is based on the hedonic hypothesis that goods are valued for their utility (Rosen, 1974). Utility is either perceived or actual, and is objectively measured by its attributes. Using this hypothesis, Rosen states, "A class of differentiated products is completely described by a vector of objectively measured characteristics" (p. 34). In other words, the price of the whole, $p(z)$, is a function of its characteristics.

$$p(z) = f(\text{characteristics}_z)$$

By regressing the prices of differentiated products on their characteristics, we can estimate a set of implicit or "hedonic" prices. The hedonic model can then be used to "clarify the meaning and interpretation of estimated implicit prices" and "identify the underlying structural parameters of interest" (Rosen, 1974, p.35).

Hedonic Models and Pricing Housing Amenities

Housing is a heterogeneous good, composed of a bundle of characteristics – both structural and locational (Sirmans et al., 2005). Structural characteristics would include features like the number of bedrooms, total square footage, construction quality, interior finishes, age, etc. Locational characteristics involve the relationship between the housing unit and its surrounding environment. Locational characteristics could include proximity to commercial amenities or points of interest, the quality of the neighborhood, employment opportunities, or the school district and quality of schooling options.

The hedonic model has been used to determine the effect of individual characteristics as they pertain to the price of housing. Sirmans and Macpherson's (2003) research, titled "The Value of Housing Characteristics," is one of many studies that has looked at the implicit value of single-family housing characteristics. Some of their conclusions indicated that in the Philadelphia area, each additional bathroom adds about 24% to the selling price, fireplaces add about 12%, flat roofs sell for about 10% less than pitched roofs, and central air adds about 12% to the price (pp.2-3; see also Sirmans et al., 2005). Research pertaining to rental units also indicates implicit values with positive and significant coefficients for bedrooms, fireplaces, and bathrooms. Additionally, multifamily research also addresses significant values for community amenities and utilities, like electricity, being included in the rent (Guntermann & Norrbin, 1987; Sirmans, Sirmans, & Benjamin, 1989; Sirmans & Benjamin, 1991).

A hedonic study for weekly vacation rental houses by Nelson (2009) resulted in some different and interesting conclusions. For weekly rentals, additional bedrooms added between 7.2% and 10.34% to the rental price compared to only 4% for the

Philadelphia residential housing study. Additionally, bathrooms only contributed a marginal increase of 6-7%, much lower than the 24% figure above (p. 22).

The variance in pricing indicates an alternative mindset, or differing consumption interests. Consumers of long-term housing may be more apt to carefully select (demand) specific comforts of "home." They may be more willing to pay for an amenity that they will use daily for a long period of time such as an extra bathroom. When selecting more transient housing options like a weekly vacation rental, consumer interests may shift to other characteristics that better suit a short-term stay. For example, Nelson (2009) indicates that consumers are willing to pay more for an extra bedroom than an extra bathroom. This could be indicative of the way that the housing will be utilized, potentially suggesting higher instances of crowding or roommate situations with vacation rentals.

Hedonic Models and Pricing Residential Proximity and Location

Hedonic models have also been conducted to measure the locational characteristics of housing. Like structural characteristics, locational attributes can either add to or subtract from the value of the housing option.

A number of locational studies have been conducted for single-family housing. Some examples include the impact of proximity to churches on houses prices (Babawale, 2011); historic districts on residential property values (Coffin, 1989); location on water and water views (Sirmans & Macpherson, 2003; Bond, Seiler, & Seiler, 2002); proximity to a golf course (Sirmans & Macpherson, 2003; Pompe & Rinehart, 2002); proximity to rail transit stations (Bowes & Ihlanfeldt, 2001); magnet schools and school quality

(Walden, 1990); and even the price effects of landfills on house values (Nelson, Genereux, & Genereux, 1992). Some significant coefficients include premiums for golf course proximity and "good views" of 8% and 5-15% respectively, and discounts of 6-12% for close proximity to a landfill. See Sirmans et al. (2005) for a more complete collection of locational studies.

In Nelson's (2009) research on weekly vacation rentals, more significant premiums were found for locational attributes. Lakefront locations carried rental premiums of 43-44% in the summer and 20-22% in the winter. Rentals with ski-slope access saw premiums of 22-27% in the winter (p. 14). As mentioned earlier with structural amenities, it is apparent that transient housing decisions are subject to unique consumer interests, and that locational characteristics are an important piece of that demand. In Nelson's (2009) study, the large premiums indicate that vacationers rent these houses for a particular reason -- to be by the lake or the ski-slopes.

Student Housing and University Markets

The need for student housing can be traced back to the Middle Ages when large influxes of students would reside in traditionally small towns, demanding housing that did not exist. As a result, some students resorted to living in tents, fields, or in the sides of hills -- "In time, students moved from living with schoolmasters and townspeople to rented houses that became known as '*hostels*' in Bologna, '*paedagogies*' in Paris, '*halls*' or '*colleges*' at Oxford, and '*Bursen*' at German universities" (Blimling, 2003, p. 23). When the United States was founded and the first colleges were established, the academic influencers followed the English model seen at Cambridge and Oxford which offered some on-campus, university-owned residential facilities (Blimling, 2003).

While some universities strive to maintain a residential campus, only 14.2% of students lived on-campus in 2007-2008. (U.S. DOE, 2007-08). Alternatively, 54.0% of students lived in some form of off-campus housing, not including those that lived with relatives. With college enrollment more than doubling from 1970 to 2009 (8.6 million to 21 million students) and future projections remaining strong, private investment in off-campus student housing has become more commonly recognized and praised for the opportunities it presents (U.S. DOE, 2009, Table 190; Knapp et al, 2011, Table 1; Preiss, 2010; Real Estate Journal Online, 2011; Institute of Real Estate Management, 2011; Tucker, 2009).

Kirk Preiss, president and CFO of The Preiss Company, notes that a combination of decreasing dorm capacity, increasing enrollment, and changes in student values, "…caused the advent of purpose-built and purpose-managed off-campus student housing" (Preiss, 2010). Built and sometimes operated more like resorts than apartment communities, the new product often offers lavish swimming pools, private bathrooms for every bedroom, and high-speed internet. Some of today's students are paying over $500 a month per bedroom for their college housing. Additionally, national conferences are being held to connect student housing providers and offer educational opportunities. Such conferences are currently being held by the National Apartment Association (NAA), the National Multi Housing Council (NMHC), and InterFace Conference Group. The introduction of student housing-specific publications and websites are also increasing in popularity.

While the research is limited, the affect that a university can have on the local housing market has not gone completely unnoticed in the academic world. Ogur (1973) considered how institutes of higher education influenced housing markets. Using census data from the 1950s and 60s, Ogur concluded that, "…the presence of colleges and universities causes rents to be higher than otherwise" (p. 391). Using the theory that "…land values should decline as distance increases from central points," Jaffe and Bussa (1977) conducted a study of students attending the University of Illinois with the central focal point being the center of campus (p. 8). Their simple model, comparing adjusted rent per square foot and distance from campus, indicated a downward sloping relationship and confirmed that a university campus can be an effective focal point.

Guntermann and Norrbin (1987) conducted a study of apartment rents in Phoenix, Arizona. A section of their study focused on apartments within two miles of Arizona State University. The authors hypothesized that because of the unique values that students have in regard to their housing, "certain variables might be expected a priori to be either more or less important in explaining variations in apartment rents for the university submarket" (p. 333). They expected common area amenities, extra-bath, and extra-bedroom variables to be valued higher and the condition variable to be valued lower due to the students' preference for close proximity to campus and willingness to compromise for it. Their regression results confirmed their expectations for common area amenities and the extra-bedroom variable, but the extra-bathroom variable was found insignificant and the coefficient for condition was valued at 6% and significant at the .05 level, disproving their original expectations.

In 2009, a student off-campus housing survey was administered at the University of Wisconsin-Whitewater (Kashian, 2009). The survey was completed by 543 students, and while the data is only descriptive of one market, it provides insight into off-campus student housing as a whole. Some interesting results from the study indicate that

- 85% of off-campus respondents lived within four blocks of campus;
- 64.6% lived in an apartment;
- 83.4% lived with at least one roommate;
- only 35% indicated that they would be living in the same place the following year;
- internet and water were included in the rent at 70.5% and 94.3% of the properties respectively; and
- 86.9% indicated that they have a private bedroom.

Summary

A number of hedonic studies have been conducted for residential housing, but the research is lacking for the unique market of off-campus student housing. As the limited information suggests, off-campus student housing presents consumers and consumer mindsets that are likely to value housing differently than what has been studied so far. Like vacation rentals, student housing is a more transient accommodation. Students generally have an expected time-frame for residence that matches their academic status, and share a locational point-of-interest -- campus. The number of roommate situations in student housing is significantly higher than the average market, indicating the social and financial consciousness of this population (Kashian, 2009). Like vacation rentals, they may often compromise privacy or comfort for lesser rents or increased locational attributes (i.e. living within walking distance to campus). Therefore, the consumer interests of this population may reflect unique implicit values for the characteristics of student housing.

CHAPTER 3

METHODS

Under the hypothesis that student consumers of off-campus housing have a unique mindset – a shared interest in campus (a focal point), extremely high instances of crowding (roommates), and are more transient than traditional residential housing (higher turnover and short-term expectancies) – it can be suggested that the results of a hedonic regression model should offer implicit values unique to this niche market. This chapter will explain the methods used to gather and regress the data for an off-campus student housing hedonic model, with an emphasis on proximity to campus. This includes the selection and size of the student housing sample, a description of the variables to be tested, the methods for data collection and analysis.

Sample Selection and Size

The data for this research is a mix of primary data collected by the author and secondary data provided by Ken Danter of The Danter Company, a real estate research company based out of Columbus, OH. The research sample consists of six college markets that Danter has worked with and gathered variable data for in the past. Table 1 displays the six markets along with some characteristics of the universities. The sample size represents a broad range of geographical locations, enrollment figures, and in-state, undergraduate tuition costs.

From the six markets, data was collected for 97 properties, with a total of 288 floor plans (unique entries). Table 2 displays the allotment of communities and floor plans for each market. It should be noted that the number of properties represents the number used in this study, not the total number of properties for that market.

Table 1 – University Statistics

University/College Market	State	Fall 2009 Total Enrollment	2010-2011 UG In-State Tuition
James Madison University	VA	18,971	$7,860
Grand Valley State University	MI	24,408	$9,088
Florida State University	FL	39,785	$5,238
Texas A&M University	TX	48,702	$8,387
North Carolina State University	NC	33,819	$6,529
University of Arizona	AZ	38,767	$8,237

Source: U.S. Department of Education, National Center for Education Statistics, College Navigator.

Table 2 – Data Contribution by Markets

University/College Market	# of Properties	# of Floor Plans/Entries
James Madison University	12	17
Grand Valley State University	10	23
Florida State University	37	104
Texas A&M University	16	76
North Carolina State University	12	30
University of Arizona	10	39
Total:	97	288

Variables

In an attempt to produce a highly descriptive model, data was gathered for thirty-nine variables or variations of variables. Hedonic equations are often estimated with either linear or semi-logarithmic models. As Sirmans et al. (2005) explains, "A complication [with linear models] is that these values are not likely to be the same for all price ranges…For this reason, the hedonic pricing model is often estimated in semi-log form with the natural log of price used as the dependent variable" (p. 4). For this study,

Table 3 - Initial Study Variables and Descriptions

Variables	Descriptions
UNITRENT*	The monthly rental rate per unit based on a 12-month lease (ex. If the rent is $300 per person/bed, UNITRENT would equal $600 for a two-bedroom or $900 for a three-bedroom)
DISTANCE*	The distance, in miles, from the housing option to the academic center of campus.
DISTANCE1PLUS	Binary variable: If DISTANCE is greater than 1 mile = 1, if not = 0
DISTANCE4PLUS	Binary variable: If DISTANCE is more than 4 miles = 1, if not = 0
BED*	The number of bedrooms per rental unit.
BATH	The number of bathrooms per rental unit
SQFT	The total square footage for the rental unit
FURN	Binary variable: If the UNITRENT includes furnished = 1, if not = 0
WAT	Binary variable: If the UNITRENT includes water = 1, if water is billed separately = 0
SEW	Binary variable: If the UNITRENT includes sewage = 1, if sewage is billed separately = 0
TRASH	Binary variable: If the UNITRENT includes trash = 1, if trash is billed separately = 0
ELEC	Binary variable: If the UNITRENT includes electric = 1, if electric is billed separately = 0
CABLE	Binary variable: If the UNITRENT includes cable = 1, if cable is billed separately = 0
INT	Binary variable: If the UNITRENT includes internet = 1, if internet is billed separately = 0
APT_TOWN	Binary variable: If the housing option is an apartment = 1, if it is a townhome = 0
OCC*	The occupancy percentage for the 2010/2011 school year.
AGE*	The age of the housing option as of 2010.
UNITS*	The total number of units at the property/community (ex. a 230 unit complex/community).
UNITCOMP*	The comparability factor for the unit amenities. This figure is a weighted analysis of the following amenities: refrigerator, range, microwave, dishwasher, disposal, air conditioning, washer/dryer, washer/dryer connections, carpet, window coverings, fireplace, intercom security, balcony/patio, carport, garage, basement, ceiling fan, vaulted ceilings, and security system.
COMCOMP*	The comparability factor for the community amenities. This figure is a weighted analysis of the following amenities: pool, common building, sauna, hot tub, exercise room, tennis courts, playground, sports court, jog/bike trail, lake, picnic area, laundry facility, security gate, on-site management, and elevator.
AESTHCOMP*	The comparability factor for the general aesthetics/quality of the housing option. Using a scale of one to ten, this is a subjective analysis of areas such as landscaping, entryways, condition of the property, etc.
TOTALCOMP*	The summation of the unit, community, and aesthetic comparability factors.
IS_TUITION	In-state tuition for the 2010/2011 school year at the university for which the housing serves.
R_AND_B	Room and board for the 2010/2011 school year at the university for which the housing serves.
ENROLL	Total on-campus enrollment for the 2010/2011 school year at the university for which the housing serves.
CITY_POP	The population for the city that appears in the university's mailing address.
CITY_AREA	The land area, in square miles, of the city that appears in the university mailing address.
CITY_DEN	The population density per square mile for the city that appears in the university's mailing address (CITY_POP ÷ CITY_AREA)
CITY_STU_DEN	The enrollment number of students per square mile for the city that appears in the university's mailing address (ENROLL ÷ CITY_AREA).
CITY_PER_CAP	The 2009 per capita income for the city that appears in the university's mailing address.
CITY_UNITS	The total number of housing units in the city that appears in the university's mailing address.
CITY_PER_RENTERS	The percentage of renting households in the city that appears in the university's mailing address.
COUNT_POP	The total population of the university's county.
COUNT_AREA	The land area, in square miles, of the university's county.
COUNT_DEN	The population density per square mile for the university's county.
COUNT_STU_DEN	The enrollment number of students per square mile for the university's county.
COUNT_PER_CAP	The 2009 per capita income for the university's county.
COUNT_UNITS	The total number of housing units in the university's county.
COUNT_PER_RENTERS	The percentage of renting households in the university's county.

* denotes the variables that were provided by The Danter Company.

the natural log of UNITRENT was used as the dependent variable. This allowed coefficients to be explained as more accurate percentages rather than specific monetary values.

Independent variables for the study included structural characteristics like the number of bedrooms, bathrooms, and age; features like utilities or furnished units included in the rent; comparability indices for unit amenities, community amenities, and quality; market variables like city per capita income and density, campus enrollment, and the percent of renters in the county; and locational variables like distance from the center of campus and binary variables for different distance rings (i.e. more than four miles from the center of campus). For a complete listing and description of the original variables, see Table 3.

Methods for Collecting the Data

The data collected for this study is a mix of primary and secondary data. Primary data collection for housing characteristics includes the following variables: BATH, SQFT, FURN, WAT, SEW, TRASH, ELEC, CABLE, INT, and APT_TOWN. This data was collected in the spring of 2011 using a combination of internet research via each property's website and direct telephone conversations with the leasing staff. All of the market variables regarding university, city, and county data were also collected by the researcher. The most recent data for these variables was collected via the National Center of Education Statistics website and census data. The remaining variables (UNITRENT, BED, DISTANCE, OCC, AGE, UNITS, UNITCOMP, COMCOMP, and TOTALCOMP) were secondary data provided by Ken Danter of The Danter Company. This data was collected from field visits throughout 2010 and into 2011.

Human Subjects Approval

After speaking with Christopher Mangelli, director of research compliance for Ball State University, it was concluded that the data collection method for this study did not require an official review. Because the study does not involve any personal information or human participation, it does not require approval from the Internal Review Board (IRB). See Appendix B for a record of this communication.

Data Analysis

Once the data was collected for the various communities and markets, it was analyzed using EViews7 statistical software. Statistical descriptions of the variables were analyzed and any outliers that could potentially skew the research were removed or corrected.

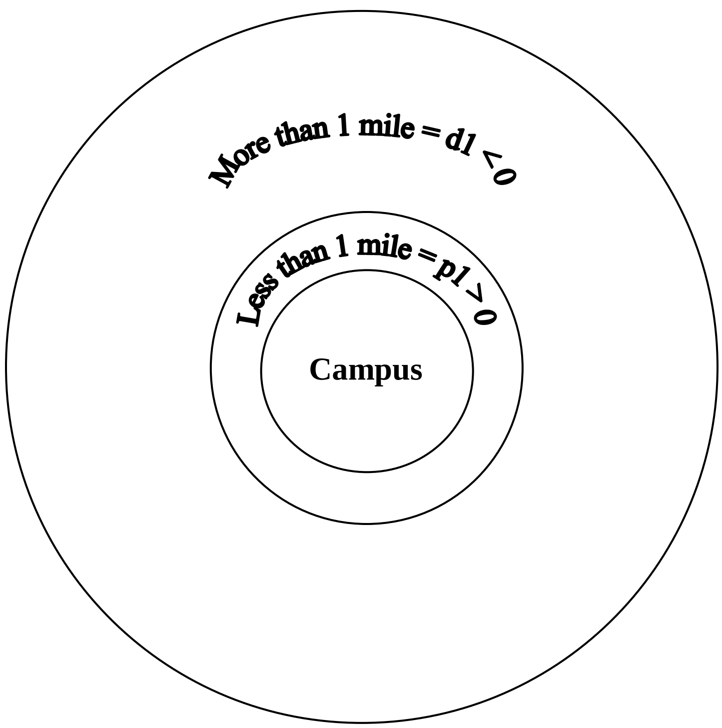


Figure 1 – Hypothesized Relationship between Distance and Rent (Model 2)
p1 = the premium coefficient for being within one mile of the academic center of campus and d1= the discount coefficient for not being within one mile of the academic center of campus

Two models were created using both nonlinear and binary variables for distance. The first model used the actual distance to develop a coefficient for the variable DISTANCE. The second model used the binary variable DISTANCE1 to approximate the existence of a premium for being within one mile of campus, or put another way, a discount for being outside of one mile (see Figure 1). It is hypothesized that the discount should be greater the further the housing option is from the academic center of campus.

Because of the large number of variables initially collected for this study, it is not surprising that some of the variables measured similar features, thus creating a high degree of multicollinearity (Guntermann & Norrbin, 1987). Like the Guntermann and Norrbin (1987) study of apartment variability, subsequent estimations of the model were attempted using multiple combinations of variables to find the models that offered the highest explanatory power (R^2).

To monitor the integrity of the model, variables included in the equation were significant to at least a .05 level, have signs that represent common intuition, and do not have serious heteroscedasticity or correlation problems. The Durbin-Watson statistic was used to monitor the potential presence of autocorrelation of random errors.

Summary

Data was collected for off-campus student housing communities in six university markets -- covering geographical regions that include the Midwest, east coast, southeast, and southwest -- with enrollment rates ranging from just over 18,000 to nearly 50,000 at Texas A&M University. Information was gathered for thirty-nine variables or variations of variables, but because of multicollinearity, significantly less were included in the final estimated equations. Two models were designed using both nonlinear and binary variables for distance to test and estimate the existence of premiums or discounts for rental prices relating to proximity to campus. The results are explained in Chapter 4.

CHAPTER 4

RESULTS

In previous studies, hedonic models have been developed for various housing options -- most commonly detached single-family houses -- as well as other residential and more transient housing like weekly vacation rentals. These studies have indicated that the consumer's mindset or purpose for housing can greatly impact the implicit value they place on certain characteristics (i.e. distance from a focal point or additional bedrooms, see Chapter 2 for further detail). For this study, variables were collected for six university markets to determine how college students value certain characteristics of their housing, with an emphasis on the variable of proximity to campus. Two models were designed to estimate the coefficient of distance and the presence of a premium for being within one mile of the academic center of campus.

EViews7 statistical software was used to generate the descriptive statistics for the thirty-nine initial variables (see Table 4). Some interesting summary statistics of the sample include the following:

- the mean unit rent for the 2010/2011 school year was $1,377 for a unit with 1,143 square feet, 2.76 bedrooms, 2.53 bathrooms, and located 2.43 miles from the academic center of campus;
- 62% of the units included furniture in the rent;
- water, sewer, and trash were included in the rent for 66%, 64%, and 71% of the units respectively;
- electricity was included for only 22% of the units;
- cable and internet were provided for 90% and 89% respectively;

- 80% of the units were apartments;
- the average age of the properties in 2010 was 12 years old; and
- the average occupancy was 96%.

Table 4 – Descriptive Statistics

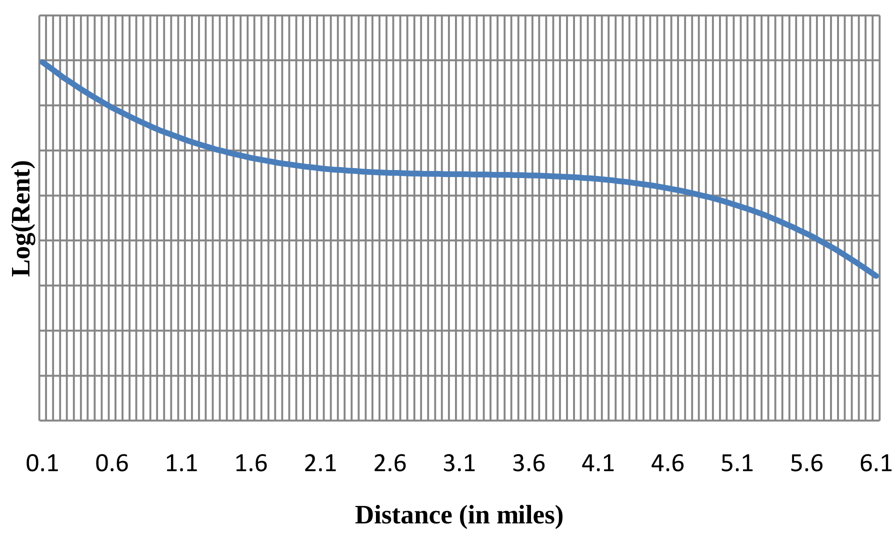
Variable	Mean	Standard Deviation	Minimum	Maximum
UNITRENT	1,377.33	489.92	549	2,850
DISTANCE	2.43	1.22	0.10	6.10
DISTANCE1	0.10	0.31	0	1
DISTANCE4PLUS	0.12	0.32	0	1
BED	2.76	1.14	0	5
BATH	2.53	1.10	1	5
SQFT	1,142.58	374.12	356	2400
FURN	0.62	0.49	0	1
WAT	0.66	0.48	0	1
SEW	0.64	0.48	0	1
TRASH	0.71	0.46	0	1
ELEC	0.22	0.42	0	1
CABLE	0.90	0.31	0	1
INT	0.89	0.31	0	1
APT_TOWN	0.80	0.40	0	1
OCC	0.96	0.04	0.855	1
AGE	12.05	10.98	1	39
UNITS	213.58	109.97	14	557
UNITCOMP	12.02	1.97	3	16
COMCOMP	7.79	3.18	0	13
AESTHCOMP	7.14	0.87	3	9
TOTALCOMP	26.95	5.25	6.5	34.5
IS_TUITION	7,060.89	1,499.45	5,238	9,088
R_AND_B	8,220.40	256.18	7,700	8,614
ENROLL	38,891	8,273.37	18,971	48,702
CITY_POP	197,947.30	163,408.90	18,331	535,268
CITY_AREA	90.95	56.16	17.2	195.1
CITY_DEN	1,903.97	558.62	803.99	2,743.56
CITY_STU_DEN	0.39	0.34	0.07	1.33
CITY_PER_CAP	21,188.58	3,889.86	15,965	30,308
CITY_UNITS	87,460.74	69,685.34	5,420	225,394
CITY_PER_RENTERS	0.55	0.12	0.25	0.67
COUNT_POP	384,301.32	308,022.78	73,570	990,213
COUNT_AREA	1,819.45	2,921.84	566	9,186.27
COUNT_DEN	377.48	239.52	86.45	996.1
COUNT_STU_DEN	0.16	0.09	0.04	0.28
COUNT_PER_CAP	24,531.93	3,544.97	19,763	32,234
COUNT_UNITS	163,822.85	128,132.22	31,327	419,647
COUNT_PER_RENTERS	0.42	0.11	0.18	0.55
Number of observations = 288 (except SQFT = 280)				

Model 1 – Nonlinear Relationship between Distance and Rent

The first regression model was designed to test the effect of distance from campus on rent. Using the variables DISTANCE, $DISTANCE^2$, and $DISTANCE^3$ the results from the model had a very high explanatory value with an adjusted R^2 of .92 and displayed that the relationship between distance from the academic center of campus and unit rent is nonlinear. In other words, the negative value associated with being further from the center of campus is not proportionate at every level. Figure 2 displays a graphic representation of the nonlinear relationship between distance from the academic center of campus and its effect on unit rent.

Figure 2 – The Nonlinear Relationship between Distance from Campus and Rent

$$\text{Log(UNITRENT)(hat)} = 360.82 - .2538(\text{DISTANCE}) + .0794(\text{DISTANCE}^2) - .0084(\text{DISTANCE}^3)$$



For the first mile, rent decreases as distance increases, as expected. However, between roughly one and four miles from campus, the value levels off before decreasing more dramatically again beyond the four-mile mark. This nonlinear relationship implies that students are willing to pay more to be within about one mile of campus, but for the next three miles, incremental proximity does not carry much value.

Considering the college environment, this model bears a great deal of logic. Being within one mile of the academic center of campus suggests being within reasonable walking distance. The ability to walk to campus is not only convenient for a student, but potentially eliminates expensive commuting costs associated with having a vehicle – like parking permits and gasoline. Once a student chooses to live outside of walking distance, but still within four miles of campus, their incremental proximity to campus is not valued as importantly. The model suggests that the difference between commuting two miles and commuting four miles is not worth paying much extra for. The student would still be experiencing the inconveniences of commuting, buying parking permits, and the difference in gasoline usage is marginal. However, the model does suggest that students prefer to stay within four miles of campus. This could be attributed to wanting to be near friends or facilities, or the desire to live in the "college-part-of-town."

After reviewing the results of the first model, a third model was created and added to the study. Using Figure 2 as a guide, the third model tests the hypothesis of a premium for being within one mile and a discount for being outside four miles of the academic center of campus (see Figure 3). The results for all three models are displayed in Table 5. The top figure represents the coefficient for the variable, and the number in parentheses denotes the coefficient's standard error. All of the variables were significant at the .05 level, but several were significant at the .01 level.

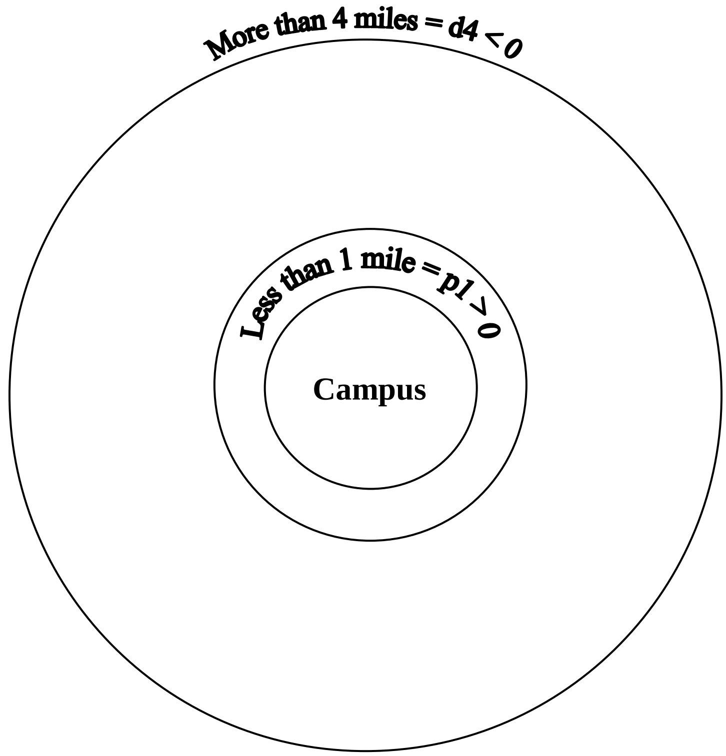


Figure 3 – Hypothesized Nonlinear Relationship between Distance and Rent (Model 3)
p1 = the premium coefficient for being within one mile of the academic center of campus and d4= the discount coefficient for being outside four miles from the academic center of campus

In addition to providing a nonlinear model for distance from campus, the first model indicates seventeen variables, or variations of variables, that were statistically significant in describing student housing rent. These core variables were significant for all three models (except CITY_DEN/100^2 in Model 3).

The estimated coefficient for the variable, BED, is .206. This implies that each additional bedroom will add 20.6% in rent. BATH had an estimated coefficient of .091 implying a marginal value of 9.1% for each additional bathroom. The variable, BED*BATH, measured the relationship between the two characteristics. Because it is significant, the implicit values for an additional bedroom and bathroom are as follows:

Bedroom: Log(UNITRENT)(hat) = .206(BED) - .018(BED*BATH)
Bathroom: Log(UNITRENT)(hat) = .091(BATH) - .018(BED*BATH)

Table 5 – Regression Results

Equation Variables	Model 1	Model 2	Model 3
DISTANCE	-0.254* (0.05)	----	----
DISTANCE^2	0.079* (0.02)	----	----
DISTANCE^3	-0.008* (0.002)	----	----
DISTANCE1	----	0.170* (0.031)	0.163* (0.030)
DISTANCE4PLUS	----	----	-0.130* (0.030)
BED	0.206* (0.017)	0.210* (0.020)	0.208* (0.019)
BATH	0.091* (0.028)	0.096* (0.030)	0.087* (0.029)
BED*BATH	-0.018* (0.007)	-0.020* (0.008)	-0.017** (0.008)
SQFT/100	0.029* (0.004)	0.031* (0.005)	0.031* (0.004)
SEW	0.061* (0.016)	0.037** (0.017)	0.033** (0.016)
AESTHCOMP	0.045* (0.012)	0.039* (0.012)	0.038* (0.011)
UNITCOMP	0.036* (0.005)	0.040* (0.005)	0.042* (0.005)
INT*CABLE	0.150* (0.023)	0.124* (0.021)	0.127* (0.022)
UNITS/100	-0.018* (0.007)	-0.019* (0.008)	-0.017* (0.007)
OCC*100	-11.270* (2.32)	-12.308* (2.67)	-11.053* (2.62)
(OCC*100)^2	0.119* (0.026)	0.130* (0.029)	0.117* (0.028)
(OCC*100)^3	-0.0004* (0.0001)	-0.0005* (0.0001)	0.0004* (0.0001)
CITY_PER_CAP/1000	-0.010* (0.003)	-0.005** (0.003)	-0.007* (0.002)
CITY_DEN/100	0.041* (0.017)	0.033** (0.017)	0.007* (0.002)
(CITY_DEN/100)^2	-0.0008** (0.0004)	-0.0007** (0.0003)	----
R_AND_B/1000	-0.159* (0.034)	-0.225* (0.031)	-0.146* (0.032)
ENROLL/1000	.004** (.002)	.006* (.002)	.007* (.001)
Constant	360.82* (73.20)	394.44* (82.24)	353.33* (80.91)
Observations Adjusted R-squared	280 0.92	280 0.91	280 0.92

* significant at the .01 level
** significant at the .05 level

For example, in a two-bedroom apartment, an extra bathroom is estimated to increase rent by .055 (.091 - .018*2-bedrooms).

The variable for unit size, SQFT, implies that a 100 square foot increase in unit size will result in a 2.9% increase in rent. The estimated coefficient for sewage being included in the rent indicates a 6.1% premium for this amenity. Two of the three comparability indices were significant – AESTHCOMP and UNITCOMP. AESTHCOMP is a subjective measure of the properties' appearance and quality on a scale of one to ten. The estimated coefficient implies a 4.5% increase in rent for every point increase on the scale. The UNITCOMP index is point-based system in which a higher number represents the presence of more desirable unit amenities and characteristics (see Table 3 for a more complete definition of what is included). The lowest score in this study was three, and the highest score was 16. The estimated coefficient for UNITCOMP implies a 3.6% increase in rent for each additional unit comparability point.

The binary variable, INT*CABLE, measured whether internet *and* cable were included in the unit rent. The estimated coefficient indicates a 15% premium in rent for including these amenities. UNITS, the variable for the total number of units at a property, indicates a rent discount of 1.8% for each additional 100 units. This could be contributed to economies of scale on the supply side, or a slight preference for smaller properties on the demand side. Other significant variables include two nonlinear variables – occupancy and city density – and three linear variables – city per capita (-), room and board expenses (-), and total enrollment (+).

Model 2 – Premium for Being within One Mile

The second model used the binary variable, DISTANCE1, which measured whether a property was within one mile of the academic center of campus. The model is highly descriptive with an adjusted R^2 of .91, and indicates that properties within one mile carry a rental premium of 17%. This implies that if a property currently within one mile of campus were moved outside of that proximity, it can be expected that its rental rates would decrease by 17%, all other variables remaining the same.

The structural characteristics remain strongly significant for this model. Most of the estimated coefficients are very similar to the first model with the exception of SEW decreasing from .061 to .037 and INT*CABLE decreasing from .150 to .124.

Model 3 – Premium and Discount for Distance Variable

Based on the results from the first model, the third model used two binary variables to approximate the nonlinear relationship between rent and distance. Like the second model, DISTANCE1 was used to measure whether a property was within one mile of the academic center of campus. The second binary variable, DISTANCE4PLUS, measured whether a property was more than four miles from the academic center of campus. Excluding the properties between one and four miles in distance allows the model to approximate the nonlinear relationship with a premium for being within walking distance and a discount for being outside the student-desired four-mile radius.

The model was highly explanatory with an adjusted R^2 of .92, and indicated a premium of 16.3% for being within walking distance and a discount of 13% for being outside the student-desired radius. This implies that if a property was currently three miles from the center of campus, moving that property within one mile of campus would increase rent by 16.2% and moving that property outside of four miles of campus would decrease rent by 13%, all other variables remaining the same. All of the structural characteristics for this model remain strongly significant, and the estimated coefficients do not vary by more than a percent from the second model.

Summary

Table 6 displays a combined summary range of the estimated coefficients for select variables from all three models. See Appendix A for the complete regression results for each model. The following chapter will further discuss these results and compare them to previous studies.

Table 6 – A Combined Summary of Selected Estimated Coefficients

Equation Variables	Estimated Coefficients
DISTANCE1	16.3% to 17.0%
DISTANCE4PLUS	-13.0%
BED	20.6% to 21.0%
BATH	8.7% to 9.6%
BED*BATH	-1.7% to -2.0%
SQFT/100	2.9% to 3.1%
SEW	3.3% to 6.1%
AESTHCOMP	3.8% to 4.5%
UNITCOMP	3.6% to 4.2%
INT*CABLE	12.4% to 15.0%
UNITS/100	-1.7% to -1.9%
Constant	353.3 to 394.4
Observations	280
Adjusted R-squared	.91 to .92

CHAPTER 5

DISCUSSION

Hedonic studies have been conducted for a number of real estate inquiries. However, little academic research has been attributed to the multifamily submarket, off-campus student housing. The intent of this study is to estimate a hedonic model for off-campus student housing with an emphasis on the variable of distance. Three models were estimated, indicating a nonlinear relationship between distance and rent, with a premium for being within one mile of campus (walking distance) and a discount for being outside four miles of campus.

University Proximity and Rents

Jaffe and Bussa (1977) presented that land values are impacted by more than distance from a city’s center. Their case study used a simple model of estimated rents to reveal that the center of a university campus can be an effective focal point, from which values decline as distance increases. Like their previous results, this study also indicated that the center of campus could effectively act as an effective focal point for student housing, from which rents diminished as distance increased. However, this study also uncovers that the relationship between diminishing rents and distance is nonlinear.

Implications of the Study Models

Using sample means, a hypothetical discussion may help to clarify the meaning of the study results. Suppose a property, named Average Academic Acres, rents its units at $1,377 per month and is located 2.43 miles from the academic center of campus (mean figures are from the descriptive statistics in Table 4). If Average Academic Acres could be lifted up and moved to any distance, Model 1 suggests that the incremental increase or decrease in distance would not proportionately affect the value (nonlinear relationship). Instead, it suggests that moving it a mile and a half closer could dramatically improve its value, while moving it a mile and a half further could have minimal repercussions.

Models 2 and 3 imply that moving Average Academic Acres from its current position to within one mile of campus should increase rent by 16.3-17%. For the hypothetical property, that would increase monthly rent by $224 to $234 per unit, thus bringing the total rent to over $1,600 per month from the original rate of $1,377. Assuming Average Academic Acres has 214 units (the sample mean), that would be a total monthly increase in revenues of $47,936 to $50,076 (or roughly $600,000 per year) just for being one and a half miles closer to campus.

Model 3 implies that being outside of a four-mile radius from campus carries a discount in rent of 13%. For Average Academic Acres, moving from its current position to beyond four miles would decrease rent by $179 per unit per month. Thus, lowering the total monthly rent to $1,198, and decreasing total monthly revenues by $38,306 for merely a two mile increase in distance. It is important to note how the monetary benefit or weakness of a property's location is so crucial in the initial stages, because unlike the hypothetical company used in this discussion, once a property is constructed, it cannot be lifted up and moved at will.

The estimated coefficients for the structural variables support the hypothesis that students have alternate implicit values for certain characteristics of their housing. A marginal value for an additional bedroom of 21% is much higher than the 4% seen in Sirmans and Macpherson's (2003) study of residential housing characteristics, and even two to three times the 7.2% and 10.34% figures for weekly vacation rentals (Nelson, 2009). This is consistent with, and reflective of, certain trends in the student housing industry – many companies rent by the bed and the percentage of units with roommates is very high (Kashian, 2009). Kashian's (2009) study at the University of Wisconsin indicated that 83.6% of the respondents lived with at least one roommate, and 86.9% indicated that they have a private bedroom.

The marginal value for an additional bathroom, 8.7% to 9.6%, is a little higher, but close to the figures for weekly vacation rentals at 6-7% (Nelson, 2009). Both are much lower than the 24% figure for conventional housing (Sirmans & Macpherson, 2003). The third variable that stands out for off-campus student housing is INT*CABLE. The high estimated coefficient of 12.4% to 15% is consistent with previous assumptions and indications that the student population places a very high value on the availability of technology (Kashian, 2009; NMHC, 2004). In the University of Wisconsin study, 70.5% of the respondents indicated that internet service was included in their monthly rent (Kashian, 2009). If Average Academic Acres was not already providing internet and cable in its rent price, it could expect a rental premium of $171 to $207 for doing so – much less than the cost to supply it.

Summary

A discussion of their implications helps to better understand the models developed in this study. Using a hypothetical student housing property, the percentage coefficients from the regression models can be converted to dollar figures, and their meanings better realized. It then becomes more apparent how proximity to campus, the addition of bedrooms and bathrooms, and the inclusion of internet and cable can dramatically impact a company’s revenue potential. These impacts are consistent with previous studies of university markets and industry trends including preferences for close proximity to campus, high roommate occurrences, and technology demands.

CHAPTER 6

CONCLUSIONS, LIMITATIONS/DELIMITATIONS, AND RECOMMENDATIONS

The intent of this quantitative study was to evaluate the marginal contribution of the individual characteristics that comprise off-campus student housing properties with a special emphasis on the variable of distance, or proximity to the academic center of campus. In the study, variable data for housing in six college markets was collected and analyzed using a hedonic regression model to single out the marginal contributions.

In summary, the off-campus student housing submarket offers a unique environment for the valuation of housing characteristics. Regression results from this study estimated coefficients for certain variables that vary greatly from previous studies conducted regarding traditional residential consumers (Sirmans et al., 2005). And while the figures showed some resemblance to Nelson's (2009) study of highly transient weekly vacation rentals, there are distinct differences in certain variables – namely location, the number of bedrooms, and internet access.

The results indicate that the relationship between distance from campus and student housing rents are nonlinear. Students place high premiums on being within one mile of campus, but do not hold much incremental value when selecting housing between one and four miles. After four miles, rents begin to decrease again, suggesting a student-desired radius of being within four miles of campus.

These distance levels are in line with the expected student lifestyle. Being within one mile of campus suggests the benefit of being within reasonable walking distance, while being outside four miles begins to segregate students from the "college-part-of-town," other college friends, and easy use of the campus facilities. Between one and four miles, students are likely to commute, and the incremental advantage or disadvantage of proximity to campus is not seen as a driving factor.

While students do not place quite as much value on being within one mile of campus as vacationers do when renting a lakefront house for a week (as might be expected), they do place a great deal of value on the number of bedrooms and the benefit of having cable and internet included in their rent – with implicit values of approximately 21% and 12.6-15.1% respectively. So, while location is not *everything*, with premiums of up to 17%, it constitutes a major component of how a housing option is valued by students.

Limitations/Delimitations

The marketplace is rarely a simple environment, and in the student housing market, pricing and valuation are no exception. Comparing apples to apples is difficult to accomplish because of the complexity and infinite number of possible options, features, and amenities available. Due to the complex nature of the market, the following limitations exist for this study:

- Rent prices are not always exact. Some properties offer rent ranges for variables not included in this study, including varying floor levels and views. In these cases, a simple average is used to estimate the unit rent. Additionally, rent prices can be volatile, changing weekly or monthly with different concessions or specials. The authors strived to use the market rent for the basic included amenities and services.

- Amenities are not always comparable. For example, a furnished unit might include luxury furniture throughout every room with flat screen televisions and full-size beds. Or, a furnished unit might only have a dated couch, twin-size beds, and simple desks. Obviously the value of these options should be different, but they are simply noted as being "furnished." Other amenities that can vary greatly in quality include pool areas, internet speed, fitness rooms, and appliances. By using binary variables, grey areas get converted to simple black and white. To help control for this variation, a quality comparability index was used, but it was derived from subjective observations.
- Undoubtedly, there are several unique variables that have positive or negative marginal values that have been left out of the equation. Floor level and views were mentioned above, but other variables might include the management's professionalism and leasing skills.
- The hypothesis implies that the value of proximity will equally decrease in every direction the further a housing option is from the center of campus. This is unlikely the case because other attractions impact the value and utility of the housing option. For example, if the same property two miles west of campus puts it in a corn field, two miles north puts it in a newly developed suburb, two miles east puts it in a renovated downtown district, and two miles south puts it in a distressed urban neighborhood, you would

expect that more than the distance from campus effects the unit rent (see Jaffe & Bussa, 1977 for discussions of revised bid-rent relationships and land-use theories). On a more micro-level, immediately adjacent sides of campus can have more appeal than others (i.e. the north side of campus may be known for having the better shops or parties).

Recommendations

This paper adds to a small body of academic literature regarding off-campus student housing. As this industry continues to grow, consolidate, and mature, more and more research regarding students' willingness to pay, property valuation, and other subjects that add to the overall understanding of student housing will be greatly appreciated. The addition of knowledge will help developers, investment and management companies, appraisers, and consumers make smarter decisions in regard to off-campus student housing opportunities.

In this study, two market variables were significant with signs that do not match common intuition. The estimated coefficients for the cost of room and board at the university and the city per capita income were both negative. This suggests that as room and board or city per capita increase, student housing rents should decrease. More research regarding these correlations could be helpful in understanding this complexity.

The nonlinear relationship between occupancy and rent is also an interesting finding. It appears that rent is negatively related to occupancy for low levels of occupancy. This implies that owners need to lower rents to increase occupancies. Beyond a certain level, high occupancies drive higher rents (positively correlated) due to high demands. Further research may help to better understand the nonlinear relationship between rent and occupancy.

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APPENDIX A

EVIEWS7 REGRESSION RESULTS

Table 7 – Model 1 Regression Results

Dependent Variable: LRENT
Method: Least Squares
Included observations: 280
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 6.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DISTANCE	-0.253771	0.048540	-5.228042	0.0000
DISTANCE^2	0.079442	0.017498	4.540019	0.0000
DISTANCE^3	-0.008405	0.001798	-4.674100	0.0000
BED	0.206269	0.017011	12.12560	0.0000
BATH	0.091038	0.028089	3.241097	0.0013
BED*BATH	-0.018001	0.007485	-2.404727	0.0169
SQFT/100	0.029417	0.004234	6.947443	0.0000
SEW	0.060854	0.015797	3.852241	0.0001
AESTHCOMP	0.045285	0.011931	3.795707	0.0002
UNITCOMP	0.035720	0.005071	7.043882	0.0000
INT*CABLE	0.150173	0.023256	6.457448	0.0000
UNITS/100	-0.017836	0.007319	-2.437057	0.0155
OCC*100	-11.26966	2.376479	-4.742166	0.0000
(OCC*100)^2	0.119173	0.025676	4.641331	0.0000
(OCC*100)^3	-0.000419	9.24E-05	-4.537890	0.0000
CITY_PER_CAP/1000	-0.009610	0.002858	-3.363046	0.0009
CITY_DEN/100	0.040635	0.016938	2.398996	0.0171
(CITY_DEN/100)^2	-0.000836	0.000392	-2.131307	0.0340
R_AND_B/1000	-0.159341	0.034144	-4.666725	0.0000
ENROLL/1000	0.003981	0.001860	2.140225	0.0333
C	360.8209	73.20201	4.929112	0.0000

R-squared	0.924792	Mean dependent var	7.162405
Adjusted R-squared	0.918984	S.D. dependent var	0.369411
S.E. of regression	0.105146	Akaike info criterion	-1.594886
Sum squared resid	2.863447	Schwarz criterion	-1.322277
Log likelihood	244.2841	Hannan-Quinn criter.	-1.485542
F-statistic	159.2387	Durbin-Watson stat	1.712003
Prob(F-statistic)	0.000000		

Table 8 – Model 2 Regression Results

Dependent Variable: LRENT
Method: Least Squares
Included observations: 280
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 6.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DISTANCE1	0.170499	0.030935	5.511555	0.0000
BED	0.209618	0.019731	10.62392	0.0000
BATH	0.095538	0.029987	3.185979	0.0016
BED*BATH	-0.019660	0.007791	-2.523422	0.0122
SQFT/100	0.030748	0.004608	6.673331	0.0000
SEW	0.037262	0.016823	2.214905	0.0276
AESTHCOMP	0.038929	0.011822	3.292897	0.0011
UNITCOMP	0.039759	0.005176	7.682095	0.0000
INT*CABLE	0.124460	0.021473	5.796133	0.0000
UNITS/100	-0.018931	0.007519	-2.517633	0.0124
OCC*100	-12.30811	2.671691	-4.606863	0.0000
(OCC*100)^2	0.129921	0.028887	4.497599	0.0000
(OCC*100)^3	-0.000456	0.000104	-4.386770	0.0000
CITY_PER_CAP/1000	-0.005142	0.002859	-1.798525	0.0732
CITY_DEN/100	0.032841	0.016796	1.955281	0.0516
(CITY_DEN/100)^2	-0.000695	0.000388	-1.789900	0.0746
R_AND_B/1000	-0.225090	0.031093	-7.239213	0.0000
ENROLL/1000	0.005554	0.001949	2.849884	0.0047
C	394.4370	82.23976	4.796184	0.0000

R-squared	0.919804	Mean dependent var	7.162405
Adjusted R-squared	0.914273	S.D. dependent var	0.369411
S.E. of regression	0.108160	Akaike info criterion	-1.544959
Sum squared resid	3.053351	Schwarz criterion	-1.298312
Log likelihood	235.2942	Hannan-Quinn criter.	-1.446028
F-statistic	166.3071	Durbin-Watson stat	1.742992
Prob(F-statistic)	0.000000		

Table 9 – Model 3 Regression Results

Dependent Variable: LRENT
Method: Least Squares
Included observations: 280
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 6.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DISTANCE1	0.163425	0.030243	5.403741	0.0000
DISTANCE4PLUS	-0.129718	0.029645	-4.375675	0.0000
BED	0.207575	0.019165	10.83116	0.0000
BATH	0.087076	0.028939	3.008911	0.0029
BED*BATH	-0.017336	0.007642	-2.268577	0.0241
SQFT/100	0.030777	0.004333	7.102827	0.0000
SEW	0.033428	0.016083	2.078476	0.0386
AESTHCOMP	0.037750	0.011321	3.334482	0.0010
UNITCOMP	0.042244	0.004647	9.091046	0.0000
INT*CABLE	0.127172	0.021929	5.799310	0.0000
UNITS/100	-0.017263	0.007105	-2.429634	0.0158
OCC*100	-11.05320	2.624937	-4.210845	0.0000
(OCC*100)^2	0.117060	0.028344	4.130064	0.0000
(OCC*100)^3	-0.000412	0.000102	-4.047475	0.0001
CITY_PER_CAP/1000	-0.006903	0.002413	-2.860726	0.0046
CITY_DEN/100	0.007453	0.002253	3.308391	0.0011
R_AND_B/1000	-0.145684	0.031799	-4.581348	0.0000
ENROLL/1000	0.006864	0.000929	7.391955	0.0000
C	353.3288	80.91244	4.366804	0.0000

R-squared	0.925181	Mean dependent var	7.162405
Adjusted R-squared	0.920021	S.D. dependent var	0.369411
S.E. of regression	0.104471	Akaike info criterion	-1.614364
Sum squared resid	2.848620	Schwarz criterion	-1.367717
Log likelihood	245.0109	Hannan-Quinn criter.	-1.515433
F-statistic	179.3018	Durbin-Watson stat	1.762939
Prob(F-statistic)	0.000000		

APPENDIX B

INTERAL REVIEW BOARD (IRB) COMMUNICATIONS

IRB Determination

Reply | Reply to All | Forward

You replied on 6/9/2011 12:33 PM.

Mangelli, Christopher M.

Sent: Thursday, June 09, 2011 10:57 AM
To: Fields, Terry Joseph
Cc: Earhart, Carla M.

Dear Mr. Fields;

Thank you for contact the Office of Research Integrity and the BSU IRB concerning your proposed project.

Based on the information provided in our phone conversation, it is my determination that your project does not meet the Federal Definition of human subjects research at this time. This determination is based on the fact that you are not collecting data from individuals "about whom".

Under the Federal Regulations, A *human subject* is defined as "a living individual about whom an investigator (whether faculty or student) obtains either (1) data through intervention or interaction with the individual, or (2) identifiable private information."

As presented, you will be collecting data about apartment communities (rents, # of rooms, square footage, etc.). It is understood that in some situations the only way to collect this kind of data is through interactions with people. This is typically not considered human subjects research unless you are also collecting data about the individuals themselves for research purposes (such as what their highest degree is, how much money they earn, whether or not they have filed a complaint against the management company, etc.) and/or you are collecting research data (ex. conducting a pre and post test).

Please note that as long as you are not collecting information from the individuals about themselves, then this assessment stands. Should you decide to collect more data than presented, please contact our office again for a follow-up determination. If you have any questions or need more information, please feel free to contact me at any time.

Chris Mangelli

Christopher M. Mangelli
JD, MS, M. Ed, CIP
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Muncie, IN 47306
O: 765-285-5070
F: 765-285-1328
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www.bsu.edu/research/compliance/

APPENDIX C

COMMUNICATIONS WITH THE DANTER COMPANY

FW: TJ Fields

Reply | Reply to All | Forward

Danter, Ken [KenD@danter.com]

Sent: Wednesday, April 20, 2011 4:37 PM

To: Fields, Terry Joseph

Attachments: image001.jpg (8 KB); Rent Per Bed Student Housi~1.pdf (1 MB) [Open as Web Page]

TJ

I have attached most of the data we discussed. I will forward the distance from campus tomorrow.

Let me know if you have any questions.

Ken

DANTER COMPANY

Ken Danter
President/CEO
Danter Company, LLC
2760 Airport Drive, Suite 135
Columbus, OH 43219
Phone: (614) 221-9096
Fax: (614) 221-4271
KenD@danter.com
http://www.danter.com

The Danter Company has a free database of student enrollment and housing climate for over 500 universities nationwide.

From: Gould, Yvonne
Sent: Wednesday, April 20, 2011 3:36 PM
To: Danter, Ken
Subject: TJ Fields

Campus distances.xls

Reply | Reply to All | Forward

You replied on 4/26/2011 2:09 PM.

Danter, Ken [KenD@danter.com]

Sent: Thursday, April 21, 2011 1:41 PM

To: Fields, Terry Joseph

Attachments: Campus distances.xls (24 KB) [Open as Web Page]

TJ

Here is the list of properties and their distance to campus. We typically use the academic center of campus as our point of reference. This is usually the area with the highest concentration of classroom buildings or the student library. It is, of course, somewhat subjective, although it is a better measure that to the edge of campus.

Also, I noticed that we did not include the Map Code identifier but you should be able to figure that out.

Hope this helps

Ken