



## **Corvallis Area Rental Market Analysis**

**Prepared by**  
**Oregon State University**  
**School of Public Policy**  
**SOC 519 Project Team**

**June 2012**

© 2012

Research Team: Mark E. Edwards, Joanna M. Carroll, Joseph O. Clark, Lauren M. Dennis, Dennis A. Dugan, Kelly M. Foley, Daniel C. Hauser, Charles C. Lanfear, Maria J. Lewis, Kathryn A. Moran, Jarrod Olson, Megan Osborne, Lawrence R. Ruiz, Trevor W. Waddell, Conor P. Wall.

## **Acronyms and Abbreviations of Terms**

GIS	Geographic Information Systems
HUD	United States Department of Housing and Urban Development
OLS	Ordinary Least Squares
OSU	Oregon State University
WNHS	Willamette Neighborhood Housing Services

## **Summary of Statistical Terms**

*Cross-tabulation (Crosstab):* A simple method of statistical analysis that shows the number, or frequency, of particular units observed in a group, and also allows us to check if the observed relationship is meaningful. Cross-tabulations can, for instance, tell us if a particular group of people, such as students, are more likely to be in a higher or lower income category.

*Regression:* A method of statistical analysis used to determine the impact of a variable, change, or status on another variable, holding all other factors constant. Regression analysis allows researchers to use observed data, such as our survey and online listings, to predict values, in this case, for rental prices or demand for specific housing types. Regression is more sophisticated than cross-tabulation as it allows us to isolate the effects of independent variables that impact the outcome or dependent variable.

*Logistic (Logit) Regression:* A form of regression that predicts probabilities of a binary outcome, that is the chance of “yes or no” given a variety of data. Logistic regression can, for instance, tell us how likely it is that a particular household type, such as two parents with a child, will choose a particular type of housing.

*Ordinary Least Squares (OLS) Regression:* A common method of regression that predicts numeric values of variables, such as rental prices, from a variety of forms of data. OLS regression can, for instance, tell us how much a particular type of house or apartment will cost on average given the number of bedrooms and bathrooms and its location.

# Corvallis Area Rental Market Analysis

## TABLE OF CONTENTS

<b>1.0</b>	<b>EXECUTIVE SUMMARY</b> .....	<b>6</b>
<b>2.0</b>	<b>INTRODUCTION</b> .....	<b>6</b>
2.1	SCOPE AND PURPOSE OF REPORT.....	6
<b>3.0</b>	<b>LITERATURE REVIEW</b> .....	<b>7</b>
3.1	AFFORDABLE HOUSING DEVELOPMENT AND HOUSING MARKET.....	7
3.2	LOW INCOME HOUSEHOLDS AND THE HOUSING MARKET.....	7
3.3	VACANCY RATES AND RENT DETERMINANTS.....	8
3.4	UNIVERSITY INFLUENCES ON RENTS AND NEIGHBORHOODS.....	9
3.5	LAND USE/ZONING REGULATIONS AND THE HOUSING MARKET.....	9
<b>4.0</b>	<b>DATA AND METHODS</b> .....	<b>10</b>
4.1	DATA.....	10
4.1.1	Survey Data.....	10
4.1.2	Web Based Data.....	10
4.1.3	Geographic Information Systems Data.....	12
4.2	METHODS.....	12
4.2.1	Descriptive Statistics.....	12
4.2.1.1	Sampling Methods.....	12
4.2.1.2	Survey Delivery Method.....	13
4.2.2	Collection Method of Web Based Data.....	13
4.2.2.1	Web Harvester.....	13
4.2.2.2	Manual Searching.....	14
4.2.2.3	Data Preparation.....	14
4.2.3	Geographic Information Systems.....	15
4.2.3.1	Data Cleaning Method.....	15
4.2.3.2	Data Processing Method.....	15
4.2.4	Choice Models.....	16
4.2.4.1	Housing Type Choice Model.....	16
4.2.4.2	Bedroom Choice Model.....	17
4.2.5	Corvallis Market Price Model.....	17
<b>5.0</b>	<b>RESULTS</b> .....	<b>18</b>
5.1	DESCRIPTIVE STATISTICS.....	18
5.2	GEOGRAPHIC INFORMATION SYSTEMS.....	23
5.3	CHOICE MODELS.....	26
5.3.1	Housing Type Choice Model.....	26
5.3.2	Bedroom Type Choice Model.....	28
5.4	CORVALLIS MARKET PRICE MODEL.....	28
5.4.1	Rental Price Projections.....	30
5.4.2	Market Prices in Nearby Communities.....	32
5.5	VACANCY RATE.....	32
<b>6.0</b>	<b>DISCUSSION</b> .....	<b>33</b>
<b>7.0</b>	<b>CONCLUSION</b> .....	<b>34</b>
<b>8.0</b>	<b>BIBLIOGRPAHY</b> .....	<b>35</b>

## LIST OF TABLES

Table 4.1.2-1 Online Data Sources .....	11
Table 4.1.2-2 Average Price by Bedrooms From Online Data .....	12
Table 4.2.2.1-1 Harvested Data by Date .....	14
Table 4.2.2.2-1 Average Prices by Bedrooms in Manually Obtained Data.....	14
Table 4.2.3.2-1 Error Measurements for the Rental Prediction Surface in Corvallis .....	15
Table 4.2.3.2-2 Cross-Validation Statistics.....	16
Table 4.2.4.1-1 Expected Impact of Variables on the Probability of Choosing an Apartment.....	16
Table 4.2.4.2-1 Expected Effects of Variables on the Probability of Choosing More Bedrooms.	17
Table 5.1-1 Survey Descriptive Statistics .....	18
Table 5.1-2 Survey Respondent Self-Reported Ethnicity.....	19
Table 5.1-3 Rental Property Monthly Rent by Bedroom .....	19
Table 5.1-4 Renter and Homeowner Age .....	20
Table 5.1-5 Renter and Homeowner Income.....	20
Table 5.1-6 Non-Student Renter and Homeowner Income .....	21
Table 5.1-7 Student and Non-Student Renter Income.....	21
Table 5.1-8 Difficulty Locating Affordable Housing by Renter Tenure.....	21
Table 5.1-9 Difficulty Locating Affordable Housing by Income.....	22
Table 5.1-10 Homeowner Reported Impact of Rental Properties .....	22
Table 5.1-11 Renter Priorities When Selecting Places to Live.....	23
Table 5.3.1-1 Housing Choice Model with Odd Ratios .....	26
Table 5.3.2-1 Bedroom Choice Model with Odd Ratios .....	28
Table 5.4-1 Marginal Increase in Rent from Additional Bedrooms .....	29
Table 5.4-2 Estimated Average Corvallis Rent by Bedrooms and Bathrooms .....	29
Table 5.4-3 Comparison of Observed Mean and HUD Fair Market Rent Values .....	30
Table 5.4.1-1 Linear Regression of Effect of Bedrooms on Rental Price for Internet Listings ....	30
Table 5.4.1-2 Linear Regression of Effect of Bedrooms and Bathrooms on Rental Price .....	31
Table 5.4.1-3 Linear Regression of Effect of Bedrooms and Web Listing on Rental Price .....	31
Table 5.4.1-4 Linear Regression of Effect of Bedrooms and Community on Rental Price .....	32
Table 5.4.2-1 Market Price Differences for Neighboring Communities .....	33

## LIST OF FIGURES

Figure 5.2-1 Distribution and Price of Rentals in Corvallis.....	24
Figure 5.2-2 Distribution of Rental Housing Prices in Corvallis.....	25
Figure 5.3.1-1 Probability of Choosing an Apartment by Number of Adults and Minors.....	27
Figure 5.3.1-2 Probability of Selecting an Apartment by Number of Adults and Minority Identification.....	27

## APPENDICES

Appendix A	Professor's Commentary on Community Stakeholder Interviews and Project
Appendix B	Survey Questionnaire
Appendix C	Websites Sourced for Data
Appendix D	Figures Regarding Housing Choice/Decisions
Appendix E	Recommendations

## 1.0 EXECUTIVE SUMMARY

A market analysis of the current rental housing situation within Corvallis, Oregon and surrounding areas was conducted through a multi-method approach. The market analysis used web based data and survey data to produce descriptive statistics, cross-tabulations, Geographic Information Systems (GIS) spatial analysis, choice models, and a Corvallis market price model. An increase in housing demand from students paired with reduced availability of development funding, thus decreasing growth in housing supply, has produced lower vacancy rates and higher rents in real terms. Our estimate of the vacancy rate in Corvallis is approximately 2.3 percent. Rental prices are currently increasing because of this low vacancy rate. Location influences rental prices, demonstrated by our spatial analysis and by analysis of preferences of potential renters. Proximity to Oregon State University (OSU) does increase monthly rent. However, when determining rental prices, the number of bedrooms is the single most important factor while distance from OSU and amenities are not nearly as important. We found no difference between low-income students and low-income non-students in terms of their participation in the housing market. A major implication of this research is that an increase in the housing supply would be beneficial to Corvallis renters.

## 2.0 INTRODUCTION

Despite considerable concern over rising housing costs, no comprehensive housing market analysis of Corvallis or surrounding areas has been conducted since 2004. Willamette Neighborhood Housing Services' (WNHS) goal of providing quality affordable housing for low-income households requires a better understanding of what is occurring in the Corvallis area. In April 2012, a graduate research methods class in the School of Public Policy at OSU agreed to conduct an analysis of the rental housing market in the City of Corvallis and surrounding areas. The Corvallis Area Rental Market Analysis seeks to inform WNHS decisions on the feasibility and location of future housing projects. In the past 20 years the growth of OSU exceeded the growth in rental housing availability in Corvallis. Although the housing crisis and recession diminished home values, they slowed, but did not halt, the increase in rents which doubled during the 1990s and have continued to rise sharply in recent years. With OSU targeting a two percent annual growth for the next 15 years, there is a significant need for new housing in Corvallis to accommodate the growing university population. This need for new housing combined with already-low vacancy rates and increasing rents is believed to have contributed to a variety of negative outcomes including: (1) low income non-student households experiencing rising cost of living; (2) young families choosing to live in other neighboring towns rather than Corvallis; (3) increased traffic/commuting and parking difficulties due to families living elsewhere but working in Corvallis; (4) potential over-crowding in existing rental housing; (5) students having difficulty finding housing; (6) neighborhood transitions perceived as negative by homeowners as owner-occupied houses near them are converted to student rentals; and (7) marginally housed families and individuals becoming more vulnerable to homelessness. This report seeks to fill that knowledge gap and assist WNHS in assessing how it can best assist low-income households who are most vulnerable to the increased housing costs.

### 2.1 SCOPE AND PURPOSE OF REPORT

The purpose of this report is to provide a snapshot in time of the Corvallis rental market with a particular focus on impacts on low-income renters. The scope of this project includes answering three broad questions (1) Where do Corvallis renters live and why do they live there? (2) What is their experience of living in that location? and (3) What do they want out of a living situation?

These questions are answered through survey data, web-based data, and mapping data through a multi-method analysis approach.

### **3.0 LITERATURE REVIEW**

To provide background on the influences and considerations of the rental market and affordable housing within Corvallis, a wide range of academic literature on housing was reviewed. Specific attention was given to the literature on the housing challenges of low-income, minority, and other vulnerable households. Research discussing vacancy rate and rental price determinants was also explored, as well as the effects of university students and land use regulations on local housing markets. In addition to the literature review, Appendix A contains a commentary on findings from community stakeholder interviews conducted by the Applied Research Methods class in the School of Public Policy at OSU.

#### **3.1 AFFORDABLE HOUSING DEVELOPMENT AND HOUSING MARKET**

Over the last few decades, as a result of new funding programs such as the Fair Housing Initiatives Program, the Federal HOME Program's Community Development Block Grants, and a variety of state and local grant programs, subsidized rental housing development in the U.S. has transformed from a collection of large, centralized, publicly owned projects to ones that are privately owned, small-scale, and dispersed throughout communities (Russell, 2008; Thompson, 2012). Many contend that this transformation has been a success. The 2005 American Housing Survey, administered to over 40,000 households, indicated that subsidized renters were more satisfied with their housing than nonsubsidized renters (Russell, 2008). A larger, longitudinal analysis of nearly a half million households from 1985 to 2004 concluded that satisfaction among subsidized housing occupants, associated with the decreased size and age of their housing structures, resulted in greater satisfaction among neighboring areas (Russell, 2008). This transformation of subsidized housing stock, some argue, has benefited both low-income populations and the areas in which low-income developments are sited.

Others, however, point out negative outcomes that dispersed low-income housing development has had on local housing markets, and vice versa. On one hand, the addition of affordable housing has been shown to lower property values, though the extent to which it does so depends on the design, management, and concentration of affordable housing as well as its compatibility with the surrounding neighborhood (Nguyen, 2005). The presence of affordable housing has also been shown to shift real estate development, leaving low-income rental areas unable to attract higher-end investors, thus creating socio-economic clusters and in effect, undoing the work of low-income housing integration policies (Yates & Wood, 2005). Conversely, the dynamics of a local housing market can increase the price of housing for low-income families. As was witnessed during the recent foreclosure crisis, households that defaulted on their mortgages were driven to the rental market, causing rental rates to increase along with the demand for affordable rental housing (Collinson, 2011; Greenwood & Holt, 2010). These market interactions can be negative both from the affordable and non-affordable housing perspectives.

#### **3.2 LOW INCOME HOUSEHOLDS AND THE HOUSING MARKET**

Such changes in the affordable housing market have enormous impacts on the 13.4 million families with children who, as of 2008, were living on incomes less than 200 percent of the federal poverty level (Simms et al., 2009). Of these households, the majority identified as non-white—30 percent were Hispanic, 22 percent were black or African American and 6 percent were other non-whites (Simms et al., 2009). The low-income profile for Oregon is similarly grim:

the Oregon Housing and Community Service's Oregon Poverty Report, using data from the American Community Survey, estimates that, in 2009, 185,000 households (12.7%) earned 30% or less of the state median income, with an additional 163,000 (11.2%) households earning between 30-50% of the state median income (Carpenter, 2011).

Such households are faced with economic and social barriers that often hinder the process of locating and obtaining decent housing (Freedman and Owens, 2010; Preston et al., 2009; Rohe and Stegman, 1994). For minorities, immigrants, and other vulnerable populations, the challenges of finding affordable housing may be aggravated by discrimination from landlords, as has been observed among victims of domestic violence (Barata, 2010). Households headed by single women of color, in fact, make up the majority of those living in subsidized housing (Howard, 2007). Race and income are also often cited as significant barriers preventing an individual or family from living in an owned home, with African Americans and Hispanics in particular finding it difficult to overcome the income barrier to home ownership, and to avoid slipping back into the rental market after failing to make mortgage payments (Bohem & Schlottmann, 2003).

The inability to afford a home deprives low income households of the increased well-being, satisfaction, security, and sense of neighborhood attachment associated with homeownership, and returning back to renting can significantly decrease the self-esteem and satisfaction of a family or individual (Hiscock et al., 2001). The lack of quality living space, whether rented or owned, also places low-income households at greater risk for sickness, loss of social ties from frequent moves, and compromised psychological health (Duke-Lucio et al., 2010; Hiscock et al., 2001). Children from low-income households that suffer stress from uncertain housing have been shown to be more likely to fall behind in school and less likely to develop close social bonds (Conley, 2001). The current shortage of affordable housing, thus, has significant social costs, threatening not just the financial stability of low-income families but also their physical and psychological condition.

### **3.3 VACANCY RATES AND RENT DETERMINANTS**

Despite the importance of affordable housing for the welfare of families and individuals, the quantity and quality of housing that fits into the budgets of the poorest members of the population has decreased as prices have increased nationwide (Matlack, 2008). A key determinant of housing affordability is vacancy rate, defined as the product of the incidence of vacancy (the probability that a housing unit becomes vacant) and the duration of vacancy (the length of time that a unit remains vacant). Much research has focused on identifying this 'natural,' vacancy rate at which supply and demand are at equilibrium, and real (i.e. inflation-adjusted) prices are steady over time, with estimates ranging between 3.9% and 12% (Haegen and Hansen 2010). Some hypothesize that incidence of vacancy, and thus vacancy rate, is dampened with greater proportions of low-income public housing units, and that longer durations in vacancy will be greater in areas that have a greater diversity of rental unit types (Gabriel, 2001).

Across the U.S., the vacancy rates of local rental markets have decreased over the last five years as foreclosures have caused millions of former homeowners to search for an affordable alternative to home ownership (Collinson, 2011). This influx of renters has upset the equilibrium and has inflated local market rents by increasing demand (Gabriel, 2001). In areas with low vacancy rates and a high demand for rentals, such as Corvallis, rental prices can increase rapidly, often forcing low-income residents to look elsewhere for affordable housing options.

While vacancy rate is an important factor that influences rental prices, it is not the only one. Physical attributes, proximity to amenities, property management, and length of residency discounts are also contributing determinants. Particularly relevant to communities that have short turnover rates, such as college towns, research indicates that landlords offer rent discounts (i.e. do not raise rent rates) to tenants who remain in their units for more than one contract period, and that this discount increases with each additional contract period. This supports the notion that landlords in college towns have the unique opportunity to increase rent more frequently due to high turnover, independent of supply constraints (Sirmans & John, 1991).

### **3.4 UNIVERSITY INFLUENCES ON RENTS AND NEIGHBORHOODS**

Since the 1970s, the research community has observed the wide-reaching housing impacts triggered by the large numbers of students in university towns. In recent years, greater attention has been given to the effects of students on local housing markets and neighborhood identities (Gumprecht, 2006; Hubbard, 2008; Ogur, 1973; Penton, 2011). In a model of rental rates in college and non-college towns, Ogur (1973) observed that communities with students had higher population densities, which were correlated with a decreased median housing unit size and increased median rental rate per room. Qualitatively, others have described why this trend occurs: landlords make more money renting to a group of students than to a single family, and the high returns of renting to students allow landlords to outbid families seeking to purchase homes, making it difficult for low-income households and first-time homebuyers to find affordable properties (Hubbard, 2008). Expanding student enrollment across U.S. universities suggests that this phenomenon will continue over the coming decades (Penton, 2011).

Some scholars have discussed, though not quantified, the existence of a tipping point at which increasing levels of student rentals in a neighborhood cause living conditions to deteriorate, forcing the departure of families, and creating more vacancies for students to fill (Hubbard, 2008). Gumprecht (2006) found that while students tend to cluster in certain districts, the encroachment of one or two student units can lead to the swift transformation of a neighborhood into a student housing area. One study observed that, in an effort to shield themselves from student advances, residents of faculty neighborhoods near Cornell University attempted to preserve their district through a mix of zoning laws, citizen pressure on landlords, and, in the case of one wealthy faculty community, incorporation as a separate municipal government. This points to an important and often overlooked notion: that faculty, not just students, also impact the local housing market in a university town (Gumprecht, 2006).

Though the presence of students can degrade neighborhood condition, Gumprecht (2006) and Hubbard (2008) also point to the potential for the construction of higher quality apartment towers to induce both gentrification and the alleviation of pressure on home and rental prices. Oversupply of student apartment units, as can occur in periods of rapid development, can also drive down rental prices as developers face demand that falls short of their available stock (Penton, 2011).

### **3.5 LAND USE/ZONING REGULATIONS AND THE HOUSING MARKET**

Although land use and zoning regulations can be critical in preserving livability in rapidly developing areas, they have also been documented to increase housing prices (Anthony 2006; Jaeger 2006; Glaeser and Gyourko 2003). As noted by Jaeger (2006), such increases reflect both the positive effects of protecting amenities of an area and the negative consequences of making land for development scarcer. Glaeser and Gyourko (2003), however, argue that regulations can also increase planning and building costs, and that restrictive land use laws are

to blame for the small collection of places where housing costs dramatically exceed the price of new construction.

Studies of land regulation specific to Oregon have provided similarly mixed results. For example, Wu and Cho (2007) found that Oregon had high levels of land foregone for development compared to other Western states, and Grant, Jaeger, and Plantinga (2011) determined that Portland's urban growth boundary raised property values in some areas. Russell (2003), however, cites Oregon as a state with regulations that effectively balance affordability of housing with environmental concerns, while Liberty (2003) notes the reduction in sprawl the state has achieved.

In short, research suggests that both zoning generally and Oregon policies specifically may increase housing costs even as they protect the environment and promote quality of life. It is up to citizens and policy-makers, then, to weigh the benefits of each, and to find ways to effectively balance those competing concerns.

## **4.0 DATA AND METHODS**

### **4.1 DATA**

Our study utilizes data from multiple sources to improve our understanding of the housing market in Corvallis. First, we constructed and administered a citywide survey focused on obtaining information on demographics, preferences, and select relevant characteristics of renters and homeowners in Corvallis. Second, we obtained information on vacant and soon-to-be vacant rentals through semi-automated collection of internet rental listings. Third, we informed our survey design and modeling through novel integration and utilization of official government data, such as that available from Benton County Assessor's Office and Census Bureau. Our primary goal was to obtain new data to fill in gaps in existing sources to synthesize a comprehensive view of the Corvallis housing market, while documenting our methods, challenges, and opportunities to facilitate future replication and expansion by WNHS.

#### **4.1.1 Survey Data**

In an attempt to get a more detailed understanding of the experiences of renters and homeowners living in Corvallis we designed a survey to explore why Corvallis residents live where they do, what their experience has been living in their current housing situation, and whether their current housing situation reflects what they need and want out of a living situation. The survey was constructed with input from the entire team. To improve response rate, significant efforts were made to keep estimated completion time for respondents less than ten minutes. There were 24 total questions. All but one were asked of renters, but only ten asked of homeowners. Questions were predominantly Yes/No with a few open-ended questions. A Spanish-language version of the survey was constructed, but no additional languages. A copy of the survey appears in Appendix B.

#### **4.1.2 Web Based Data**

The internet has made a wide variety of information more readily available, including classified ads. This project took advantage of several websites of rental listings to help understand the Corvallis and surrounding area rental conditions. While only data from Corvallis were utilized for this report, listings were collected for the primary surrounding areas including Albany and Philomath. To facilitate rapid access and processing of data from large-scale

## Corvallis Area Rental Market Analysis

classified ad sites like Craigslist, custom web data harvesters were written in Python (a computer language) to parse the data. This data collection program was run several times in the early months of April 2012.

Data from disparate websites come with many different fields of information. The primary data source was Craigslist, which yielded over 200 ads with address information at least as accurate as corner locations (e.g. 29<sup>th</sup> and Walnut). This section describes the data used for analysis from all websites, as well as provides statistics about the number of ads and duplicate ads found on those websites.

The data consistently labeled the number of bedrooms, price and location. These are the three pieces of information included in our analysis of the internet data. In some cases, there are clear examples of either improperly parsed data or improperly matched data. These cases were dropped from the analysis to avoid biasing any results. There are 259 unique data points from Corvallis. There may be a few double-counted addresses due to some overlap between accurate addresses and corner addresses (i.e. it is impossible to tell the difference between 2900 Walnut and 29<sup>th</sup> and Walnut). However, we believe that this will be a very small number if any. Once the data were cleaned (see below for details), the total unique observations (favoring Craigslist when duplicated) for each website can be seen in Table 4.1.2-1.

<b>Corvallis Area Rental Market Analysis</b>		
<b>Table 4.1.2-1</b>		
<b>Online Data Sources</b>		
<b>Data Source</b>	<b>Method</b>	<b>Observations</b>
Craigslist	Harvest	185
Direct Homes	Manual	5
GazetteTimes	Harvest	1
hotpads.com	Manual	2
ipmg-inc	Manual	26
Multiple	Manual	10
rentalhouses.com	Manual	1
RentingTime	Manual	10
Sterling Management Group	Manual	4
Trulia	Manual	2
www.mynewplace.com	Manual	5
Zillow.com	Manual	4
Rentals.Com	Harvest	4
<b>TOTAL</b>	N/A	<b>259</b>
N/A = Not Applicable		

Table 4.1.2-2 depicts average (statistical mean) prices for units of various sizes (number of bedrooms) in the online listings. It is notable that mean prices for the same number of bedrooms were lower for the survey results (what renters say they are paying) than for the online listings. It is uncertain what is responsible for this disparity, but we speculate that landlords are more likely to raise rents significantly when residences are vacant, that more expensive residences are vacant at higher rates, or that less expensive residences are less advertised

## Corvallis Area Rental Market Analysis

online. This is discussed in more detail in Section 4.2.5 and Section 5.4 which is on the Corvallis Price Model.

Corvallis Area Rental Market Analysis Table 4.1.2-2 Average Prices by Bedrooms in Online Data		
Number Bedrooms	Number Observations	Mean Price <sup>1</sup>
0	8	\$525
1	64	\$639
2	84	\$843
3	64	\$1,296
4	17	\$1,740
5	8	\$1,909
6	2	\$1,703
7	1	\$2,400
Unknown	11	\$514

<sup>1</sup> Mean Price within Corvallis

### 4.1.3 Geographic Information Systems Data

The data gathered from online harvesting and our survey allowed us to utilize GIS to analyze spatial relationships in rental prices. A number of online resources were accessed in an attempt to generate a comprehensive list of all vacant rental properties in April of 2012. As described in detail in Section 4.2.3, the following data were gathered as available: rental prices, rental addresses, number of bedrooms, and number of bathrooms. It would have been ideal to also gather square footage to improve the accuracy of our estimates, but it was not available from most sources. In total, 259 rental listings were generated in data collection.

## 4.2 METHODS

### 4.2.1 Descriptive Statistics

#### 4.2.1.1 Sampling Methods

The survey utilized a stratified random sample of households within the Corvallis city limits. Publicly available data from the Benton County Assessor's Office were used to help determine household selection. Cases where the owner address on file differed from the property address and the property was zoned residential were deemed likely to be rentals. The city of Corvallis was divided into eight districts and then 16 sub-districts, and most sub-districts were then split even further into zones that had at least 100 estimated rental properties. Within each zone, two to four cluster points – points that suggested a relatively high density of rental properties – were selected. From there, canvassing teams were instructed to canvass every house around the cluster point, with the caveat that teams had some license to move around based on visual identification. Information was collected regarding which block of which street the respondent property was located. This approach protects anonymity of potential respondents. The canvassing schedule was such that zones were visited at random and different times, in an attempt to account for varying work schedules. Shift times and locations were randomly selected, to give an equal chance at a day or evening time as well as a weekday or weekend time. However, because of the number of canvassing shifts (~23) and number of

zones (~30), not every zone was canvassed; uncanvassed zones were randomly determined. Shift lengths were two hours and during the week, shifts started at 10 AM, 12 PM, 2 PM, 4 PM and 6 PM; on the weekend, shifts started at 11 AM, 1 PM, and 3 PM.

#### **4.2.1.2 Survey Delivery Method**

Canvassing teams consisted of pairs; each pair was given license to split up if the canvassers were comfortable and observed basic safety precautions. Canvassers maintained a record of each residence they attempted to contact that included the outcome of the visit (Participated/Refused/Not Home) as well as a subjective visual ranking of the quality of the residence (High/Medium/Low) as determined by the canvasser. When a respondent participated in the survey, it was generally orally delivered (canvassers were given a script), with the caveat that for the last three demographic questions (age, ethnicity and income) respondents were given the option to respond in writing on the survey itself and then place the completed survey in an envelope such that the canvassers did not know the answers given by the respondent. This method was chosen to increase response rates and accuracy of demographic questions. In cases where the respondent spoke Spanish and not English, a Spanish script and survey were handed to the respondent for them to fill out on their own when the canvasser did not speak Spanish; no respondents speaking languages other than English or Spanish were encountered. Over the course of the week of May 7<sup>th</sup>-13<sup>th</sup>, 2012 sixteen teams of two each completed a total of four hours administering surveys door to door to Corvallis residents. In total, 64 hours were spent administering surveys in the field.

#### **4.2.2 Collection Method of Web Based Data**

Data gathering utilized both a manual search process for websites with a small number of listings in the Corvallis area and software “web harvesters” for websites with a large number of listings. Details about which sites were manually searched are available in Appendix C. This section describes both the automated portion and the manual portion of the web-searching.

##### **4.2.2.1 Web Harvester**

The use of automated web harvesters has increased in the field of economics in recent years. The increasing accessibility of computer programming languages and the growing number of websites with econometric data has helped drive this trend (Edelman, 2012). A web harvester is simply a program that automatically starts at a given web address, saves the data to a local disk and then navigates to all relevant links, also saving those pages. It creates a large archive of the website at the time of the harvest. Then, the structured HTML data are parsed into traditional spreadsheet tables for easy analysis with traditional statistical analysis tools. The internet is typically well-structured to facilitate cheap, large-scale display of user data. Accordingly, it can be easily parsed down into its component parts. The relatively unstructured nature of Craigslist and other similar websites where users put up their own ads requires the use of pattern searches using regular expressions to find specific information. For example, price is easy to find in a page because it almost always either starts with a \$ or ends with “dollars.”

The harvester for this project was built using Python, an open source high-level programming language. For parsing of data, it employed the BeautifulSoup library, which allows for parsing of HTML data. Harvests were conducted on three different days at least one-week apart to capture any new data. This dataset includes three weeks of harvests (April 5<sup>th</sup>, April 13<sup>th</sup> and April 22<sup>th</sup>). Table 4.2.2.1-1 illustrates the number of ads harvested in that time frame for all communities on Craigslist (other harvested websites yielded largely insignificant numbers of

## Corvallis Area Rental Market Analysis

results). Data were manually checked for duplicates, address types and other issues, which increased the marginal cost of each additional harvest. However, more sophisticated programmers could probably automate many of these processes.

<b>Corvallis Area Rental Market Analysis</b>				
<b>Table 4.2.2.1-1</b>				
<b>Harvested Data by Date</b>				
Date of Harvest	Number of Ads	Number of Unique Ads	Number of Clean Addresses <sup>1</sup>	Number of Corner Addresses <sup>2</sup>
April, 5 2012	853	491	106	74
April 13, 2012	336	159	38	14
April 22, 2012	235	135	32	25
<sup>1</sup> Clean address refers to listings where full address was provided in listing				
<sup>2</sup> Corner Address refers to listings which only provided block intersections				

### 4.2.2.2 Manual Searching

To ensure complete canvassing of websites and avoid systematic bias in the sample due to missing observations, several websites were manually canvassed by the group. These websites are identified in Appendix C. Each member of the group was assigned a website to examine between April 13<sup>th</sup> to April 19<sup>th</sup>. Using Google Docs forms, the group members identified key features including address, unit type, number of bedrooms, number of bathrooms and any notes considered relevant. These data were manually checked for duplicates and inconsistencies. Table 4.2.2.2-1 indicates the totals for unique observations of manually searched data.

<b>Corvallis Area Rental Market Analysis</b>		
<b>Table 4.2.2.2-1</b>		
<b>Average Price by Bedrooms in Manually Obtained Data</b>		
Number Bedrooms	Number Observations	Mean Price
0	7	\$515
1	21	\$686
2	28	\$847
3	8	\$1,150
4	2	\$2,298
5	3	\$2,415

### 4.2.2.3 Data Preparation

The dataset was combined with the data from automated web harvests to facilitate analysis. This required manual checking for duplicates and the sacrifice of some detailed information that was not available across multiple websites. When a harvested data source and a manually searched data source were duplicates, the harvested source was favored to identify the most cost-effective approach for finding these types of data.

### 4.2.3 Geographic Information Systems

#### 4.2.3.1 Data Cleaning Method

Data were sorted by address and manually entered into a pre-existing shapefile of all addresses in the city provided by The City of Corvallis. In order to normalize the data, rental price was divided by the number of bedrooms and the analysis was conducted as a ratio of price to bedroom. Housing price studies generally normalize by area (square feet, square meters), however, this information was not available for the given rental data (Olmo, J.C. 1995, Martinez M.G., Lorenzo J.M.M., and Rubio N.G. 2000, Montero J.M. and Larraz B. 2011). While price per square foot would have been ideal, it was found that number of bedrooms is a good predictor of price in Corvallis (refer to Section 4.2.5 and Section 5.4). Due to this imperfect normalization, rental values with the same geographic location had to be averaged. For example, the mean was taken of price/bedroom at apartment complexes where rental values were available for 1, 2, and 3 bedroom apartments. The mean price/bedroom was taken for 16 total data points. Additionally, a portion of the data could not be geo-referenced due to a number of factors: rental advertisement did not include number of bedrooms (8), studios were eliminated because they could not be considered 1 bedroom rentals (6), intersections could not be geo-referenced (78), duplicates, and addresses that did not exist in the pre-existing database. After data cleaning, 124 addresses with rental price/bedroom were entered into a GIS using ESRI's ArcGIS10.1 software.

#### 4.2.3.2 Data Processing Method

The rental data were inspected visually for any outliers or potential errors (refer to Table 4.2.3.2-1). Next, the data were analyzed for spatial autocorrelation using a Moran's I statistical test. Spatial autocorrelation occurs when attributes are correlated with one another because of their locational proximity. Here, this would mean that the rental price at any given location is correlated with rental prices of other units in close proximity. This phenomenon is sometimes referred to as the "neighborhood effect." The data were examined using a frequency distribution, a semivariogram, and a trend analysis.

Based on previous studies on spatial autocorrelation in housing prices, the rental prices across the city were estimated using a geostatistical interpolation method known as kriging (Dubin R.A. 1992). Spatial interpolation is a well-known method of real-estate appraisal which considers spatial patterns to explain market variability (Pagourtzi, E., V. Assimakopoulos, T. Hatzichristos, and French N. 2003). Here, it is used to estimate rental values across the city of Corvallis based on known rental values in certain locations. Ordinary kriging with a spherical model was utilized to reflect the methods of similar studies (McCluskey W.J., Deddis W.G., and Lamont I.G. 1999, Martinez M.G., Lorenzo J.M.M., and Rubio N.G. 2000, Montero J.M. and Larraz B. 2011). Additionally, a second order trend was fitted to the data to reflect the pattern in Corvallis where housing prices are highest in the center of the city (where OSU is located), a technique also used in previous studies (Olmo J.C. 1995).

Corvallis Area Rental Market Analysis		
Table 4.2.3.2-1		
Error Measurements for the Rental Prediction Surface in Corvallis		
Mean Prediction Error	Root Mean Square	Root-Mean-Square Standardized
-3.33	123.56	0.96

The mean prediction error, root mean square, and root-mean-square standardized were utilized to measure the accuracy of the predicted rental surface. A mean prediction error is best closest

**Corvallis Area Rental Market Analysis**

to 0, a smaller root mean square is best, and a root-mean-square standardized closest to 1 is best.

Corvallis Area Rental Market Analysis Table 4.2.3.2-2 Cross-Validation Statistics	
Mean Error	Range of Error
6.22	-318.93 to 351.61

Table 4.2.3.2-2 presents cross-validation statistics using a subset of data utilized to validate the predicted rental surface.

**4.2.4 Choice Models**

**4.2.4.1 Housing Type Choice Model**

Choice models employ a type of regression that identifies the probability of a choice being made. In the context of the housing type choice model, a binomial logistic regression was employed. This is the simplest choice model and it computes how different characteristics of people impact the odds of a binary decision (yes or no) they will make. For this model, the two options are live in a house and live in an apartment. To enable this analysis, several different categories of housing were aggregated into either houses or apartments. The “house” category included houses, townhouses, and manufactured homes. The “apartment” category included apartments, duplexes and quadplexes.

The logit model is both unbiased and efficient when key assumptions are met. The initial model does not exhibit signs of heteroskedasticity or multicollinearity that may impact our results. However, our GIS model clearly indicates spatial correlation is a factor in pricing and we assume that spatial autocorrelation may be an issue in this choice model. Accordingly, clustered standard errors are employed for hypothesis testing with the survey tracts as the areas. With these corrections, the model meets the key assumptions for unbiasedness and efficiency, consequently results should be reasonably accurate and reliable.

Corvallis Area Rental Market Analysis Table 4.2.4.1-1 Expected Impacts of Variables on the Probability of Choosing an Apartment		
Variable	Expected Sign	Description
STUDENT (1 = Student)	+	Expected to increase probability of choosing an apartment because of the temporary nature of their residency and the ease of living associated with apartment living.
AGE	-	Expected to increase the probability of choosing a house because older individuals will tend to be more established. This will also likely capture some income effects to a certain point (retirement) because age is typically correlated with increasing income.
NUMBER OF ADULTS	-	Expected to increase the probability of choosing a home because more adults enjoy more space and an apartment is limited in space.
NUMBER OF MINORS	-	Expected to increase the probability of choosing a home because families are expected to prefer the privacy of a house over an apartment.
ETH_W (1 = Non-Minority)	-	Expected to decrease the probability of choosing an apartment as a control factor. It likely reflects more of an income effect than a true causal “minority” effect.

**4.2.4.2 Bedroom Choice Model**

Similar to the housing type choice above, renters will make a decision about the number of bedrooms they prefer in a housing unit. This model employs a simple logistic regression approach to identify each household’s probability of choosing each of four bedroom configurations. The configurations are a one bedroom, a two bedroom, a three bedroom or four or more bedrooms. The decision to limit the maximum bedroom size to four is due to the extremely limited sample in the five, six and seven bedroom categories. The binary logistic regression approach was taken to simplify interpretation and because the data violate the proportional odds assumption of an ordinal regression making interpretation challenging. Multinomial choice models could have been a good option, but their interpretation is also unclear. Additionally, with the increased complexity comes a variety of more restrictive assumptions. Binary logistic regression allows us to review an individual’s independent probabilities of selecting a housing type. It should be thought of as “the probability a household will choose an ‘x’ bedroom layout over all other types.” It reflects a household consumption preference.

In order for a logit model to be unbiased and efficient, it needs to meet certain assumptions. The model does not exhibit heteroskedasticity and the variables are not collinear. However, to correct for potential spatial autocorrelation, clustered standard errors are employed for hypothesis testing. The correction means that the model meets all assumptions for unbiasedness and efficiency.

Corvallis Area Rental Market Analysis Table 4.2.4.2-1 Expected Effects of Variables on the Probability of Choosing More Bedrooms		
Variable	Expected Sign	Description
STUDENT (1 = Student)	-	Expected to increase the probability of smaller bedroom configurations, although maybe not significantly due to the tendency to filter into larger houses with more paying adults.
AGE	+	Expected to increase the probability of larger bedroom configurations, but not as a causal factor. This is included as a control and may more likely cover variation due to higher income and other factors associated with aging.
NUMBER OF ADULTS	+	Expected to increase the probability of larger bedroom configurations because as the number of adults increases it is likely that a separate living space will be preferred for each of them. This assumption holds only above 2 adults due to the possibility of marriage.
NUMBER OF MINORS	+	Expected to increase the probability of larger bedroom configurations for the same reason as ADULTS. However, as children are brought into the home, it is less likely that a bedroom configuration change is necessary as many children share rooms with siblings.
ETH_W (1 = Non-minority)	-	Included as a control, and like AGE, may reflect factors other than the effect of being a minority. It will probably decrease the probability of larger bedroom configurations by also reflecting a general tendency towards lower incomes.

**4.2.5 Corvallis Market Price Model**

Ordinary least squares (OLS) regression techniques were used to estimate market rents for Corvallis. This was done using data collected from the 126 rental units included in the Corvallis survey we conducted in the city (refer to Appendix B). Two observations had to be dropped

## Corvallis Area Rental Market Analysis

because they were so uncommon (one had 6 bedrooms and the other had 5 bathrooms) that they would have required a separate category and caused skewed predictions.

One obstacle to the analysis was the hypothesized non-linear relationship between price and the number of bedrooms and bathrooms. Because it was predicted that the marginal price change resulting from upgrading from a one-bedroom to a two-bedroom unit would be different from the change in price between a four-bedroom and five-bedroom unit, standard regression of price on the number of bedrooms was not appropriate. Instead, the number of bedrooms and bathrooms in each unit were coded into indicator variables and used to explain changes in price.

All models were estimated using hc-3 (heteroskedasticity corrected) standard errors, which account for any increase in error for larger variable values. Such standard errors set higher thresholds for statistical significance than normal regression results, and thus produce particularly robust results.

## 5.0 RESULTS

### 5.1 DESCRIPTIVE STATISTICS

Surveyors knocked on a total of 834 doors and recorded 270 responses and 117 refusals (69.8% response rate for individuals at home). Descriptive statistics of the surveyed respondents and their households as well as inferential statistics indicating relationships between a variety of demographic, attitudinal, and household variables are discussed below.

Table 5.1-1 provides a breakdown of the response rate for the survey, the distribution of housing types surveyed, the percentage of owners and renters, and the median monthly payments of respondents. The majority of surveys (66%) were conducted at houses, followed by apartments (26%), and the number of renters and owners was approximately equal. Median monthly payments are for the entire residence, unadjusted for number of residents and a non-significant number of owners provided values for monthly mortgage payments, preventing direct comparison in expenditures between owners and renters.

<b>Corvallis Area Rental Market Analysis Table 5.1-1 Survey Descriptive Statistics</b>	
<b>Survey Breakdown</b>	
Survey stops	834
Participated	270
Refused	117
Not Home	447
Response Rate	69.8%
<b>Percentage of Ownership</b>	
Own Housing <sup>1</sup>	47.0%
Rent Housing <sup>2</sup>	53.0%
<b>Percentage of Housing Type</b>	
Apartment/Condo <sup>3</sup>	25.9%
Duplex/Quadplex <sup>4</sup>	2.7%
House/Townhouse <sup>5</sup>	65.9%
Manufactured/Other <sup>6</sup>	5.5%
<b>(continued)</b>	

**Corvallis Area Rental Market Analysis**

<b>Corvallis Area Rental Market Analysis Table 5.1-1 Survey Descriptive Statistics</b>	
<b>Median Monthly Payment</b>	
Homeowner Payments	\$1,300
Renter Payments	\$925
<sup>1</sup> Sample Size (N) for "Own Housing" = 126 <sup>2</sup> Sample Size (N) for "Rent Housing" = 142 <sup>3</sup> Sample Size (N) for "Apartment/Condo" = 199 <sup>4</sup> Sample Size (N) for "Duplex/Quadplex" = 21 <sup>5</sup> Sample Size (N) for "House/Townhouse" = 506 <sup>6</sup> Sample Size (N) for "Manufactured/Other" = 42	

Table 5.1-2 presents descriptive statistics for the self-reported ethnicity responses for survey respondents. The U.S. 2010 Census Percentage column presents values from the 2010 U.S. Census for the city of Corvallis (U.S. Census Bureau, 2010). It is notable that these values are very close to official estimates. Given the relatively low number of total respondents (270), the similarity of the distribution of ethnicity indicates our survey sampling methodology was effective. In combination with the relatively small sample, the low overall number of ethnic minorities in the Corvallis area hinders our ability to analyze minority-specific market factors, though ethnicity was found to be a statistically significant factor in some analyses.

<b>Corvallis Area Rental Market Analysis Table 5.1-2 Survey Respondent Self-Reported Ethnicity</b>			
<b>Ethnicity</b>	<b>Sample Size (N)</b>	<b>Percentage from Survey</b>	<b>U.S. 2010 Census (for Corvallis)</b>
White (Non-Hispanic)	206	82.7%	83.8%
Asian / Pacific Islander	15	6.0%	7.3%
Black / African American	2	0.8%	1.1%
Hispanic	13	5.2%	7.4%
Native American	2	0.8%	0.7%
Multi-Ethnic	1	0.4%	4.0%
Other <sup>1</sup>	10	4.0%	2.8%
<sup>1</sup> Includes designation "American"			

Table 5.1-3 shows the distribution of rental properties by bedroom with mean and median monthly rents. The relationship between rental price and number of bedrooms in a unit is

<b>Corvallis Area Rental Market Analysis Table 5.1-3 Rental Property Monthly Rent by Bedroom</b>				
<b>Bedrooms</b>	<b>Sample Size (N)</b>	<b>Percentage</b>	<b>Mean</b>	<b>Median</b>
1	14	10.5%	\$566	\$548
2	55	41.4%	\$777	\$700
3	39	29.3%	\$1,162	\$1,175
4	16	12.0%	\$1,579	\$1,550
5	8	6.0%	\$1,973	\$1,888
6	1	0.8%	\$1,800	\$1,800
Total	133	100%	1,043	\$925

discussed in detail in the price model section of this report. Descriptively, this table primarily shows that the majority of rental units found by the survey were two (41.4%) or three (29.3%) bedroom residences. It is unknown to what degree this accurately represents the distribution of

**Corvallis Area Rental Market Analysis**

rentals by bedroom in Corvallis, but it may be indicative of an insufficient supply of single bedroom units.

Table 5.1-4 presents an independent samples t-test of the difference in age between owners and renters, indicating a statistically significant difference, with renters clearly younger than homeowners. This is undoubtedly impacted by the number of students in our survey sample (approximately 30%), and is not unexpected.

Corvallis Area Rental Market Analysis Table 5.1-4 Renter and Homeowner Age			
	Mean Age	Standard Deviation	Standard Error
Own	54.7	19.5	1.8
Rent	33.5	15.0	1.3
t-value	9.7		
p-value	<.001		
Effect size ( $r_{pb}$ )	.52		

Table 5.1-5 is a cross-tabulation of respondent household income for renters and owners. This table indicates there is a statistically significant relationship between ownership status and income, with renters disproportionately likely to be found in the lowest income categories (particularly the 0 to 25,000 dollar per year household income category). Because income is recorded for entire household, this difference may be further magnified by the larger number of adults per residence in rental units as compared to houses.

Corvallis Area Rental Market Analysis Table 5.1-5 Renter and Homeowner Income			
Income	Own	Rent	Total
0-25K	13.6%	57.6%	37.6%
26-40K	20.0%	22.0%	21.1%
41-60K	23.6%	6.8%	14.5%
61-80K	18.2%	6.1%	11.6%
81K +	24.5%	7.6%	15.3%
$\chi^2$ value	65.7		
p-value	<.001		
Cramer's V effect size	.50		

Assessing the link between ownership status and income may also be complicated by the large number of students who report little to no income. Thus, we focus just on non-student households in Table 5.1-6. The relationship found in Table 5.1-5 is repeated in the non-student households in Table 5.1-6. Although a smaller fraction of non-student renters are concentrated in the lowest income group (in comparison to the analysis including students), incomes for renters are lower, with a full two-thirds (67%) of non-student rental households in Corvallis earning under \$40,000 per year.

Table 5.1-7 compares respondent household income for student and non-student renters. This table indicates a statistically significant relationship between income and status as a full-time student where students are very likely to fall into the lowest income categories. Non-student renters are also overrepresented in the lowest income category, but more evenly represented in

**Corvallis Area Rental Market Analysis**

higher categories. In interpreting this table, it is important to recognize that student renters are

<b>Corvallis Area Rental Market Analysis Table 5.1-6 Non-Student Renter and Homeowner Income</b>			
<b>Income</b>	<b>Own</b>	<b>Rent</b>	<b>Total</b>
0-25K	10.2%	41.4%	23.2%
26-40K	21.4%	25.7%	23.2%
41-60K	24.5%	8.6%	17.9%
61-80K	17.3%	10.0%	14.3%
81K +	26.5%	14.3%	21.4%
$\chi^2$ value	28.4		
p-value	<.001		
Cramer's V effect size	.41		

likely to derive support from sources other than personal income and thus are unlikely to be subject to the same factors as non-student renters, but are likely to compete for similar rental units particularly in the constrained market described throughout this report.

<b>Corvallis Area Rental Market Analysis Table 5.1-7 Student and Non-Student Renter Income</b>			
<b>Income</b>	<b>Student</b>	<b>Non-Student</b>	<b>Total</b>
0-25K	75.8%	41.4%	57.6%
26-40K	17.7%	25.7%	22.0%
41-60K	4.8%	8.6%	6.8%
61-80K	1.6%	10.0%	6.1%
81K +	0.0%	14.3%	7.6%
$\chi^2$ value	25.5		
p-value	<.001		
Cramer's V effect size	.40		

Table 5.1-8 illustrates the difference in respondent perception of difficulty in finding affordable housing by duration of current residence. Overall 53% of renters surveyed reported difficulty in finding an affordable place to live. (Interestingly, not shown in this table, approximately 48% of those who found it difficult reported being able to obtain their ideal living

<b>Corvallis Area Rental Market Analysis Table 5.1-8 Student and Non-Student Renter Income</b>			
<b>Survey Question</b>	<b>Living in home for 1 year or less</b>	<b>Living in home for over 1 year</b>	<b>Total</b>
No – It was not difficult for me to find an affordable place to live	55.2%	38.8%	47.0%
Yes – It was difficult for me to find an affordable place to live	44.8%	61.2%	53.0%
$\chi^2$ value	3.6		
p-value	.056		
Phi effect size	.164		

situation). Unexpectedly, those who had moved more recently described less difficulty than those who had not recently moved (44.8% v. 61.2%). This difference is not statistically significant so may be the result of mere chance. It is possible that a better baseline for difficulty finding affordable housing could be obtained with a larger sample that could capture more residents of sufficient tenure to predate the current housing market constriction. It is also possible that

**Corvallis Area Rental Market Analysis**

recently moving renters have adapted to the constricted housing market and perceptions of difficulty in finding affordable housing have changed.

Table 5.1-9 is a cross-tabulation between perception of difficulty in finding affordable housing and respondent household income separated into lowest income and all higher categories. We did not find a statistically significant relationship, indicating renters of low and higher income had relatively equal perceptions of difficulty in finding affordable housing.

<b>Corvallis Area Rental Market Analysis Table 5.1-9 Difficulty Locating Affordable Housing by Income</b>			
<b>Survey Question</b>	<b>Low income (0-25K)</b>	<b>Above low income (26K +)</b>	<b>Total</b>
No – It was not difficult for me to find an affordable place to live	43.1%	51.9%	46.8%
Yes – It was difficult for me to find an affordable place to live	56.9%	48.1%	53.2%
$\chi^2$ value	.96		
p-value	.33		
Phi effect size	.09		

Our survey also attempted to capture homeowner opinions about rental properties. 34.9% of homeowner respondents indicated beliefs that rental properties negatively impact their neighborhood. Of those respondents reporting negative impacts, Table 5.1-10 depicts the breakdown of concern areas of homeowners. Percentages sum to over 100 due to some respondents reporting multiple areas of concern. It is worth emphasizing, on the other hand, that 65.1% of homeowners reported that rental properties did not negatively impact their neighborhoods. We were unable to assess the degree to which homeowners opinions were related to actual number or rental properties in their vicinity.

<b>Corvallis Area Rental Market Analysis Table 5.1-10 Homeowner Reported Impact of Rental Properties</b>	
Neighborhood Appearance	32.0%
Noise	25.3%
Property Values	20.0%
Other <sup>1</sup>	18.7%
Crime and Safety	8.0%
Relationships with Neighbors	8.0%
Street Parking	6.7%
<sup>1</sup> Reported impacts under “Other” includes cleanliness, college, density, different lifestyles, smoking, and traffic	

Table 5.1-11 depicts renters' relative prioritization of various aspects of residences when choosing where to live. As can be seen below, location, affordability, and neighborhood dominate renter priorities, trailed by quality and living space.

## Corvallis Area Rental Market Analysis

Corvallis Area Rental Market Analysis Table 5.1-11 Renter Priorities When Selecting Places to Live		
Priority	Number of Times Mentioned by Respondents <sup>1</sup>	Percent of Respondents who Mention this Priority
Location	85	62%
Price/Affordability	74	54%
Quality/Condition/Maintenance	49	36%
Neighborhood/Neighbors	38	28%
Size/Living Space	34	25%
Other	25	18%
In-Home Amenities	22	16%
Safety	20	15%
Noise	16	12%
Yard	13	9%
Pet Friendly	12	9%
Positive Relationship with Landlord	7	5%
Parking/Traffic	5	4%

<sup>1</sup> Sample Size (N) = 137

## 5.2 GEOGRAPHIC INFORMATION SYSTEMS

Figure 5.2-1 shows the city of Corvallis and the locations where listed rentals appeared. Larger circles on the map indicate high priced (per bedroom) rental properties, and smaller circles indicate cheaper units. Circles (of any size) appear concentrated near OSU and with other clusters in Southtown, the southwest corner of town, and a cluster in along neighborhoods near 9<sup>th</sup> Street in the northeast.

Figure 5.2-2 represents the results of the interpolation of the rental data shown in Figure 5.2-1. The larger outline of Corvallis indicates with colors the estimated price per bedroom at different locations throughout the city. The brightest red/orange areas are the most expensive and the lighter pastel colors ranging toward green are the less expensive units. Rental prices are highest near OSU, and lowest in the southeast portion of the city. Price per bedroom ranges from \$109-\$825, with an average price of \$467.

Figure 5.2-2 also shows a smaller image of the city limits in gray scale, portraying the potential error in our estimates for different locations (price/bedroom). The prediction surface is more accurate in the center of the city (where most of the data points were located) and less accurate in the corners of the city. In particular, there is large error in the southwest and northeast portions of the city. The model used to predict these prices had some error and perhaps could benefit from a different kriging method (Table 4.2.3.2-1, Table 4.2.3.2-2). Without further and repeated studies, it is difficult to draw conclusions about the strength of the model. Future studies might include analyzing seasonal trends in rental prices (which may be important with the influx of students in the fall) and trends over time as the university system grows.

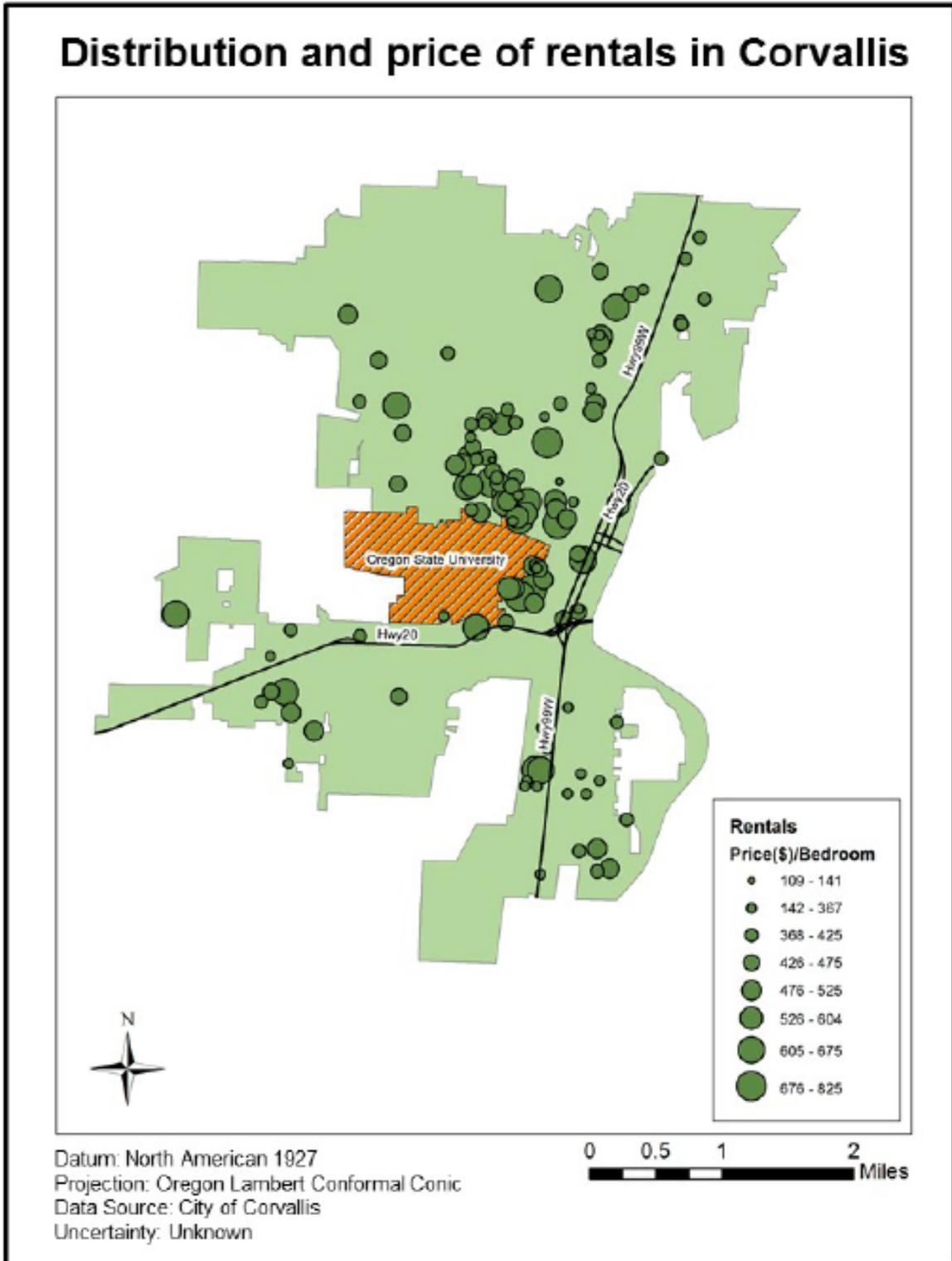


Figure 5.2-1: Distribution and Price of Rentals in Corvallis

# Distribution of Rental Housing Prices in Corvallis

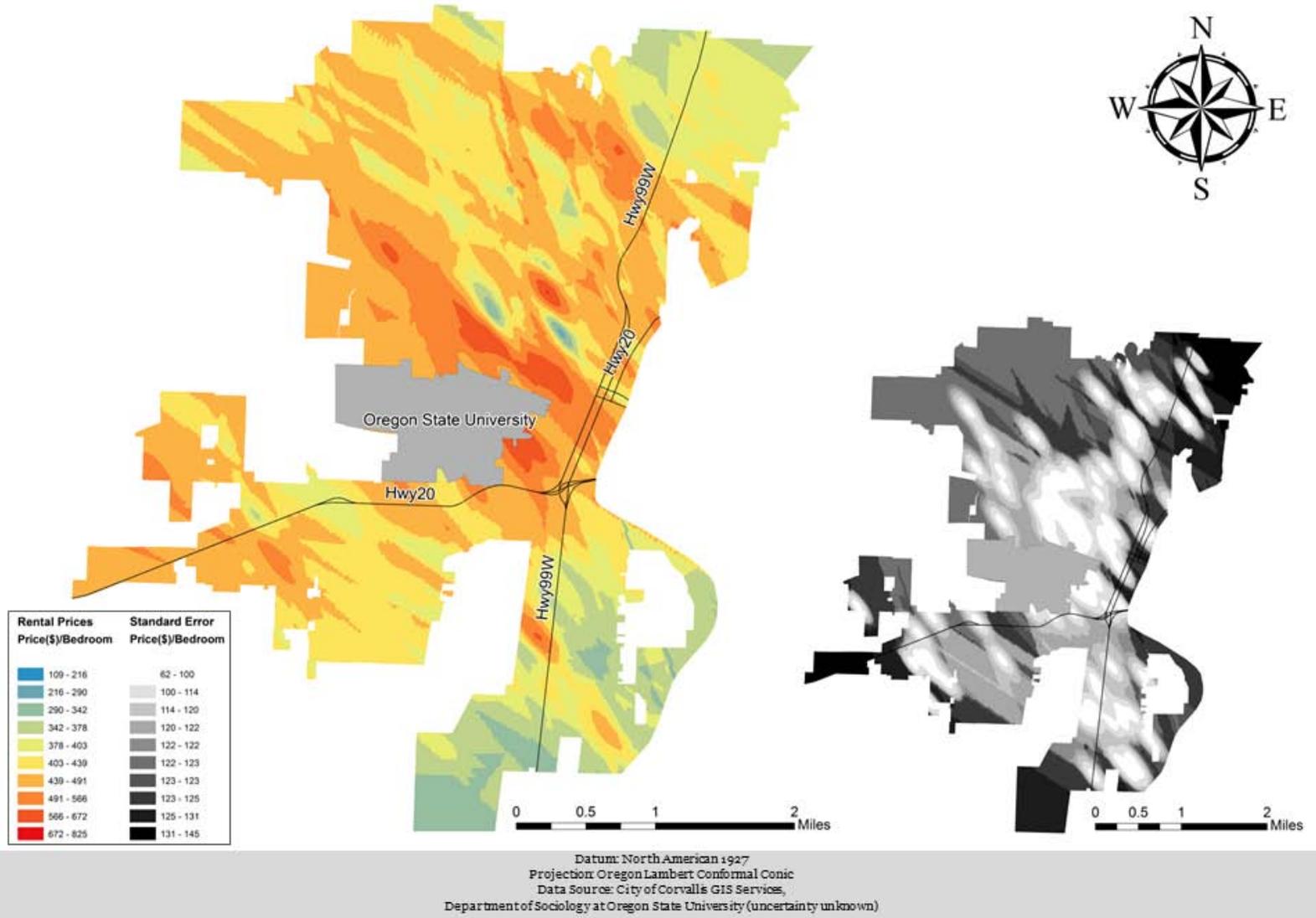


Figure 5.2-2: Distribution of Rental Housing Prices in Corvallis

## Corvallis Area Rental Market Analysis

There are a number of sources of potential error contributing to the uncertainty of the rental price predictions. The rental data were collected from a number of online databases, which do not fully represent all rentals. It is also important to remember that the map is based on data collected in the Spring and may not reflect prices at other times of the year. We also do not know what is the level of error in the pre-existing address database for the City of Corvallis. Additionally, while kriging interpolation has been used for a number of different housing price studies, there have been few studies that utilize kriging for rental housing analysis to reference here. In short, the accuracy and uncertainty associated with this interpolation is largely unknown although the map does use the best available data and methods.

### 5.3 CHOICE MODELS

#### 5.3.1 Housing Type Choice Model

The model is jointly significant and suggests that being a student and age has no bearing on whether someone prefers an apartment or a house. As the number of adults in the household goes up, the odds go down that the household will choose an apartment; for each additional adult, the residence is .27 times less likely to be an apartment (73% as likely to be an apartment). The same story holds for minors, but for each additional child in the house, the odds of choosing an apartment are .59 times less likely (41% as likely to choose an apartment). Finally, whites are .20 times less likely to choose an apartment than a house as compared to minorities. This model is corrected for spatial autocorrelation and does not exhibit problems from multicollinearity or heteroskedasticity which could inflate or deflate the significance levels. Of the total possible sample of renters, it uses 151 observations.

Table 5.3.1-1 shows the results of the logistic regression. The “Odds Ratio” can be interpreted as the effect on the odds of selecting an apartment, holding other factors constant. A value greater than “one” indicates an increased chance of selecting an apartment, while a value below “one” indicates a reduced chance. The column  $P > |z|$  indicates the significance level of the finding. All factors that are significant at a greater than 95% confidence level are indicated. An example of the interpretation: “A household with two adults is .27 times less likely to choose an apartment than an apartment with one adult, holding all other factors constant.”

Corvallis Area Rental Market Analysis Table 5.3.1-1 Housing Choice Model with Odds Ratios		
Variable	Odds Ratio	Significance level ( $P >  z $ )
STUDENT	1.62	0.411
AGE	0.97	0.177
ADULTS	0.27 <sup>1</sup>	0.001
MINORS	0.59 <sup>2</sup>	0.040
ETH_W	.20 <sup>2</sup>	0.023
CONSTANT	121.6 <sup>1</sup>	0.009
<sup>1</sup> Significant at $p < .01$ <sup>2</sup> Significant at $p < .05$		

Figure 5.3.1-1 illustrates the probability of choosing an apartment over a house given a number of adults, with each line representing a different number of minors in the household. The interaction effect is insignificant, but it is clear the importance of both factors in housing type choices.

Corvallis Area Rental Market Analysis

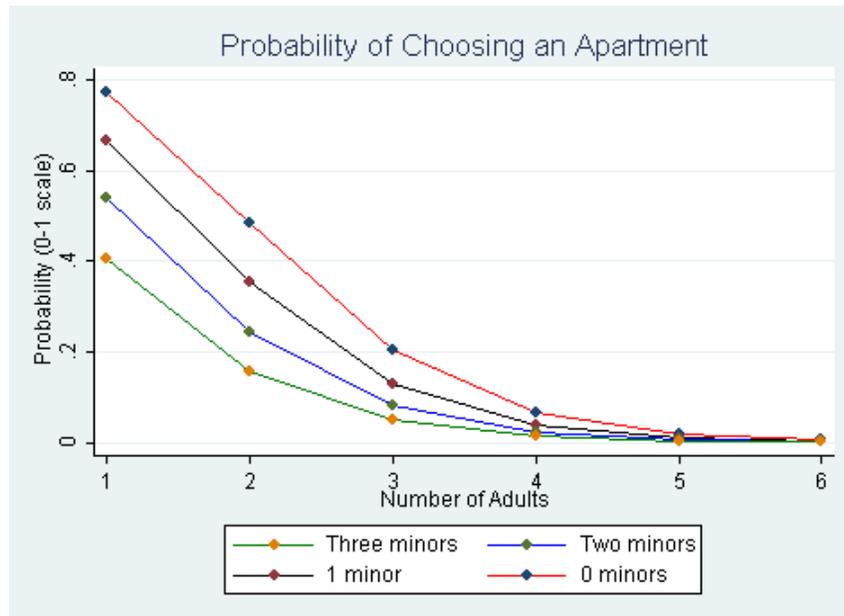


Figure 5.3.1-1: Probability of Choosing an Apartment by Number of Adults and Minors

Figure 5.3.1-2 indicates the difference between non-minorities and minorities in the probability of choosing an apartment given a range of values for adults. The red line represents the probability for a minority group member and the black line is the probability for non-minorities holding all else constant. Here, we can interpret the results as suggesting that ethnic minorities are more likely to choose to live in an apartment than a white person, assuming the same number of adults.

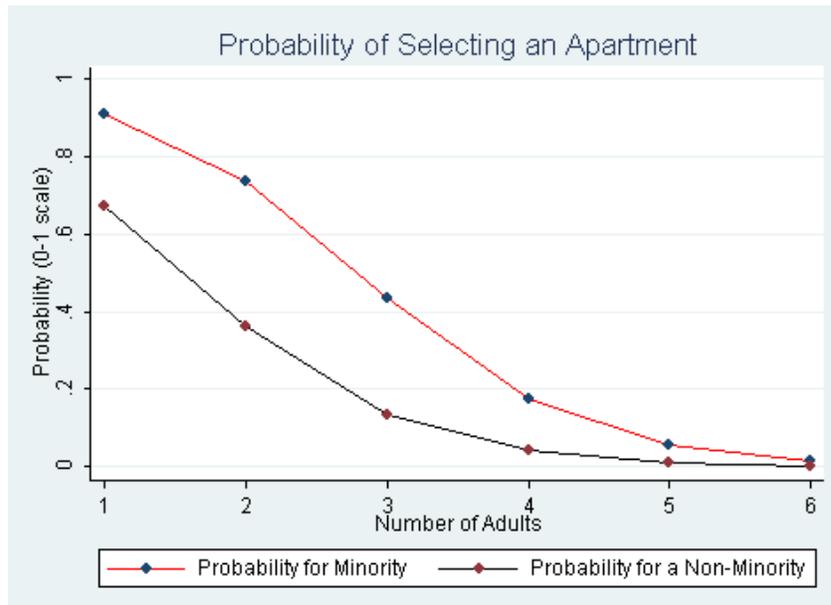


Figure 5.3.1-2: Probability of Selecting an Apartment by Number of Adults and Minority Identification

### 5.3.2 Bedroom Type Choice Model

Table 5.3.2-1 depicts four of the logit models, all of which are jointly significant. The result for each variable varies across the different bedroom configuration. It is surprising that the 3 bedroom model has only one significant variable, but it is clear that the number of adults is the key indicator across the four models. As the number of adults increases the probability of choosing a smaller bedroom configuration decreases. The student variable is significant only in the one bedroom configuration, suggesting that being a student only affects the bedroom choice when looking at one bedroom configurations. Its effect is to greatly increase the probability of choosing a one bedroom layout. (This observation is especially interesting given the suggestion presented to the project team regarding a potentially large need for single-bedroom units in Corvallis. It is possible that such a need exists, but this data does not uncover it.) Number of minors is also only significant in the one bedroom configuration and significantly decreases the probability of choosing a one bedroom residence. Ethnicity is significant across all categories except for the four bedroom layout. Being white decreases the probability of being in smaller bedroom units. Finally, age is insignificant across all categories except for the four bedroom layout. Appendix D provides five additional probability graphs for a traditional four member family choosing an apartment, one bedroom, two bedroom, three bedroom, and four bedroom based on age.

Corvallis Area Rental Market Analysis Table 5.3.2-1 Bedroom Choice Model with Odds Ratios				
Variable	1 Bedroom	2 Bedrooms	3 Bedrooms	4 Bedrooms
STUDENT	6.347062 <sup>1</sup>	1.098542	1.705481	.8892561
AGE	0.955553	.9799459	1.002915	1.039172 <sup>1</sup>
ADULTS	0.004533 <sup>1</sup>	.3440307 <sup>1</sup>	.9624226	6.146342 <sup>1</sup>
MINORS	0.201434 <sup>1</sup>	0.7207556	0.6944231	1.400649
ETH_W	0.139276 <sup>1</sup>	0.2859897 <sup>1</sup>	.2618274 <sup>1</sup>	1.570444
CONSTANT	11369.56 <sup>1</sup>	39.7444	6.626469	0.000886 <sup>1</sup>

<sup>1</sup> Significant at p<.1

### 5.4 CORVALLIS MARKET PRICE MODEL

Analyzing the Corvallis housing surveys shows that the number of bedrooms in a rental unit explains 67% of variation in price between units, with bedrooms and bathrooms together explaining 73% of price variation. The strong predictive power of bedrooms and bathrooms on price and the use of ordinary least squares statistical analysis allow calculation of the expected increase in rent from adding an additional bedroom or bathroom to a rental unit.

Table 5.4-1 depicts marginal costs of additional bedrooms from our survey data. As expected, the marginal costs of additional bedrooms are far lower than the cost of the first bedroom. The predicted increase in rent from a one-bedroom to a two-bedroom is 175 dollars and additional rooms increase in price, likely because they reflect increases in common space or yard space as well. It is important to note that, because the cost of the first bedroom is spread across more rooms, the overall cost per bedroom decreases or remains steady for larger units.

## Corvallis Area Rental Market Analysis

<b>Corvallis Area Rental Market Analysis Table 5.4-1 Marginal Increase in Rent from Additional Bedrooms</b>	
<b>Bedroom</b>	<b>Marginal Value</b>
1 <sup>st</sup> <sup>1</sup>	\$566 <sup>2</sup>
2 <sup>nd</sup>	\$175 <sup>2</sup>
3 <sup>rd</sup>	\$218 <sup>2</sup>
4 <sup>th</sup>	\$331 <sup>2</sup>
<sup>1</sup> With one bathroom	
<sup>2</sup> Significant at p<.001	

These tables, combined with information on increased value from added bathrooms, enable calculation of market rents for various combinations of bedrooms and bathrooms. The results below in Table 5.4-2 are based on the survey data and the marginal bedroom prices above, as well as an increase in rent of \$277 per month for adding an additional bathroom. Though the numbers presented are highly statistically significant, they still represent estimates subject to variation approaching \$200 in either direction (refer to Table 5.4-2). Such variation likely reflects both random error and the effects of other, unmeasured variables, such as square footage and neighborhood quality.

<b>Corvallis Area Rental Market Analysis Table 5.4-2 Estimated Average Corvallis Rent by Bedroom and Bathrooms</b>	
<b>Unit Type</b>	<b>Corvallis Survey Rent</b>
Studio/1 bed, 1 bath	\$566
2 beds, 1 bath	\$741
2 beds, 2 baths	\$1,018
3 beds, 1 bath	\$989
3 beds, 2 baths	\$1,236
4 beds, 1 bath	\$1,290
4 beds, 2 baths	\$1,567
5 beds, 1 bath	\$1,605
5 beds, 2 baths	\$1,882
5 beds, 2.5 baths	\$1,977

The real question, of course, is how these baseline rents affect low-income households. Based on the US Department of Housing and Urban Development's (HUD) 2011 determination of the low-income thresholds for a family of four as \$59,410 (80% of Benton County's median income), it appears that such a family could afford a three-bedroom units without paying more than 30% of their income in rent. Even the wealthiest households classified as 'very low income,' (earning less than \$37,100, or 50% of the county median), however, would need to pay at least 31.9% of their monthly income to afford a three bedroom unit, forcing such families to either accept smaller housing, cut back on other expenses, or leave Corvallis in search of cheaper housing.

Data collected on actual rental vacancies, however, suggest this may be optimistic, as comparisons between online listings and survey responses show that observations from our survey sample tended to cost \$83 less per month than comparable units that were on the market in April. Table 5.4-3, below, illustrates the differences in expected prices of units currently occupied and those listed as available, with HUD's FY2012 Fair Market Rent for Benton County used as a comparison.

**Corvallis Area Rental Market Analysis**

<b>Corvallis Area Rental Market Analysis</b>			
<b>Table 5.4-3</b>			
<b>Comparison of Observed Mean and HUD Fair Market Rent Values</b>			
<b>Unit Type</b>	<b>HUD Fair Market Rent</b>	<b>Corvallis Survey Rent</b>	<b>Corvallis Web Listings Rent</b>
Studio/1 bed, 1 bath	\$512/\$622	\$566	\$625
2 beds	\$774	\$775	\$847
3 beds	\$1,125	\$1,172	\$1,295
4 beds	\$1,293	\$1,624	\$1,740
5 beds	N/A	\$1,908	\$1,894
N/A = Not Applicable			

Though the projections themselves are not precise enough to be directly comparable with each other or with the HUD numbers, it is notable that the survey prices tend to be comparable with HUD’s fair market rents for smaller units, but far more expensive for four bedrooms. The properties on the market, that are from the internet sources, show higher rents across all categories. Although the differences between the estimates themselves are not statistically significant, the expected \$84 difference between listed and surveyed properties is significant at the 99% confidence level (refer to Table 5.4-3).

Findings on the difference in rent between advertised units and those surveyed door-to-door suggest that the market rents calculated based on the survey data may not be available to families who are currently searching for housing. This finding corroborates Sirman & John’s (1991) finding that those who remain in their dwellings for multiple contracts tend to receive discounts over time. In addition to suggesting that low-income families, which tend to move more frequently than wealthier families (Duke-Lucio, et al., 2010), may be more vulnerable to increases in rents, this provides evidence that housing prices in Corvallis are continuing to rise.

**5.4.1 Rental Price Projections (Based on Web Listings)**

The coefficients on the bedroom variables below can be interpreted as the expected change in price resulting from a change from a one-bedroom unit to the variable in question, and those on bathroom variables can be interpreted as the change in price from a unit with only one bathroom. For example, in Table 5.4.1-1, the value of 222.5 indicates that a two bedroom unit costs approximately \$222.5 more to rent than a one bedroom unit. Table 5.4.1-2 includes information about how number of bathrooms also impact prices.

<b>Corvallis Area Rental Market Analysis</b>			
<b>Table 5.4.1-1</b>			
<b>Linear Regression of Effect of Bedrooms on Rental Price for Internet Listings</b>			
<b>Variable</b>	<b>Coefficient</b>	<b>Standard Error</b>	<b>Significance Level (P&gt; t )</b>
Two Bedroom	222.5	30.2	0.000
Three Bedroom	670.4	42.6	0.000
Four Bedroom	1115.0	104.8	0.000
Five Bedroom	1269.2	235.6	0.000
Constant	624.6	17.3	0.000
Sample Size (N) = 245 R <sup>2</sup> = 0.65			

**Corvallis Area Rental Market Analysis**

<b>Corvallis Area Rental Market Analysis</b>			
<b>Table 5.4.1-2</b>			
<b>Linear Regression of Effect of Bedrooms and Bathrooms on Rental Price</b>			
<b>Variable</b>	<b>Coefficient</b>	<b>Standard Error</b>	<b>P&gt; t </b>
Two Bedroom	175.2	32.6	0.000
Three Bedroom	392.9	64.4	0.000
Four Bedroom	723.9	135.2	0.000
Five Bedroom	1039.2	236.6	0.000
1.5 Bathroom	5.3	94.5	0.955
Two Bathroom	276.9	65.9	0.000
2.5 Bathroom	371.4	132.3	0.006
Three Bathroom	593.4	285.7	0.040
Constant	566.1	22.5	0.000
Sample Size (N) = 124 R <sup>2</sup> = 0.74			

In Table 5.4.1-3, the coefficient on WebListed represents the expected change in price between identical listed and nonlisted units. A value of 0.65 for R<sup>2</sup> indicates that 65% of the variation in price is explained by this model, and values of 0.000 in the (P>|t|) column indicate the results are statistically significant at the 99.9% confidence level.

<b>Corvallis Area Rental Market Analysis</b>			
<b>Table 5.4.1-3</b>			
<b>Linear Regression of Effect of Bedrooms and Web Listing on Rental Prices</b>			
<b>Variable</b>	<b>Coefficient</b>	<b>Standard Error</b>	<b>P&gt; t </b>
Two Bedroom	222.9	25.3	0.000
Three Bedroom	649.1	32.5	0.000
Four Bedroom	1096.0	83.8	0.000
Five Bedroom	1341.7	149.3	0.000
Web Listed	83.8	32.0	0.009
Constant	545.0	29.8	0.000
Sample Size (N) = 370 R <sup>2</sup> = 0.65			

The coefficients for the community variables in Table 5.4.1-4 similarly indicate the expected difference in price between a given unit in Corvallis and one with the same characteristics in another community.

## Corvallis Area Rental Market Analysis

<b>Corvallis Area Rental Market Analysis</b>			
<b>Table 5.4.1-4</b>			
<b>Linear Regression of Effect of Bedrooms and Community on Rental Price</b>			
Variable	Coefficient	Standard Error	P> t
Two Bedroom	194.1	22.0	0.000
Three Bedroom	594.6	26.4	0.000
Four Bedroom	981.3	70.7	0.000
Five Bedroom	1263.2	141.0	0.000
Albany	-210.5	27.4	0.000
Philomath	-128.7	57.1	0.025
Lebanon	-272.3	40.9	0.000
Sweet home	-436.3	41.2	0.000
Constant	639.7	14.9	0.000

Sample Size (N) = 499  
R<sup>2</sup> = 0.65

### 5.4.2 Market Prices in Nearby Communities

The continued increase in Corvallis's rental prices has been thought to affect rental prices in other communities, as some students and low-income workers seek to save money on rent by commuting from other places. Although the number of rental listings for nearby communities was not sufficient to support reliable projections of market rents, the data gathered do allow comparison between similar units across cities. Table 5.4.2-1 shows price differentials for units with the same number of bedrooms between four other local communities and Corvallis.

<b>Corvallis Area Rental Market Analysis</b>		
<b>Table 5.4.2-1</b>		
<b>Market Price Differences for Neighboring Communities</b>		
Community	Miles from Corvallis Downtown	Market Price Difference
Philomath	5.8	-\$129 <sup>1</sup>
Albany	11.1	-\$210 <sup>2</sup>
Lebanon	19.1	-\$272 <sup>2</sup>
Sweet Home	32.7	-\$436 <sup>2</sup>

<sup>1</sup> Significant at p<.05  
<sup>2</sup> Significant at p<.01

This data confirms the hypothesis that nearby communities have lower rents than Corvallis, with discounts for with the same number of bedrooms ranging from \$129 in Philomath to \$436 in Sweet Home. The tendency of these discounts to become larger as distance from Corvallis increases suggests that commuting may be a factor in these differences, with at least some renters willing to pay more in rent to shorten their commute. Other renters who cannot afford Corvallis may move into surrounding communities contrary to their preferences while incurring increased transportation costs.

### 5.5 VACANCY RATE

There has been much concern in recent years over the vacancy rate in Corvallis, though concrete estimates are in short supply. One management company with Corvallis holdings, for example, said a survey of their properties in February 2012 showed a 3.1% vacancy rate, though

the market has since tightened. The 1% number cited by various local sources (e.g., Hall, 2012), appears to be based on informal calculations by the Corvallis Housing Division, which includes only units that are both vacant and ready for move in. Though not directly comparable with academic literature on vacancy rates, this number has likely been under 1% for over two years (Loewen, 2012), and further illustrates the difficulties faced by those looking for housing.

Such low numbers are of particular concern because of academic research showing that vacancy rates below an equilibrium level drive rent increases (Gabriel & Nothaft, 2005; Hagen & Hansen, 2010). Much research has focused on identifying this 'natural,' vacancy rate at which supply and demand are at equilibrium, and real (i.e. inflation-adjusted) prices are steady over time, with estimates ranging between 3.9% and 12% (Haegen and Hansen 2010). Though determining the natural vacancy rate for Corvallis would require massive collection of price and vacancy data, we can estimate a vacancy rate and compare it to natural vacancy rates documented in other areas.

According to the Corvallis Housing Division, the city currently has 11,113 units on which rental taxes are paid. (This number ignores some 753 units in fraternity and sorority houses). This figure does not include the 600 newly built or discovered units to be added in the next fiscal year, nor approximately 1,000 units that have been given exemptions from rental taxes due to being subsidized low-income housing, on-campus housing, or rental units (such as duplexes) occupied by their owners or owners' family members. A comprehensive survey of rental websites taken in April 2012 revealed 257 unique rental listings, which, divided by the 11,113 non-fraternity and non-sorority units on the tax rolls, computes to a vacancy rate of 2.3%.

The 2.3% number should be considered an imprecise estimate, rather than a definitive statement, producing a reasonable approximation of the rate faced by families looking for housing. Though this is not an estimate of the vacancy rate for the entire year, an estimate taken in the spring does have virtue, avoiding both the hypothesized loosening of the market as students leave for the summer and the hypothesized tightening as students arrive in the fall. Basing total vacancies on web listings also ignores places that are not advertised online, but also avoids counting places that may not be available to families that do not have personal connections with landlords. Although this number does not include places that are vacant but have new tenants already set to move in, the number is likely more than balanced by the number of units that are advertised before the old tenants have actually moved out.

Given that places often advertised for a month or more in advance of their availability, we believe that the 2.3% number is a high-end estimate of Corvallis's vacancy rate, and that the percent of properties available to a family in immediate need of housing is far lower. Given that this estimate is well below even the lowest documented estimates of natural vacancy rates, Corvallis can, absent significant increases in the housing stock or diminished demand for housing, expect continued rental price increases.

## 6.0 DISCUSSION

In analyzing the results of the various models used in this project, a narrative presents itself. We know that the influx of students into Corvallis has decreased the vacancy rate and supply of available rental housing. We further know that vacancy rates below approximately 4% will cause rental prices to increase in real terms, and we have found evidence of that here, both in terms of the low vacancy rate and increasing rental prices. Basic theory of supply and demand suggests that some combination of decreasing demand and increasing supply are necessary to regain equilibrium in the rental market, but there is no indication that demand will

decrease in the near future. This is true both because we see no reason to think the displacement effect of increasing rental prices will be large enough to drive the vacancy rate above 4%, nor do we see any reason to suggest that OSU enrollment will decrease sufficiently. Therefore, we believe it is more likely that an increase in supply will produce an equilibrium vacancy rate.

Second, we found that household composition is a very important predictor regarding the kinds of choices individuals and families make when selecting the type of residence in which to live. There is a preference away from single-bedroom units for families and towards multi-bedroom units, especially when minors are present as part of the composition of the household.

Third, we found that students and non-students are not significantly different in terms of the choices they make. This means they are, in effect, competing for the same housing supply. When it comes to multi-bedroom residences, this means that in at least some cases, groups of students are competing against families. The two groups have some differences that are important: Students may have low incomes and seek low-income units, but they often have access to resources that non-students and families do not, such as parental income and education-related financial aid. As well, students can be more flexible than families in their living arrangements insofar as students can more easily rearrange themselves into differently-sized groups.

The implication of this is that the increased access to resources and the ability to be flexible in living arrangements mean students can generally out-compete families and low-income adults when seeking rental housing. Between this and the low vacancy rate, we infer that an increase in housing supply of any type will be good for low-income and non-student residents. Our data do not support more specific claims, such as recommended number of bedrooms or the locations in which new housing supply should be built. Nor can we make further suggestions as to how others may wish to approach the problem of providing affordable housing for low-income non-student renters in this sort of environment, though we do note that WNHS' current practice of restricting student access to their housing units is one way to approach this problem. What we can say is that we believe any effective approach to solving this problem needs to be multi-pronged (i.e. address not only housing supply itself but related issues like transportation) and that it needs to involve a broad base of stakeholders and interested parties, including but not limited to OSU, the City of Corvallis, and local non-profits. Despite the diversity of methods undertaken for this project, there are several areas that could benefit from additional research which is discussed in the Recommendations Section (refer to Appendix F). The problem seems too large and complex to be solved by a single approach or group.

## 7.0 CONCLUSION

This research project attempted to answer basic questions regarding the current state of the Corvallis housing market. We employed multiple methods to gather information on various aspects of the market: online data collection of rental availability by price, location and type; surveys; and available Census and HUD data. We then created multiple models to understand and analyze the data, including simple statistical summaries, linear and logit regressions, and GIS mapping. We found that the conventional wisdom regarding the current state of Corvallis' rental market is largely correct: An increase in student population is causing a low vacancy rate, which is resulting in a shortage of available rental housing, and this shortage is resulting in real increases in rental prices. Further, we found that rental prices are higher closer to the OSU campus and downtown areas, but that would-be renters only list price as their second-most important factor in selecting a rental, behind location. We found some evidence that rental prices

decrease with distance from campus. Finally, we hypothesize that rental prices are likely to continue increasing in the near future, since it is not obvious how demand will decrease. Nor would we expect that the affordable housing supply will increase rapidly enough to impact the low vacancy rate. The result of this is likely that people will continue to pay an abnormally large (in historical terms) percentage of their income in rent. We also suggest some areas for future research, including in-depth research on sub-market populations such as age or ethnic minorities, the potential rate of displacement (and its effects), and the impact of housing quality on both rental prices and renters' experiences.

## 8.0 BIBLIOGRAPHY

- Anthony, Jerry. 2006. "State Growth Management and Housing Prices." *Social Science Quarterly* 87:122-141.
- Barata, P.C. and D.E. Stewart. 2010. "Searching for Housing as a Battered Woman: Does Discrimination Affect Reported Availability for a Rental Unit?" *Psychology of Women Quarterly* 34(1):43-55.
- Bohem, T. and A. Schlottmann. 2003. "The Dynamics of Race, Income, and Homeownership." *Journal of Urban Economics* 113-130.
- Carpenter, W. & N. Detweiler. 2011. Report on Poverty. Oregon Housing and Community Services. Retrieved from <http://www.oregon.gov/OHCS/ISD/RA/>.
- Collinson, Rob. (2011). "Rental Housing Affordability Dynamics, 1990-2009". *Cityscape* 13(2), 71-103.
- Conley, D. (2001). "A Room with a View or a Room of One's Own? Housing and Social Stratification." *Sociological Forum*, 263-280.
- Dubin, R. A. (1992). "Spatial autocorrelation quality and neighborhood." *Regional Science and Urban Economics* 22:433-452.
- Duke-Lucio, J., Peck, L.R., & Segal, E.A. (2010). "The Latent and Sequential Costs of Being Poor: An Exploration of Housing." *Poverty and Public Policy*.
- Edelman, Benjamin. (2012). "Using Internet Data for Economic Research." *Journal of Economic Perspectives* 26(2): 189-206.
- Freedman, M. and Emily Owens. (2010). Low-Income Housing Development and Crime. Ithaca, New York: Cornell University. Retrieved from <http://list-socrates.berkeley.edu/~raphael/IGERT/Workshop/Matt%20Friedman%20-%20Fall%202010.pdf>.
- Gabriel, Stuart & Northaft, F. (2001). "Rental Housing Markets, the Incidence and Duration of Vacancy, and the Natural Vacancy Rate." *Journal of Urban Economics*, 49(1), 121-149.
- Glaeser, Edward L. and Joseph Gyourko. (2003). "The Impact of Building Restrictions on Housing Affordability," FRB New York - *Economic Policy Review*, 9(2), 21-39.

## Corvallis Area Rental Market Analysis

- Greenwood, D., & Holt, R. (2010). "Growth, Inequality, and the Negatice/Trickle Down." *Journal of Economic Issues*.
- Grout, C. A., Jaeger, W. K., & Plantinga, A. J. (2011). "Land-use regulations and property values in Portland, Oregon: A regression discontinuity design approach." *Regional Science and Urban Economics*, 41(2), 98-107.
- Gumprecht, B. (2006). "Fraternity Row, the Student Ghetto, and the Faculty Enclave: Characteristic Residential Districts in the American College Town." *Journal of Urban History* 32(2): 231-273.
- Hagen, Daniel A. and Julia A. Hansen. (2010). "Rental Housing and the Natural Vacancy Rate." *Journal of Real Estate Research*, 32(4), 413-433.
- Hall, Bennett. 2012. "Student Housing Drives Annexation Push." *The Corvallis Gazette-Times*, May 23, 2012, accessed from: [http://www.gazettetimes.com/news/local/student-housing-drives-annexation-push/article\\_bb03f15c-a4b1-11e1-8688-0019bb2963f4.html](http://www.gazettetimes.com/news/local/student-housing-drives-annexation-push/article_bb03f15c-a4b1-11e1-8688-0019bb2963f4.html), June 1, 2012.
- Hiscock, R., Kearns, A., Macintyre, S., & Ellaway, A. (2001). "Ontological Security and Psycho-Social Benefits from the Home: Qualitative Evidence on Issues of Tenure." *Housing, Theory and Society* 18:50-66.
- Hubbard, P. (2008). "Regulating the Social Impacts of Studentification: A Loughborough Case Study." *Environment and Planning A*40(2) 323-341.
- Howard, Madeline. (2007). "Subsidized Housing Policy: Defining the Family." *Berkeley Journal of Gender, Law, and Justice*. 22: 97-367.
- Jaeger, William. (2006). "The Effects of Land Use Regulations on Property Values." *Environmental Law* 36:105-130.
- Liberty, R. L. (2003). "Abolishing exclusionary zoning: A natural policy alliance for environmentalists and affordable housing advocates." *Boston College Environmental Affairs Law Review*, 30 (3), 581-603.
- Loewen, Bob. 2012. Corvallis City Housing Division, phone correspondence (Wall, C.), May 24.
- Martinez, M. G., J. M. M. Lorenzo, and N. G. Rubio. (2000). "Kriging Methodology for Regional Economic Analysis: Estimating the Housing Price in Albacete." *International Advances in Economic Research* 6 (3):438-450.
- Matlack, J.L., & Vigdor, J.L. (2008). "Do Rising Tides Lift All Boats? Income Inequality and Housing Affordability." *Journal of Housing Economics*: 17(3), 2122-224.
- McCluskey, W. J., W. G. Deddis, and I. G. Lamont. (1999). "The Application of Surface Generated Interpolation Models for the Prediction of Residential Property Values." *Journal of Property Investment & Finance* 18 (2):162-176.

## Corvallis Area Rental Market Analysis

- Montero, J. M., and B. Larraz. (2011). "Interpolation methods for geographical data □: Housing and commercial establishment markets." *Journal of Real Estate Research* 33 (2):233-244.
- Nguyen, M.T., (2005). "Does Affordable Housing Detrimentially Affect Property Values? A Review of the Literature." *Journal of Planning Literature* 20(1): 15-26.
- Ogur, Jonathon D. (1973). "Higher Education and Housing: The Impact of Colleges and Universities on Local Rental Housing Markets." *The American Journal of Economics and Sociology* 34(4): 387-394.
- Olmo, J. C. (1995). "Spatial Estimation of Housing Prices and Locational Rents." *Urban Studies* 32 (8):1331-1344.
- Pagourtzi, E., V. Assimakopoulos, T. Hatzichristos, and N. French. 2003. Real estate appraisal: a review of valuation methods. *Journal of Property Investment & Finance* 21 (4):383-401. Retrieved from <http://www.emeraldinsight.com/10.1108/14635780310483656>.
- Penton Media, Inc. (2011). Student Housing: Opportunities and Threat. Retrieved from <http://www.highbeam.com/doc/1G1-266659502.html>.
- Preston, V., Murdie, R., Wedlock, J., Sandeep, A., Anucham, U., D'Addario, S., et al., (2009). "Immigrants and Homelessness – At Risk in Canada's Outer Suburbs." *The Canadian Geographer*, 288-304.
- Rohe, W. M., & Stegman, M. A. (1994). "The effects of homeownership on the self-esteem, perceived control and life satisfaction of low-income people." *Journal of The American Planning Association*, 60(2): 173.
- Russell, R. (2003). "Equity in Eden: Can environmental protection and affordable housing comfortably cohabit in suburbia?" *Boston College Environmental Affairs Law Review*, 30 (3), 437-485.
- Russell, James III N. (2008) "Impact of subsidized Rental Housing Characteristics on Metropolitan Residential Satisfaction." *Journal of Urban Planning and Development*. 134:4 pp. 166-172.
- Simms, M.C., Fortuny, K., & Henderston, E. (2009). "Racial and Ethnic Disparities Among Low-Income Families." *The Urban Institution* Retrieved from <http://www.urban.org/publications/411936.html>.
- Sirmans, G.S., & John, B.D. (1991). "Determinants of Market Rent." *Journal of Real Estate Research* 6(3).
- Thompson, N. (2012). Nonprofit Housing Developers Fill Market Gaps. Retrieved from <http://www.useful-community-development.org/nonprofit-housing-developers.html>.
- U.S. Census Bureau. (2010). U.S. Census for the City of Corvallis. Retrieved from [http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC\\_10\\_DP\\_DPDP1](http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_DP_DPDP1).

## Corvallis Area Rental Market Analysis

- U.S. Department of Housing and Urban Development. 2011. FY 2012 Fair Market Documentation System. Retrieved from:  
[http://www.huduser.org/portal/datasets/fmr/fmrs/fy2012\\_code/2012summary.odn?inputname=METRO18700M18700\\*Corvallis%2C+OR+MSA&selection\\_type=hmfa&year=2012&data=2012&area\\_id=&fmrtype=%24fmrtype%24&ne\\_flag=%24ne\\_flag&path=C%3A%5C%5Cwwwdata%5Cdatabase&incpath=C%3A%5C%5CHUDUSER%5CwwwMain%5C%5Cdatasets%5Cfmr%5Cfmrs%5CFY2012\\_Code, May 31, 2012.](http://www.huduser.org/portal/datasets/fmr/fmrs/fy2012_code/2012summary.odn?inputname=METRO18700M18700*Corvallis%2C+OR+MSA&selection_type=hmfa&year=2012&data=2012&area_id=&fmrtype=%24fmrtype%24&ne_flag=%24ne_flag&path=C%3A%5C%5Cwwwdata%5Cdatabase&incpath=C%3A%5C%5CHUDUSER%5CwwwMain%5C%5Cdatasets%5Cfmr%5Cfmrs%5CFY2012_Code, May 31, 2012.)
- Wu, J., & Cho, S. (2007). "The effect of local land use regulations on urban development in the Western United States." *Regional Science and Urban Economics*, 37(1), 69-86.
- Yates, J., & Wood, G. (2005). "Affordable Rental Housing: Lost, Stolen and Strayed." *The Economic Record*, 582-595.

**Appendix A**

**Professor's Commentary on Community Stakeholder Interviews and This Project**

## Corvallis Area Rental Market Analysis

This analysis was completely designed, conducted, written and edited by fifteen OSU graduate students enrolled in a 4-unit course during a 9 week span. They collectively invested around 1,000 person-hours examining literature, developing a survey questionnaire, scouring internet rental advertisements, canvassing neighborhoods, analyzing data, and writing the report. In addition to all of that work evident in the previous pages of this report, they also interviewed fifteen local experts, advocates, service providers, and citizens to talk about housing issues in Corvallis. Many of these local stakeholders' ideas, questions, and concerns resonated with findings we have reported here. At the risk of occasionally opining in ways I have told my students not to do, I here summarize how the concerns of those who were interviewed resonate or not with the findings from the students' analysis of survey and rental data.

First, stakeholders were nearly unanimous in their estimation of the important impact of the growing number of OSU students and in their sense that more must be done than only building affordable housing. That is, while efforts like those of WNHS and other non-profit, non-governmental organizations create excellent opportunities for some low income families, the scope of the affordability problem far exceeds what these organizations can address. Several respondents pointed to the need for more 1 and 2 bedroom units to increase the vacancy rate to a level that can moderate the rising rents. Respondents disagreed about how this supply problem is related to land use laws and limitations, with some indicating that there are plenty of opportunities for infilling Corvallis with higher density housing and others saying land use laws were restrictive.

Second, one stakeholder argued that OSU bears a responsibility that it is not yet adequately "owning". The argument here is that the impact OSU has on changing neighborhoods (via student rentals) and the disproportionate impact of the affordable rental shortage on low income families should be mitigated largely by the university. A university housing employee pointed out that OSU can make some contribution to reducing the problem by not raising room and board charges, seeking to keep university housing as full as possible, but the biggest growth in enrollment is actually among older students who do not normally live on campus, whether they be transfer students new to town or older students remaining longer in school (and hence, inflating the number of older students seeking off-campus housing.) These characteristics of OSU students suggest that the leverage OSU housing services has on the overall rental housing shortage is limited. Whatever mitigation efforts OSU engages in will probably not be through building more dormitories.

Third, several stakeholders in Albany and Corvallis identified a pattern of rent-driven out-migration for low income families seeking more affordable housing. They shared anecdotally about families that found it too expensive to rent in Corvallis and who had move further away from Corvallis, as far east as Sweet Home. School closures and declining student enrollments in the Corvallis school district already may serve as indicators of this process among home-owning families as well. In our quantitative analysis of rents in the mid-Willamette region, we found that there is clear economic rationale for such moves, seen in the declining relative rents encountered the further one moves east of Corvallis. (Rents are lower to the West in Philomath as well.)

Fourth, among stakeholders serving homeless youth, food insecure families, and immigrant families (not mutually exclusive groups, to be sure) there was agreement that the impact of the lack of affordable housing was especially hard on low income families. One nonprofit group reported how immigrant families on Division St. have had their rent doubled from \$600 to \$1200, forced now to move out. Other families in this situation have moved to trailer parks or to other towns further from their work in Corvallis. Meanwhile, those apartments are now rented by 4

## Corvallis Area Rental Market Analysis

individual students. Anecdotes like these illustrate the direct competition between students and low income families, with students having greater available resources and greater freedom to decide how many they will live with. Our findings that students make housing choices very much like other people (i.e., they are sensitive to price and location) emphasizes the fact that renters, be they student or not, are competing with each other in a very tight rental market.

Finally, one advocate emphasized that the inter-related issues of homelessness, low wage work, hunger, and other struggles faced by low income families remain relatively ignored in Corvallis. There does not yet appear to be as great of an awareness of the housing struggles of the working poor in Corvallis in comparison to concerns among neighbors that their block might be changing because of owner-occupied homes “flipping” into student rentals.

My students and I hope this report will inspire and inform future productive community conversations about how Corvallis can be a place where all those who work and study here can affordably live here as well.

Professor Mark Edwards  
Oregon State University

**Appendix B**

**Survey Questionnaire**

**We would like to know a little more about you and the place you live.**

16. How many bedrooms are in your residence? \_\_\_\_\_

17. How bathrooms are in your residence? \_\_\_\_\_

18. How much does your total residence cost in rent, per month?  
\_\_\_\_\_

19. How many people, including yourself, pay rent on your residence?  
\_\_\_\_\_

20. How many people under 18 years of age live at this residence?  
\_\_\_\_\_

21. What utilities, if any, are included in your rent?  
 Water/Sewer                       TV/Cable  
 Garbage/Recycling               Internet  
 Gas                                       Phone  
 Power                       Other: \_\_\_\_\_

**For all respondents:**

22. What is your age? \_\_\_\_\_

23. If you had to identify with one ethnic group, what would it be?  
\_\_\_\_\_

24. Which of these 5 income categories best describes your household's yearly income?

- 0 to \$25K              \$26-\$45K              \$46K-\$60K  
                            \$61-80K              \$81K and over

## Corvallis Renter and Homeowner Survey

---

**Participation is voluntary and responses are confidential.  
Thank you for your participation.**

---

**This survey is conducted by an OSU class of graduate students, working in collaboration with Willamette Neighborhood Housing Services**

**Any questions or concerns may be directed to:**

**Dr. Mark Edwards  
School of Public Policy, OSU  
541-737-5379  
medwards@oregonstate.edu**

**Jim Moorefield  
Willamette Neighborhood Housing Services  
541-752-7220**

**Notes:**



**Queremos información sobre usted y su residencia.**

16. ¿Cuántas recámaras tiene su residencia? \_\_\_\_\_
17. ¿Cuántos cuartos de baño tiene su residencia? \_\_\_\_\_
18. ¿En total, cuál es su renta mensual?  
\_\_\_\_\_
19. ¿Cuántas personas, incluyendose usted, paga la renta cada mes?  
\_\_\_\_\_
20. ¿Cuántos menores viven en su residencia?  
\_\_\_\_\_
21. ¿Cuáles gastos, (si aplican), estan incluidos en su renta mensual?  
\_\_\_\_ Agua                      \_\_\_\_ Televisión/Cable  
\_\_\_\_ Basura/Reciclaje        \_\_\_\_ Internet  
\_\_\_\_ Gas Natural              \_\_\_\_ Telefonó  
\_\_\_\_ Electricidad             \_\_\_\_ Otros \_\_\_\_\_

**Para todos:**

22. ¿Cuál es su edad? \_\_\_\_\_
23. ¿Si debiera identificarse con un grupo étnico, cuál sería?  
\_\_\_\_\_
24. ¿Dentro de estas categorías, cuál sería la que se aplica a su ingreso anual?  
0 to \$25mil      \$26-\$45mil      \$46K-\$60mil  
                    \$61-80mil      \$81mil y más

## Estudio de Residencia en Corvallis

---

**Su participación es voluntaria y las respuestas son confidenciales.  
Gracias por su participación.**

---

**Este estudio es hecho por un clase de alumnos de maestria de OSU, trabajando en colaboración con Willamette Neighborhood Housing Services**

**Se puede dirigir preguntas ó comentas a:  
Dr. Mark Edwards  
School of Public Policy, OSU  
541-737-5379  
medwards@oregonstate.edu**

**Jim Moorefield  
Willamette Neighborhood Housing Services  
541-752-7220**

**Notes/Notas:**

## Estudio de Residencia en Corvallis

1. ¿Es usted dueño ó arrendatario/a de su residencia?  
ARRENDATARIO/A      DUEÑO
2. ¿Es usted un estudiante en una universidad (no necesita ser OSU)?  
SI NO NO OPINIÓN [OTRO \_\_\_\_\_]
3. ¿Está satisfecho con su vecindario?  
SI NO NO OPINIÓN [OTRO \_\_\_\_\_]
4. ¿Está satisfecho con sus vecinos?  
SI NO NO OPINIÓN [OTRO \_\_\_\_\_]
5. ¿Cuántas personas viven en su residencia? \_\_\_\_\_
6. ¿Cuánto tiempo has vivido aqui? \_\_\_\_\_

### Solamente para dueños de casa:

7. ¿Usted siente que propiedades en renta tienen un efecto negativo en su vecindario?  
SI NO NO OPINIÓN [OTRA \_\_\_\_\_]
- 7a. ¿Si usted contestó "si", cuál es el efecto en su vecindario?
- |                         |                              |
|-------------------------|------------------------------|
| ___ Valor del propiedad | ___ Apariencia de vecindario |
| ___ Ruido               | ___ Relaciones con Vecinos   |
| ___ Estacionamiento     | ___ Otra: _____              |
| ___ Delito/Seguridad    | _____                        |
|                         | _____                        |

### Solamente para arrendatarios/ arrendatarias:

8. ¿Usted siente que su renta es justa para su domicilio?  
SI NO NO OPINIÓN [OTRO \_\_\_\_\_]
9. ¿Usted siente que su residencia es mantenida en buenas condiciones por el dueño/agencia?  
SI NO NO OPINIÓN [OTRO \_\_\_\_\_]
10. ¿Fue difícil encontrar una residencia con un precio accesible?  
SI NO NO OPINIÓN [OTRO \_\_\_\_\_]
11. ¿Usted siente que este es su domicilio ideal?  
SI NO NO OPINIÓN [OTRO \_\_\_\_\_]
12. ¿Usted siente que su residencia satisface las necesidades de usted(es)?  
SI NO NO OPINIÓN [OTRO \_\_\_\_\_]
- 12a. ¿Si usted contestó "no," por qué?:
- |                      |                            |
|----------------------|----------------------------|
| ___ Baños            | ___ Condición de propiedad |
| ___ Recámaras        | ___ Cercanza a Servicios   |
| ___ Area de vivir    | ___ Escuelas               |
| ___ Precio           | ___ Ruido                  |
| ___ Delito/Seguridad | ___ Otros: _____           |
|                      | _____                      |
|                      | _____                      |

¿Si debiera decir las tres cosas mas importante para usted cuando esta seleccionando una residencia, cuáles serían esas cosas?

13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_

**Appendix C**

**Websites Sourced for Data**

Corvallis Area Rental Market Analysis  
Table Appendix C-1  
Websites Sourced for Data

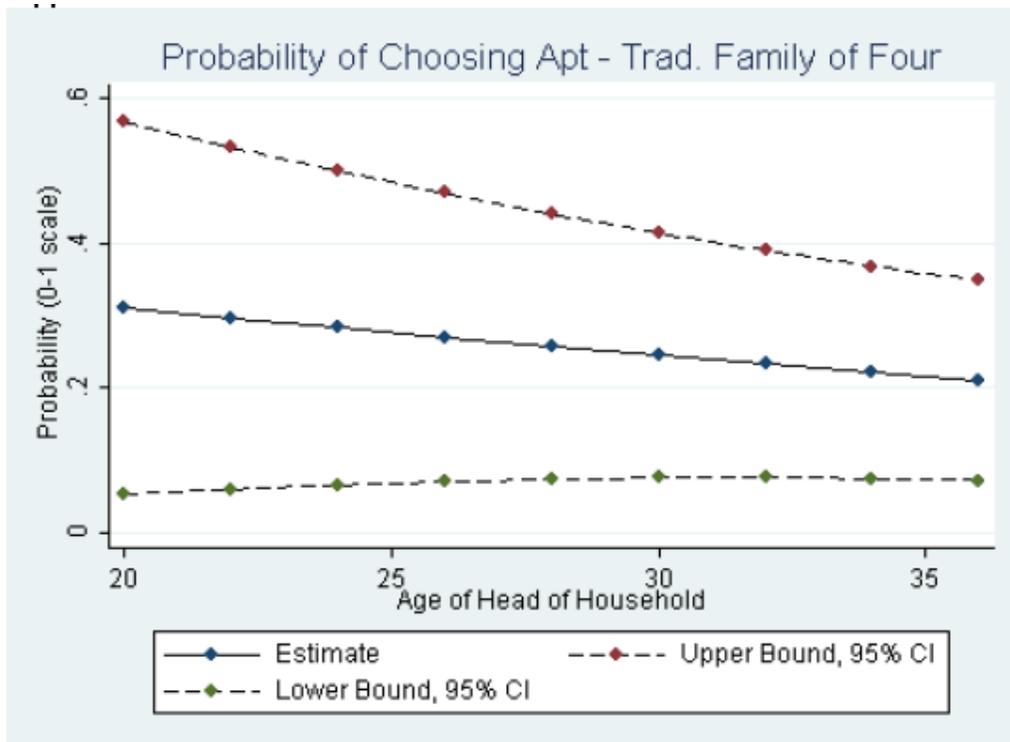
Site	Method	Listings Per Search
corvallis-oregon.apartmenthomeliving.com	Harvest	150
ipmg-inc.com	Manual	Unknown
realrentals.com	Manual	1
realestate.oregonlive.com	Manual	2
realtor.com	Manual	2
forrent.com	Manual	Unknown
eBay Classifieds	Manual	Unknown
rentalhouses.com/search/metro/Corvallis	Manual	10
trulia.com/for_rent/Corvallis,OR/	Manual	15
direct-homes.com	Manual	11 <sup>1</sup>
<a href="http://rentbits.com/rb/s/rentals-corvallis-oregon?qclid=CNWh4LjPqg8CFSMHRQodoxzRXw">http://rentbits.com/rb/s/rentals-corvallis-oregon?qclid=CNWh4LjPqg8CFSMHRQodoxzRXw</a>	Manual	12
realestate.aol.com/blog/rentals/or/corvallis	Manual	Unknown
gazettetimes.com/admarket/rentals	Harvest	53
http://apartments.oodle.com/corvallis-or/: Note: This is actually an aggregator – no unique data	None	73
rentals.com (NOTE: Spreadsheet of results available within page)	Harvest	60 <sup>1,2</sup>
sterlingmanagement.net/home_rental	Manual	20 <sup>1</sup>
forrent.com	Manual	11
corvallisrentalhomes.com	Manual	6
rent.com	Manual	3 <sup>1</sup>
hotpads.com	Manual	19
zillow.com	Manual	7
apartments.com	Manual	Unknown
mynewplace.com	Manual	26
elitepropertiesmanagement.com	Manual	30 <sup>1</sup>

<sup>1</sup> Approximant count

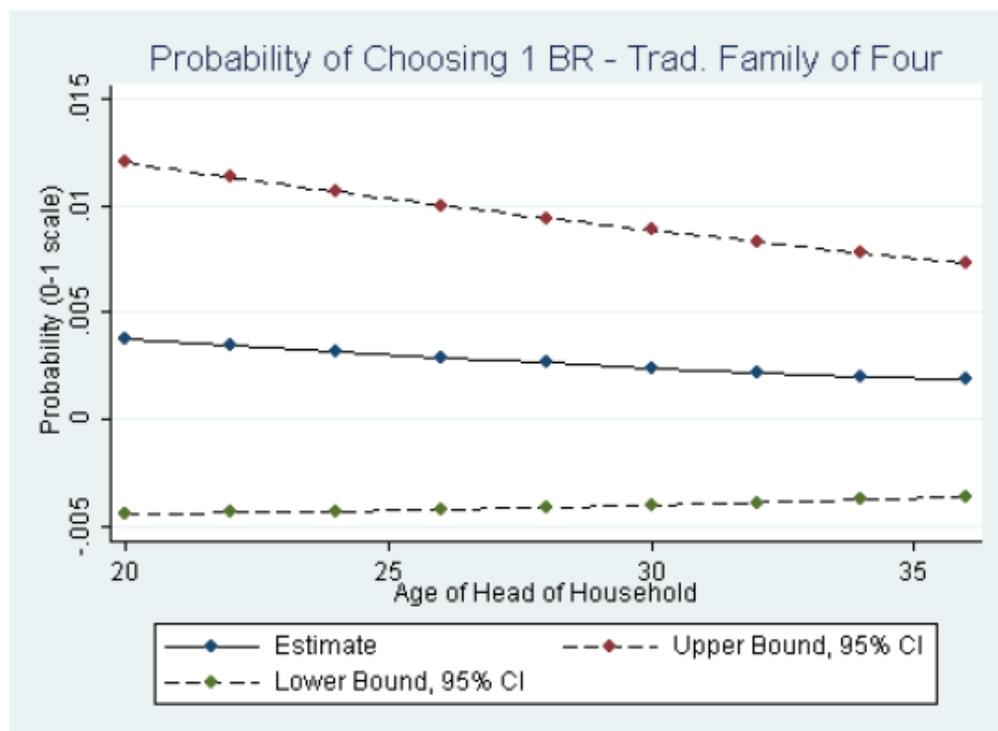
<sup>2</sup> Some of total count includes listings within Salem

**Appendix D**

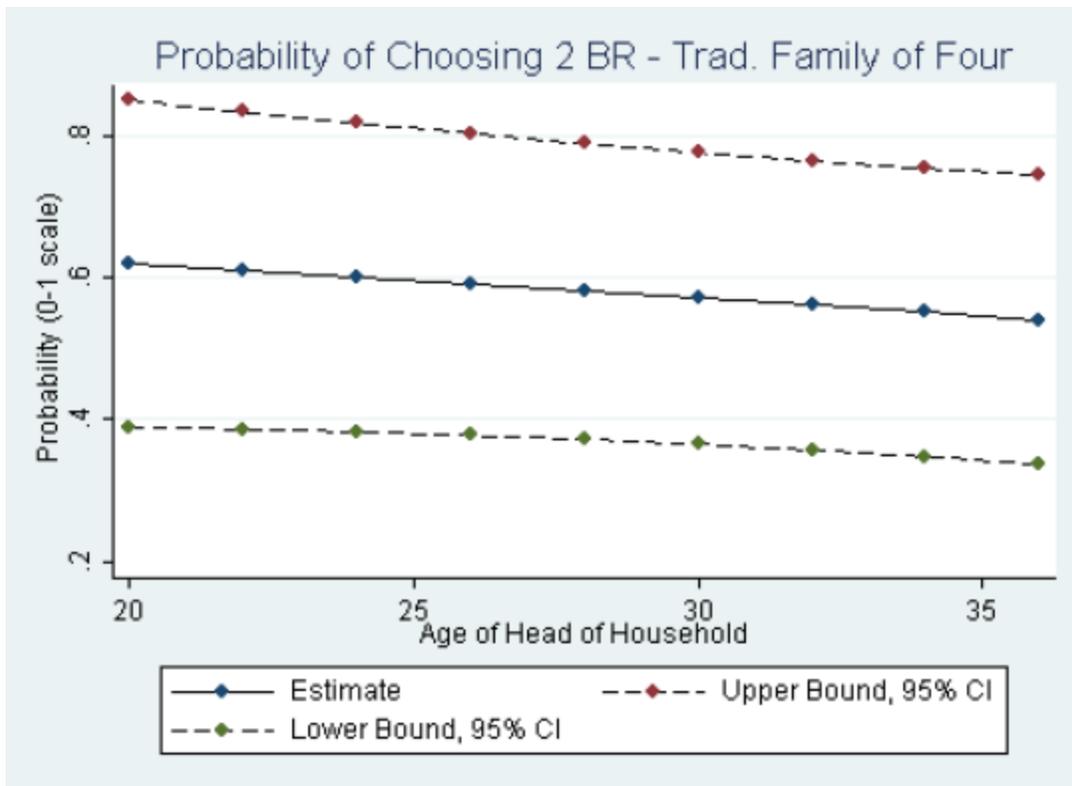
**Figures Regarding Housing Choice/Decisions**



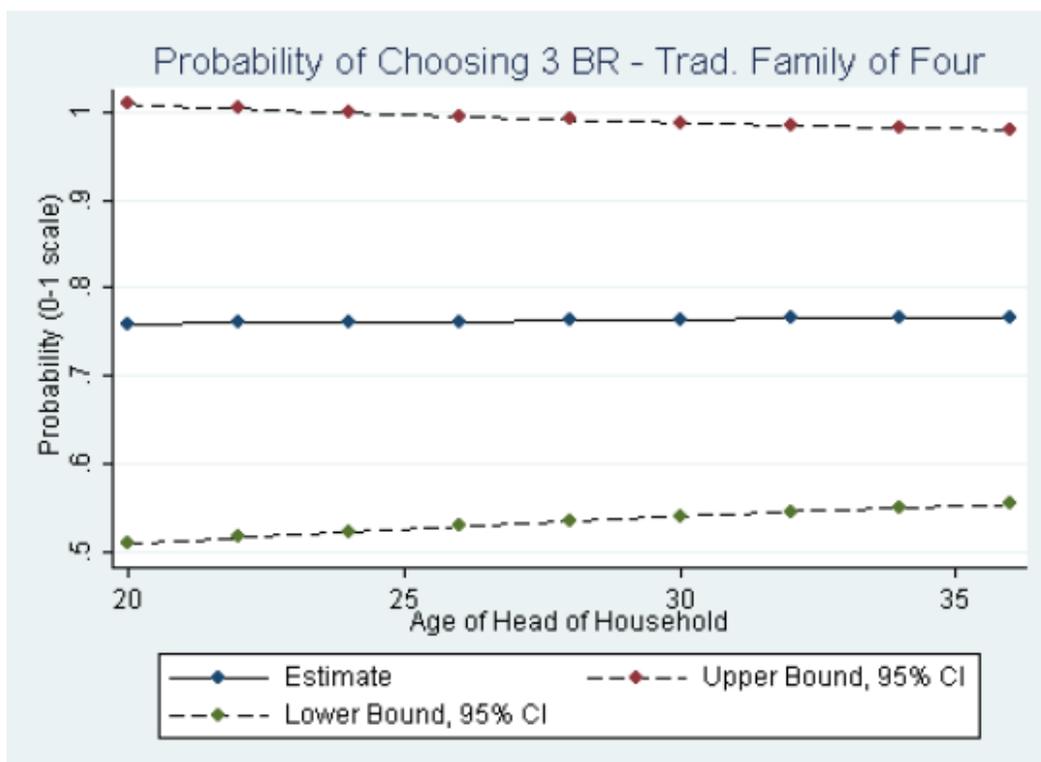
Appendix D: Figure D-1



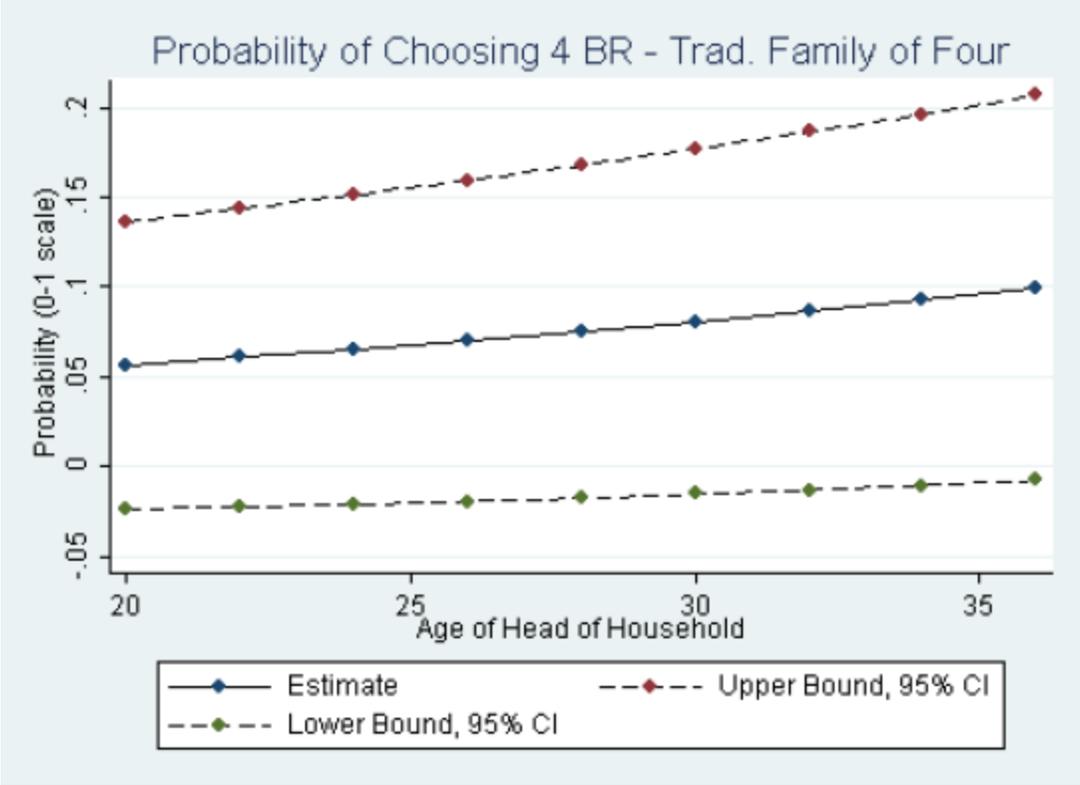
Appendix D: Figure D-2



Appendix D: Figure D-3



Appendix D: Figure D-4



Appendix D: Figure D-5

**Appendix E**  
**Recommendations**

## Recommendations

Despite the diversity of methods undertaken for this project, there are several areas we feel could benefit from additional research.

One factor that we were unable to include to our satisfaction was the impact of quality of rental property on things like rental price, homeowners' view of rental properties in their neighborhood, and tenant satisfaction. We believe that further research that includes a detailed and sturdy measure of rental quality would significantly improve the robustness of the overall results, especially given the prevalence of new rental properties going up around town – for example, what is the perceived change in property value due to the replacement of dilapidated units with new ones?

A second possible area for future research deals with the question of displacement. We know that displacement has far-reaching implications for factors like transportation timing and costs as well as general quality of life. To what degree are Corvallis residents being displaced due to increasing rent prices? As well, who is being displaced, and where are they going? Having solid answers to these questions may allow interested parties to figure out how to combat the negative displacement effect of rising rental prices.

A third potential area is in regards to Corvallis' minority populations. We were unable to examine the differences in experiences and preferences of populations by age, marital status, disability or ethnicity. The experience of ethnic minority populations is of particular interest, since it has been hypothesized that different sorts of community ties and different cultural norms may lead to different responses to low vacancy rates and rising rental prices.

A fourth possible future research question involves homeowners' perceptions of the impact rental properties on nearby property values. Though 2/3 of survey respondents reported no negative impacts, it would be worth knowing how distance to campus, respondent demographics, and the percentage of the respondent's neighborhood that are rentals impacts the answer. With the expected continued increase in OSU student growth, it is possible that neighborhoods will generally see an increase in the percentage of residences that are rentals, and knowing if there exists a 'breaking point' that causes real and/or perceived property values or homeowner satisfaction to change would be useful.

With regards to the spatial analysis of per-bedroom rental prices, the obvious shortcoming was lack of square footage of rental unit. Given our suspicion regarding the utility of multi-bedroom homes with smaller living spaces, being able to more accurately control for non-bedroom living space in the spatial analysis would likely produce more robust and more useful results. Increasing the size of the sample might also produce more robust results.

Additionally, this project faced a limitation of a relatively short deadline, which meant we were unable to examine seasonal changes in the rental market due to the fluctuation in the OSU student population. Further research that examines the nature of the fluctuation will help achieve an understanding of the market.

Finally, we were unable to address questions relating to the percentage of income paid in rent for low-income or other Corvallis residents. Information on how rental price increases have impacted low-income individuals and families' lives, and a reliable measure of what percentage of their income is being paid in rent would help highlight the consequences of existing market conditions.

## **Corvallis Area Rental Market Analysis**

Generally, we have concluded that the current nature of Corvallis' rental market and the consequences of recent changes in the market are yet to be fully understood, even given our multi-pronged effort. A market analysis that examines sub-topics in depth and uses a mixed methodology is recommended.