THESIS

THE RENTAL NEXT DOOR:

THE IMPACT OF RENTAL PROXIMITY ON HOME VALUES

Submitted by

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ABSTRACT

THE RENTAL NEXT DOOR: THE IMPACT OF RENTAL PROXIMITY ON HOME VALUES

Literature in this area mainly focuses on the impacts of multi-unit complexes and low income housing. Little has been done specifically looking at the relationship between single-family rental homes and sales price. This paper extends the literature by modeling the impact of single-family rental proximity on home sales price using a unique spatial approach. Through the use of GIS software, I was able to specifically measure the density of single-family rental properties for each sold home, rather than following the "blanket approach" of measuring density as the 'percent of rentals in the census tract' typical in the literature. With data collected for 2,766 homes sold between January 1, 2011 and July 1, 2012 in Fort Collins, Colorado, a hedonic price model was used to empirically test for the impacts of rental proximity on home values.

I find strong evidence that proximity to single-family rental homes plays an important role in determining a home's selling price. Rentals within ¼ mile of a sold home had a negative impact on price, while rentals between ¼ and ½ mile had a positive impact on price. If rentals are considered an alternative to foreclosure or short sale, these results suggest the negative impacts of distressed sales are greater than those of rental properties on surrounding home values. Further research is needed to test for this scenario. Policy implications are discussed with a particular focus on the Three Unrelated Ordinance in Fort Collins, Colorado.

TABLE OF CONTENTS

Introduction and Background Information

People generally tend to believe that rental properties will impact their neighborhood negatively as more and more homes in the subdivision turn into rental properties. Many homeowners' associations attempt to reduce the number of rental properties by regulating the placement of signs, restricting the number of rental properties in the subdivision, and in some cases, outright banning rental properties. In some cities, policy makers try to reduce the number of rental properties by passing ordinances (such as the three unrelated ordinance in Fort Collins, CO), requiring rental inspections, regulating sign placement, and charging registration and/or licensing fees. Even the mortgage industry is "anti-rental," with larger downpayments required for non-owner occupied homes and "Fannie Mae and Freddie Mac refus[ing] to underwrite mortgages in condo projects where a majority of units are rentals" (Reagen, 2009).

The general public is quick to assume a rental property will "ruin" their neighborhood, and this is traditionally the assumption in most literature. This opposition has been well documented and takes many forms. Some of the most common arguments against rental housing include: rentals attract low-income residents and less desirable neighbors, lead to an increase in crime and traffic and place an additional financial burden on local governments and schools. Opposition also stems from the belief that rental properties are not as well-maintained as owner-occupied homes and will overall lead to a decline in property values (Ellen (2007), Obrinsky (2007), Sirmans (1996)). These arguments have been supported in some of the empirical literature. Wang, Grissom, Webb and Spellman concluded

that "an inverse relationship exists between the value of a house and the presence of rental properties in the area." Specifically, they found that the presence of rental properties within close proximity (defined as the group of 5-8 surrounding homes) reduced a home's selling price by approximately 2% (Wang, Grissom, Webb, & Spellman, 1991). Similar results were found in several studies looking at the impact of subsidized and multi-family rental housing developments, though the results were mixed and varied widely between the studies (Goetz (1996), Lee (1999), Lyons (1993), Ellen (2007)).

While at first glance it would appear that rental homes are "bad" for a neighborhood and property values, the evidence is mixed overall. A study analyzing the impact of federally subsidized rental housing on property values conducted by the Furman Center for Real Estate and Urban Policy found that in most cases property values were not reduced by federally-subsidized developments and in many instances the developments actually led to increases in property values (Ellen, 2007). Grether and Mieszkowski found that proximity to "low-density apartment developments [were] relatively harmless," in terms of their impact on residential property values and a document produced for the National Policy Summit on Rental Housing summarized numerous studies in which the authors determined property values were higher in areas near multi-family housing or "proximity to subsidized housing made no difference in housing values […]" (Obrinsky, 2007).

A recent addition to the debate is how economic conditions are playing a role in the desirability of rental homes. With the housing crisis plaguing the U.S., home prices are down in many areas which means many homeowners can no longer sell

their properties without taking a loss, or bringing money to the table. As of March 1, 2012, an estimated 11.1 million homeowners were underwater[1] on their mortgage. That's approximately 22.8% of mortgages and is at the highest level since the third quarter of 2009, when the data was first tracked (Thomson Reuters, 2012). Stricter lending requirements, along with higher rates of unemployment, means fewer people are willing or able to buy. As a result, many homeowners are faced with tough choices; sell at a loss, attempt a short sale, let the home go to foreclosure, leave the home vacant or rent it out until conditions improve. For homeowners in these situations, rental restrictions limits their options. If they can't afford to make payments on two homes, or don't have money to bring to the closing table, and are unable to rent out the home due to rental restrictions, their only option left is to attempt a short sale or let the home go to foreclosure.

It is commonly assumed that foreclosures and vacant homes decrease property values, and many studies have shown that this is assumption is accurate. Dann Immergluck and Geoff Smith determined that in Chicago, each foreclosure within 1/8 mile of a single-family home results in a decrease in value of approximately 1% (Immergluck, 2005), and a 2007 study by Lin, et al., also focused on the City of Chicago, found that a foreclosure within 0.9km of a home reduces its value by 8.7% (Lin, 2009). In 2008, Brian Mikelbank analyzed the impact of foreclosures and vacant/abandoned properties in Columbus, Ohio and determined that each foreclosure negatively impacted sold homes between 1% and 2%, while

[1] A borrower is considered to be underwater when their loan balance is higher than the current market value of the property.

vacant or abandoned properties negatively impacted sold homes between 0.5% and 3.5% depending upon their on distance from the homes (Mikelbank, 2008).

For many locations, the debate has turned into choosing between the 'lesser of two evils.' Allow rentals, keeping homes occupied with fewer foreclosures, and accept the "problems" that come from non-owner occupied homes or ban rentals, and instead deal with the empty properties and increased foreclosures.

The foreclosure crisis has not only impacted property values and homeowners. Along with falling homeownership rates, the increase in foreclosures has led to a large number of households transitioning from homeowners to renters. Across the nation, rental vacancy rates have reached a ten year low, while rents continue to climb, and the rental market in Fort Collins, Colorado is no exception[2] (Callis & Kresin, 2012). Figures 1 and 2 below show the relationship between foreclosures and rental demand in Fort Collins.[3,4]

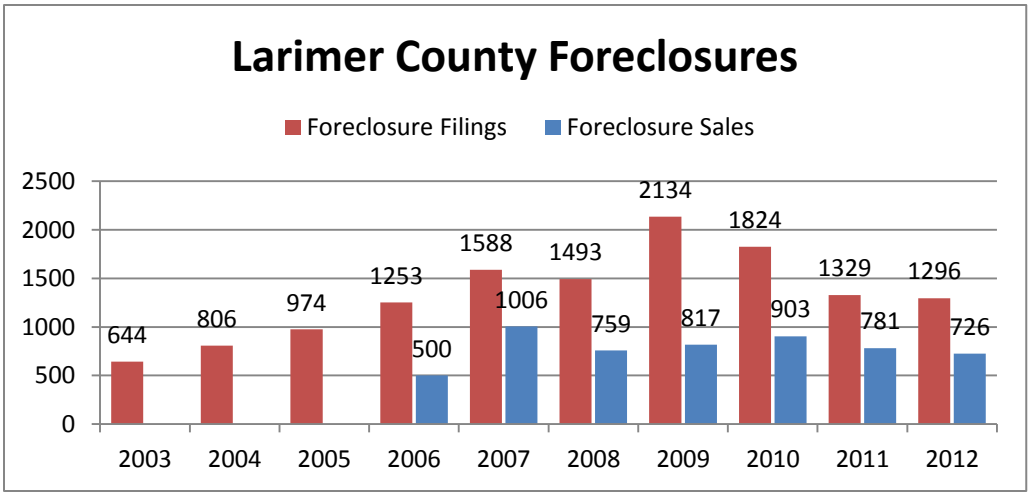

Figure 1: Foreclosure Filings and Sales
Data Source: Colorado Division of Housing

[2] See Appendix A: Figures A1 and A2.

[3] Values for 2012 are estimates based on the monthly data available at the time of the analysis.

[4] See Appendix A for foreclosure filings and foreclosure sales definitions.

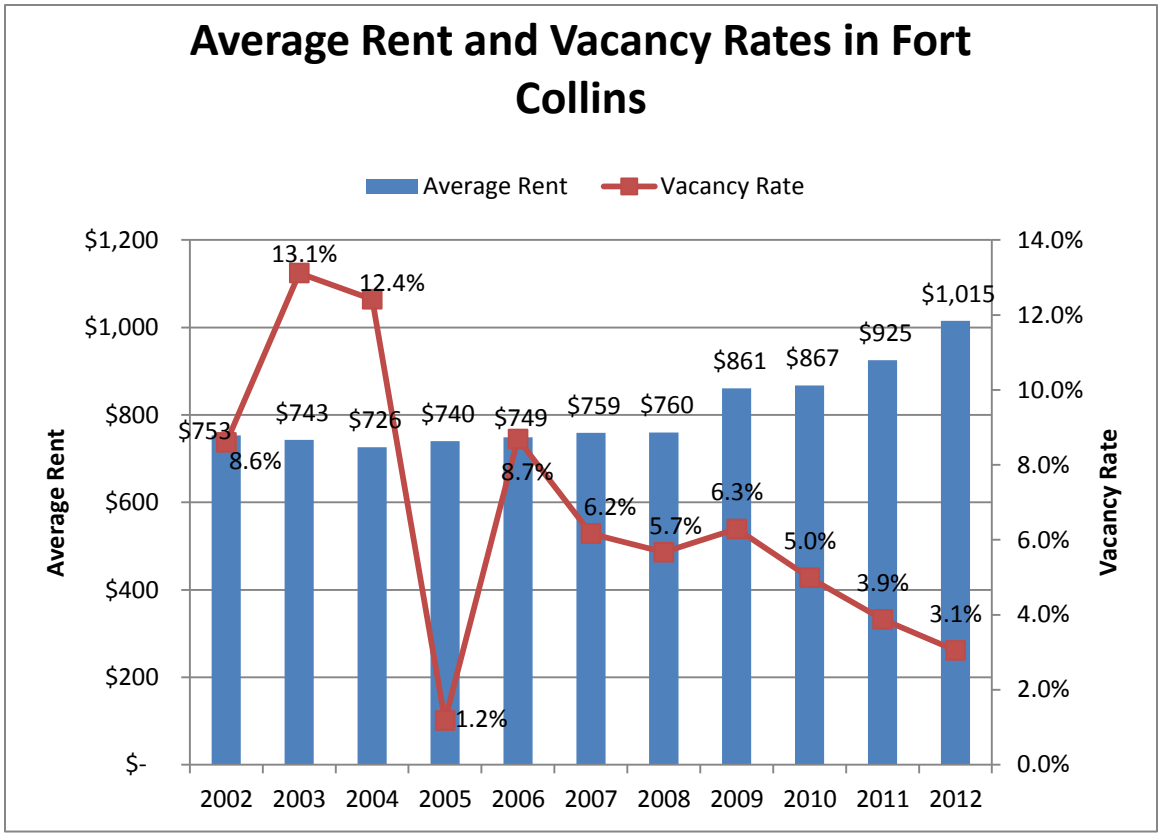

Figure 2: Fort Collins Rent and Vacancy Rates
Data Source: Colorado Division of Housing

In 2009, foreclosure filings in Larimer County peaked, creating higher demand for rental housing. Between 2009 and 2012, as fewer rentals were available (indicated by the decreasing vacancy rates), the average rent increased by 17.9%.

Rental housing policy typically focuses on balancing the need for affordable housing with the needs of homeowners' concerned with preserving the quality of their neighborhood and protecting the value of their homes. Policy discussion tends to largely focus on low-income affordable housing (i.e. subsidized housing, Section 8 housing, etc) despite the fact that such types of rental properties make up a small

percentage of overall rental housing in most communities.[5] Single-family rental homes play an important role in providing quality housing to people who are unable or unwilling to purchase their own homes, and are "essential for households at middle-income and lower-income levels" (Colorado Division of Housing, 2011).

According to the American Housing Survey, in 2010, 34.5% of occupied housing units in Fort Collins were home to renters. The estimated median household income for renter-occupied housing was $33,803, while the estimated median household income for owner-occupied housing was $ 70,441. In general, housing is considered affordable when housing expenses do not exceed 30% of a family's gross income (U.S. Department of Housing and Urban Development, 2012). Based on data obtained from the 2011 American Community Survey, it was estimated that 28 percent of owner-occupied households and 53 percent of renter-occupied households in Fort Collins had housing costs that exceeded 30% of their income. Table B1 in the Appendix B provides a detailed look at the financial characteristics of occupied housing units in Fort Collins.

Due to the high cost of housing (relative to income), and the overall dynamics of the housing market in Fort Collins, the rental-housing debate is a particularly contentious issue. With high home prices, rock bottom vacancy rates and increasing rents, local policy makers are faced with concern from both homeowners and renters. Finding a balance between supporting home prices and providing affordable housing within the community requires that policy makers have access to

[5] For example, in Larimer County, affordable rental units (including income restricted, senior and disabled housing) make up just 10.8% of renter-occupied units (Community Strategies Institute, 2009).

as much information as possible. This study aims to provide additional insight into the specific dynamics of the housing market in Fort Collins, in terms of the relationship between single-family rental homes and home sales prices.

With so much mixed evidence, and so much at stake, further investigation is required to make sound decisions about the impact of non-owner occupied homes in a subdivision.

While this issue receives a lot of public attention and policy interest, the majority of research in this area has focused on multi-family rental properties, government subsidized housing and concentration of poverty in large cities. Little has been done to look at how the presence of single family rental homes in a neighborhood for a community like Fort Collins, Colorado will impact property values. Literature in this area typically uses the percent of rental properties in the census tract as a measure of rental density. In doing so, the authors are implicitly assuming that the impact of rental composition will be identical across the tract. This paper will expand the current literature by using a unique spatial approach (described in detail below) where the location and concentration of rental properties is identified and explicitly considered, allowing the impact to be unique for each home. It is also different in that it looks at single family rental properties rather than focusing specifically on multi-unit complexes or subsidized housing developments.

Using a hedonic pricing model, the analysis will estimate the way rental properties affect home values by looking at how property values change depending upon their proximity to rental homes.

Analytical Framework

Rosen (1974) provided the framework for the hedonic price regressions that is typically used to measure housing market impacts and externalities. These models use the characteristics of a property as independent variables to explain or predict the sales price of a house.

The basic intuition in hedonic valuation is that the price of a good (in this case, a house) is a function of a bundle of attributes unique to that specific good (property). However, the prices of the individual characteristics are not directly observed; they are implicit in the sales price of the house (which is observable). Thus the hedonic price of a house is defined as the "set of implicit prices" related to the home's specific characteristics and its observed price (Rosen 1974).

In equation form, the hedonic price of house P_i is a function of its characteristics, represented by the vector X_i.

$$P_i = f\ (X_i)$$

For simplicity, assume a linear function of the form:

$$P_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta_k X_{ki}$$

Taking the partial derivative of price with respect to each characteristic yields the characteristic's marginal cost:

$$\partial P / \partial x_1 = \beta_1$$

In this case, the marginal price of an additional unit of characteristic X_1 is equal to β_1. For example, if X_1 represented the number of bedrooms, this equation is telling

us that for each additional bedroom, the price of the house increases by β_1, holding other things constant.

In addition to structural characteristics, (square footage, number of bedrooms, lot size, etc.), the location of a house is considered to play an important role in determining its value, so the characteristics of the neighborhood (location) must also be considered. Depending on the analysis, other factors expected to affect the price of a home are also added to the model (for example: environmental characteristics, proximity to amenities, etc.).

For this analysis, the hedonic model, $P_{ij} = f(X_{ij},N_j,R_i)$, measures the value of a home as a function of its structural characteristics, its neighborhood characteristics, and the rental density characteristics of its location. In semi-log functional form, the regression model can be written as follows:

$$\ln(Price_{ij}) = \beta_o + \beta_1 X_{ij} + \beta_2 N_j + \beta_3 R_i + \varepsilon_i$$

Where P_{ij} = price of house i in neighborhood j
X_{ij} = a vector of structural characteristics of house i in neighborhood j.
N_j= a vector of characteristics for neighborhood j.
R_i =rental density characteristics of the location of house i.

The variables that make up each of these characteristics, their definitions, and their expected relationship with the dependant variable are shown in Table 1.

The semi-logarithmic functional form used here was selected because it is the most commonly used functional form in hedonic studies of housing markets due to the inseparable nature of the characteristics of housing. As Coulson noted, "physical housing characteristics are for the most part, tied together in an inseparable bundle. One cannot detach a bathroom from a house and sell it on EBay.

Because of this, linearity should not be assumed in a housing hedonic function [...]" (Coulson, n.d.).

Table 1: Variable Descriptions (continued on next page)

Code	Variable	Unit of Measure	Expected Sign	Source
Dependent Variable				
lnprice	natural log of sales price	$ (real)	n/a	
Independent (Control) Variables				
Structural Characteristics				
age	age of house at time of sale	years	-	LCA*
age^2	(age)^2		+	
stories	number of stories (does not include basement)			LCA*
sf	square feet of total above grade living space	sq. feet	+	LCA*
sf^2	(sf)^2		+	
bsmtsf	number of square feet in basement (finished or unfinished)	sq. feet	+	LCA*
bsmtsf^2	(bsmtsf)^2		+	
rooms	number of rooms above grade (does not include bathrooms)			LCA*
beds	number of bedrooms		+	LCA*
baths	number of bathrooms		+	LCA*
fireplace	number of fireplaces		+	LCA*
lot	lot size	acres	+	LCA*
lot^2	(lot)^2		+	
hasac	dummy=1 if central air conditioning		+	LCA*
LovelandSchools	dummy = 1 if located inside Loveland School District		+/-	GIS Shapefile
inCityLimits	dummy =1 if located inside Fort Collins city limits		+/-	GIS Shapefile
OwnerOcc	dummy=1 if owner occupied		+/-	LCA*
Categorical Garage Variables:				
attached garage	home has an attached garage		+	LCA*
carport	home has a carport		+	LCA*
detachedgarage	home has a detached garage		+	LCA*
multiplegarages	home has multiple garages and/or types		+	LCA*
garagesf	square feet of garage space	sq. feet	+	LCA*
Categorical Distressed Sale Variables:			+	
bankowned	property was bankowned/foreclosure		-	RealList**
short sale	property was a short sale		-	RealList**
Categorical Seasonality Variables:				
q2	home was sold during the second quarter of the year (April-June)			LCA*
q3	home was sold during the third quarter of the year (July-Sept)		+	LCA*
q4	home was sold during the fourth quarter of the year (Oct-Dec)		-	LCA*
			-	
sold2012	home was sold in 2012		-	LCA*
DistanceCSU	distance to CSU (measured to Lory Student Center)		-	GIS
DistanceCSU^2	(DistanceCSU)^2			
DistanceShopping	distance to Shopping district (measured to popular shopping area)		-	GIS
DistanceShopping^2	(DistanceShopping)^2			

Table 1 Continued

Rental Density Characteristics				
Rentals500	number of rentals within 500 ft of subject		+/-	GIS
Rentals14	number of rentals within 500 ft and 1/4 mile radius of subject		+/-	GIS
Rentals12	number rentals within 1/4 and 1/2 mile radius of subject		+/-	GIS
lnRentals500	natural log of Rentals500			
lnRentals14	natural log of Rentals14			
lnRentals12	natural log of Rentals12			
Neighborhood Characteristics				
totalpop	total population in census tract			US Census Bureau***
collegedegree	% population in census tract with college degree or higher	%	+	US Census Bureau***
Renter	Percent renter occupancy	%	+/-	US Census Bureau***
Student	% population enrolled in public college	%	+/-	US Census Bureau***
medage	Median Age of population in census tract	years	+/-	US Census Bureau***
Family	husband and wife with own child <18		+	US Census Bureau***
Dad	Male with own child <18, no wife		-	US Census Bureau***
Mom	Female with own child < 18, no husband		-	US Census Bureau***
whitepop	% of population in census tract that is white only	%	+	US Census Bureau***
income	Average Income (annual) in census tract	$(real)	+	US Census Bureau***
Vacant	Vacant housing units in census tract		-	US Census Bureau***
rentals	% of rental homes in census tract	%	+/-	US Census Bureau***
student	% of population in census tract enrolled in 4-year public college	%	-	US Census Bureau***
* Larimer County Assessor's Office **RealList is a search option through the Fort Collins mulit-list service *** U.S. Census 2010				

Hypothesis

The purpose of this study is to determine how proximity to rental homes affects the value of nearby homes by estimating the magnitude and direction of the rentals' impacts on nearby homes. Thus, the hypothesis being tested is:

Ho: proximity to rental homes does not affect the price of homes in the neighborhood, all else equal.

Ha: proximity to rental homes does affect the price of homes in the neighborhood, all else equal.

Variable Selection

This study focuses specifically on properties with a postal delivery address of Fort Collins, Colorado. The sample was chosen so that general city characteristics such as, public service provisions, tax rates, etc are the same for all properties in the

sample, and can therefore be excluded from the model. Squared variables, such as Age^2, $Size^2$ and Lot^2, are included in the function, a common practice in hedonic studies, to account for the notion of diminishing returns. These variables capture the fact that as size of the home, size of the lot or age of the home increase, the price of the house will increase, but at a decreasing rate. Numerous indicator or dummy variables are also included to indicate whether prices change as a result of the presence of different attributes. For example, the dummy variable AC allows us to test whether the presence of air conditioning in a home has an impact on the home's price.

The structural characteristics included in this model that are standard in most housing price regression models include: square foot, age, number of bedrooms and bathrooms, lot size, garage and/or carport spaces, presence of a fireplace, central air conditioning, number of stories and presence of a basement. Many of these models are limited in the number of structural characteristics they can include because they lack sufficient data. My sample includes data on additional characteristics that could affect the price of a home including: basement square footage, number of total rooms above grade, age of the home at the time of sale, garage type, school district, location inside city limits and type of occupancy at the time of sale (non-owner vs. owner occupied). Based on the literature, I have also included an indicator variable to indicate whether a sold property was a fair market sale, foreclosure or short sale (which theoretically would result in a lower sales price).

It is largely considered common knowledge among real estate professionals that the time of year a home sells has an impact on its price. The seasonality of the real estate market is supported in the literature as well (Goodman (1993), Harding et al (2003), Case and Schiller (1990)). For this reason, dummy variables were included for both the year and quarter during which the home sold.

Neighborhood characteristics that theoretically could affect a neighborhood's home values include both demographic and location variables. As already discussed, the presence of rentals in a neighborhood is a main interest of this study. In addition to the rental proximity variables discussed below, the subdivision's overall occupancy composition may also have an impact on home values. Therefore, a variable for the percent of homes occupied by renters has been included. Previous studies have found that lower home prices were associated with higher percentages of minorities, presence of single parent households and higher numbers of vacant homes (Chiodo, Hernandez-Murillo, & Owyang (2010), Mikelbank (2008), Wenhua (2010)). For this reason, variables for the percent of population that is white only in a neighborhood, single parent households (with both male and female heads of household) and number of vacant homes were included. Other included variables that are traditionally associated with higher property values include education levels, age of residents, income, and presence of families with children.

A study on Fort Collins, conducted by Corona Research Inc. found that 71% of renter households with more than three unrelated persons living in a single dwelling unit were college students. While the study specifically analyzed the

impact of single-family rentals on neighborhood property values, it used the percent of single-family homes in a census block group, rather than the total number of rental homes within a certain distance of the subject property, which is the focus of this paper. The authors found four characteristics with a significant impact on neighborhood home values: percent of rentals, average number of rooms in each house in the subdivision, distance from the CSU campus to the approximate center of the neighborhood and the average age of the homes (Corona Research, Inc., 2005). Based on this information, variables for the number of college students in the census tract and distance to CSU (measured from the sold home to Lory Student Center) were included.

Typical to these types of analysis, the distance to Central Business District is included; however, the Central Business District in Fort Collins, known as "Old Town" is very close to the Colorado State University Campus (already being measured with the Distance to CSU variable). Furthermore, while Old Town is a popular area of town, it provides more of a "destination" type shopping and nightlife experience. The majority of everyday retail shopping occurs along the Harmony Road corridor which is also home to a large number of technology oriented employers. With location to Old Town already being largely accounted for in the Distance to CSU variable, a variable for the home's distance to a major shopping center[6] was added to the model.

In order to test the hypothesis that proximity to rental homes will affect a home's value rental density characteristics were constructed. These variables were

[6] The shopping center selected for this analysis was the Front Range Village, a lifestyle-shopping center anchored by several big box stores (including Lowe's, Super Target, and Sport Authority).

created using a list of non-owner occupied homes obtained from the Larimer County Assessor's office. While it would be ideal to have information on whether a home is specifically being used as a rental property, this information was not available. Therefore, the assumption was made that a home listed as non-owner occupied in the county tax records is being used as a rental property.

The homes identified as non-owner occupied were plotted, along with single-family homes sold between January 1, 2011 and July 1, 2012, using ArcGIS software. The number of rental homes within ½ mile of each sold home were identified, then grouped and totalled according to distance from the subject property. Rentals that were located within 500 feet of the subject make up the Rentals500 category. Rentals that were located within a radius of 500 feet to $^1/_4$ mile, were included in the Rentals14 category. Similarly, rentals located between a $^1/_4$ and $^1/_2$ mile radius from the subject make up the Rentals12 category. A visual representation of the construction is provided in Figures 2, 3 and 4.

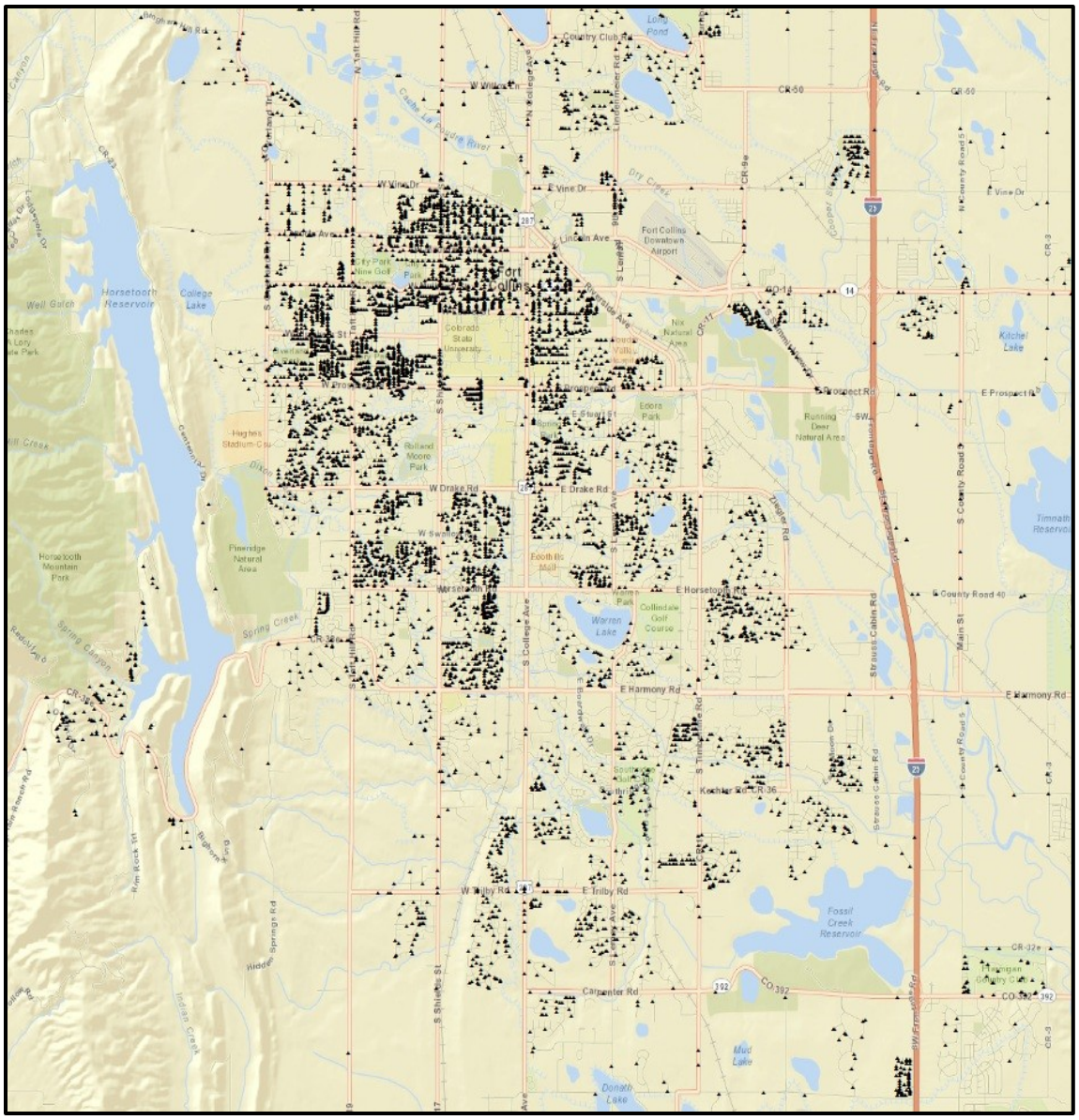

Figure 3: Map of Fort Collins, CO with rental properties plotted

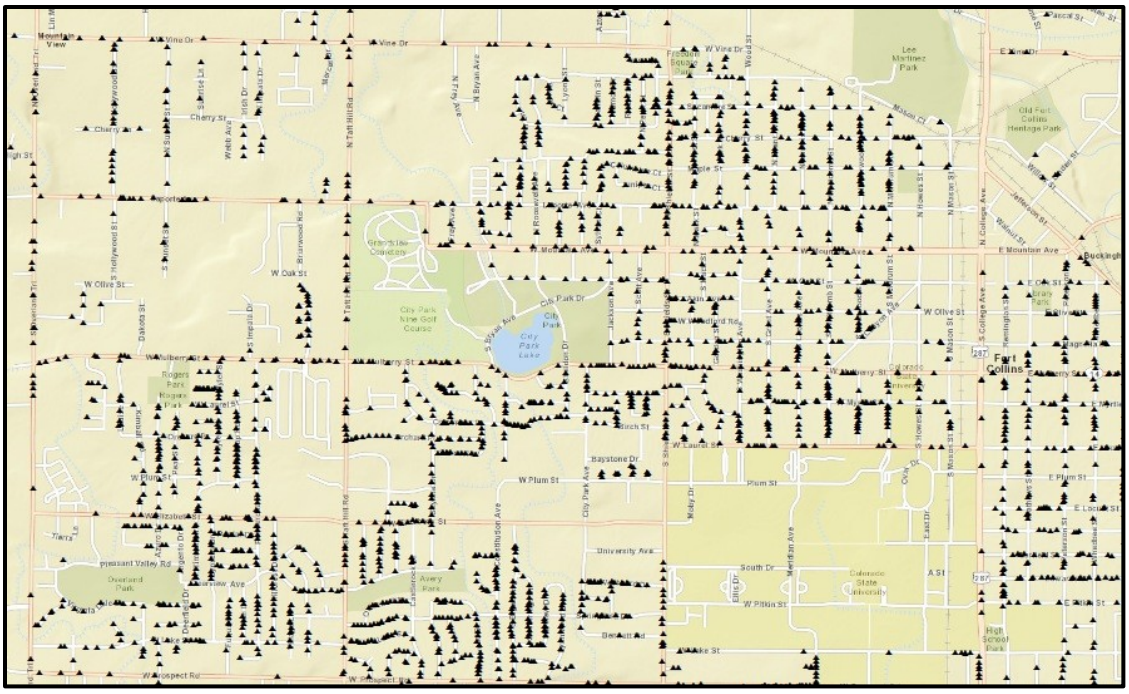

Figure 4: Close up of rental properties located near CSU Campus

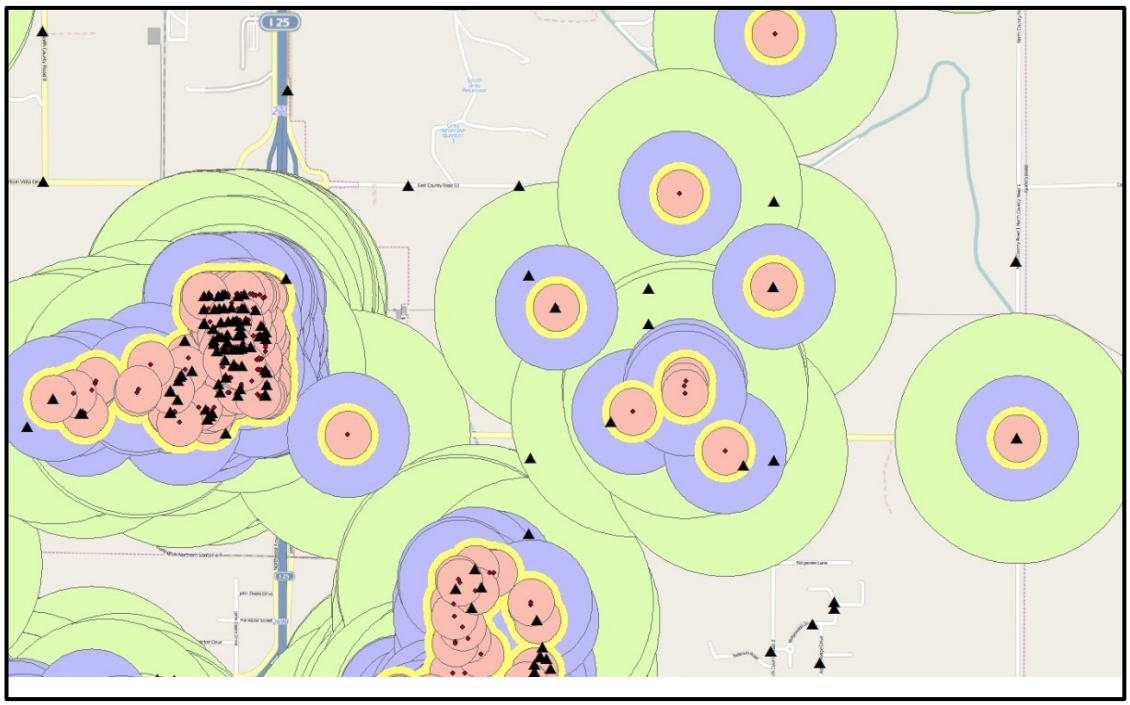

Figure 5: Proximity "rings" for each sold home

Data

The data for this study came from multiple sources. Property characteristics were obtained from the Larimer County Assessor's office and the local multi-list service (MLS). Both sources provided detailed structural information on each property, as well as transaction data for single-family homes sold between January 1, 2011 and July 1, 2012. In order to ensure a consistent, quality data set, I compared the assessor's property information with the multi-list information for every property. If an inconsistency was found, I examined that specific property in both systems to check for typographical and/or data errors. In most cases, the inconsistency was due to an error in the input of data in one of the two systems and was easily corrected in the final data set. If there were inconsistencies that could not be resolved, or significant amounts of data were missing for the property, it was eliminated from the dataset.

Sales that were not arms-length transactions[7] were identified by examining both the sale price and the type of deed used in the transaction. Property transfers that involved deed types that are not used for arms-length real estate sales were removed from the data set.[8] Sales for unusually low dollar amounts were also examined as they typically involved the "sale" of a home to a relative (for example, a home was sold to a family member for $100). After removing any transactions that

[7] An arms-length transaction is defined as, "a transaction in which the parties are dealing from equal bargaining positions" (Reilly, 2000).

[8] For example, it is common to use Quit Claim Deeds to transfer or "gift" property to another individual (for example to a spouse or child) as they do not contain any language of warranty. There are a variety of other deeds that generally indicate a transaction was not an arms-length sale, examples include: Beneficiary Deeds, Trustee Deeds, Bargain and Sale Deeds, and Administrative Deeds.

were not arms-length, the final sample size consisted of 2,760 single-family homes. This meticulous approach to data cleaning resulted in a particularly accurate dataset not commonly seen in the literature, as authors tend to use rather arbitrary assumptions in determining which samples to remove from the dataset.

Data for neighborhood characteristics and demographic information was obtained from the U.S. Census Bureau and matched to the individual properties based on Census blocks and tracts (the geographic unit used to represent a "neighborhood," a common practice in the literature). GIS shapefiles for Colorado school district boundaries and Fort Collins' city limits were used to identify whether properties were located within the city limits as well as within the boundaries of Fort Collins' school district (Poudre R-1) or the city of Loveland's school district (Thompson R2-J). Tables 2 and 3 present summary statistics for the variables.

The price of homes sold during this time period ranged from $25,500 to $825,000, with a mean sales price of $272,553. Average square footage (above grade) was 1,783 and average basement square footage was 812. Most homes had 3 bedrooms and 2 bathrooms and garage square footage of 498 (which roughly translates into a 2 car garage). The majority of sold properties were located within city limits and within the boundaries of the Poudre R-1 School District. Five percent of the homes were foreclosures, 2.0% were short sales, and 75% percent were owner occupied.

The average census tract had a population of 4,526 people, 90% of which were white, and consisted of 405 families, 36 single-dad households and 85 single-mom households. On average, 15% of the census-tract population held a bachelor's

degree. Annual income ranged between $19,699 and $132,402 with the average being $77,419. The percent of students in each census tract ranged between 3% and 90%, with a mean of 17%.

Sold homes had an average of 8 rentals within 500 feet, 59 rentals between 500feet and ¼ mile, and 139 rentals between ¼ and ½ mile. The average percent of rentals overall in each census tract was 32%.

Table 2: Summary Statistics

Summary Statistics					
Variable	***Obs***	***Mean***	***Std. Dev.***	***Min***	***Max***
Sales Price	2759	$272,553.00	$117,376.20	$25,500.00	$825,000.00
Age at time of sale	2759	30.32077	24.2283	1	126
Above Grade Square Footage	2759	1783.562	648.8553	464	7559
Basement Square Footage	2759	812.9623	620.5378	0	7279
Number of Rooms	2759	6.906125	1.859523	2	15
Number ofBedrooms	2759	3.332367	0.8730556	1	7
Number of Bathrooms	2759	2.403498	0.8998769	0.75	8
Number of Fireplaces	2759	0.6792316	0.4910807	0	2
Garage square footage	2759	498.9065	268.8539	0	3316
Lot size (acres)	2759	0.745415	4.323484	0	98.73
Distance to CSU	2759	3.538872	1.950591	0.2287113	11.36376
Distance to Shopping	2759	4.047049	2.076872	0.331439	15.26142
Total Population	2759	4526.465	2095.728	1214	11580
Median Age	2759	34.2904	6.224827	19.5	53.1
% White Population	2759	90%	3%	69%	96%
% Population with Degree	2759	15%	9%	0%	37%
Average annual Income	2759	$77,419.34	$23,528.28	$19,699.00	$132,402
% population enrolled in college	2759	17%	13%	3%	90%
Number of families	2759	405.597	2.814039	30	1218
Number of single-dad households	2759	36.34324	17.48622	2	102
Number of single-mom households	2759	85.7394	41.135549	14	160
Number of vacant households	2759	81.956387	44.030909	24	313
% rentals	2759	32%	17%	6%	90%
Number of rentals between 1/4 and 1/2 mile	2759	139.5589	134%	0	802
Number of rentals between 500ft and 1/4 mile	2759	58.89924	52%	0	548
Number of rentals within 500 feet	2759	8.512867	8%	0	59

Table 3: Categorical/Dummy Variables Summary Statistics

Categorical/Dummy Variables Summary Statistics		
Variable	***Frequency***	***Percent***
Occupancy Unknown	191	7%
Non-owner Occupied	509	18%
Owner Occupied	2,059	75%
Fairmarket Sales	2,554	93%
Bank owned sales	142	5%
Short Sales	63	2%
Sold in 2011	1,731	63%
Sold in 2012	1,028	37%
Sold in quarter 1	655	24%
Sold in quarter 2	1,149	42%
Sold in quarter 3	594	22%
Sold in quarter 4	361	13%
No air-conditioning	1,434	52%
Air-conditioning	1,325	48%
No Garage	167	6%
Attached Garage	2,290	83%
Carport	13	0%
Detached Garage	218	8%
Multiple Garages	71	3%
Outside City Limits	478	17%
Inside City Limits	2,281	83%
Fort Collins School District	2,563	93%
Loveland School District	196	7%

Empirical Results

Initially a semi-log specification was considered, however based on the relationship between sales price and rental density, the specification that best fit the data and underlying intuition was a model examining the non-linear effects of proximate rental properties on sales price. The model specification is presented below and examines the non-linear effects of rental proximity on home sales price by log-transforming the rental proximity variables. This model considers the possibility that as the number of proximate rentals rises, the marginal impact on a home's price will increase, but at a decreasing rate, and allows for interpretation of the coefficients as elasticities. The rest of the model was kept in the semi-log functional form, with sales price being the only other variable that was log-transformed. The regression was corrected for heterskedasticity using robust standard errors. Results are presented in Table 4.

Table 4: Regression Results (continued on next page)

REGRESSION RESULTS: lnSalesPrice				
Variables	**(1)**		**Variables**	**(1)**
age	-0.00330***		OwnerOcc	0.0357***
	(0.00104)			(0.0104)
stories	-0.0481**		bankowned	-0.144***
	(0.0231)			(0.0245)
sf	0.000280***		shortsale	-0.111***
	(7.94E-05)			(0.0232)
bsmtsf	0.000169***		q2	0.0385***
	(6.48E-05)			(0.0113)
rooms	0.0180***		q3	0.0474***
	(0.00396)			(0.0138)
beds	-0.0273***		q4	0.0281*
	(0.00752)			(0.0153)
bath	0.0551***		sold2012	0.00315
	(0.00871)			(0.0101)
fp	0.0457***		DistanceCSU	-0.0654***
	(0.00968)			(0.0181)
lot	-0.00714		DistanceShopping	-0.0503***
	(0.00692)			(0.0115)
hasac	0.0367***		lnRentals12	0.0559***
	(0.00868)			(0.0118)

Table 4 Continued

REGRESSION RESULTS: lnSalesPrice				
Variables	**(1)**		**Variables**	**(1)**
attachedgarage	-0.0568		lnRentals14	-0.0532***
	(0.0424)			(0.0155)
carport	0.0737		lnRentals500	-0.0439***
	(0.0705)			(0.00745)
detachedgarage	-0.0179		totalpop	-6.14e-05***
	(0.044)			(1.32E-05)
multiplegarages	-0.178**		medage	0.000979
	(0.0725)			(0.00172)
garagesf	0.000264***		whitepop	0.698***
	(5.49E-05)			(0.204)
inCityLimits	-0.0248		collegedegree	-0.00853
	(0.0217)			(0.0649)
Loveland Schools	0.0902***		family	0.000452***
	(0.027)			(8.13E-05)
dad	0.00190**		sf2	-1.93E-08
	(0.000936)			(1.78E-08)
mom	0.000506		bsmtsf2	-2.04E-08
	(0.000378)			(4.12E-08)
vacant	0.000716***		lot2	6.87E-05
	(0.000264)			(8.69E-05)
rentals	0.0383		DistanceCSU2	0.00282
	(0.0981)			(0.00196)
income	8.20E-07		DistanceShopping2	0.00536***
	(6.29E-07)			(0.00121)
student	0.331***		Constant	11.17***
	(0.0943)			(0.183)
age2	4.48e-05***			
	(8.98E-06)			
Observations		2,266		
R-squared		0.706		
Adjusted R-squared		0.692		
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Overall, the model was highly significant, with a p-value of less than 0.0001. The model's adjusted r-squared was 0.692, indicating that the model explains 69.2% of the variation in sales price after adjusting for degrees of freedom. The majority of the structural characteristics variables were statistically significant with the expected sign. Above grade square feet, basement square feet, number of rooms, number of bathrooms and number of fireplaces were positive, representing a percentage increase in home price per unit increase in the characteristic. While multiple garages was the only variable for specific garage type that was significant, garage size (measured in square feet) was significant and positive. This indicates that in the real estate market for Fort Collins, CO the size of the garage is more important to buyers than the type of garage, all other things being equal.

As expected, the size of the home had a positive impact on price. Sales price increased 0.027% for every additional square foot above grade, and by 0.018% for every additional basement square foot. While at first glance this appears to be a very small number, when one puts this into the context of an example the amount appears more appropriate. Because the variables are interpreted as the change in price due to a one square foot increase, we would expect the price difference between two houses that differ only by one square foot to be very small. In other words, a house that has 1,000 square feet above grade and a house that is 1,001 square feet above grade would not be expected to differ substantially in price.

The number of rooms and bathrooms also positively impacted home sales price by 1.9% and 5.6%, respectively, for each additional room or bathroom.

Additionally, the presence of air conditioning increased the home's price by 3.8%, all else equal.

Significant variables that were predicted to have a negative impact on sales price were age of the home and if the sale was a foreclosure (bank owned) or a short sale. As expected, homes that were bank owned sold for 15% less than those that were a fair market sale, and homes that were a short sale sold for 11.6% less than fair market sales, all else equal. There was also evidence of seasonality in the market, with homes sold during the second and third quarters of the year selling for approximately 4% more than homes sold during the first quarter of the year.

Two of the house characteristic variables that had unexpected outcomes were number of stories and number of bedrooms, however further consideration provides some insight into the results. If one considers the fact that adding a bedroom takes away from the size of other rooms in the house, it seems appropriate that increasing the number of bedrooms would negatively impact the sales price overall (Boxall, et al., 2005) (Coulson, n.d.). Lot size and presence inside the city limits were not significant.

Distance to CSU, as well as distance to the shopping district, were both significant. In both cases, home price decreased for each additional mile from CSU or the shopping district, falling by 6.5% as distance from CSU increased and by 5% as distance from the shopping district increased.

Neighborhood characteristics also played a role in determining the sales price of a home. As predicted in the literature, percentage of white population,

percent of population with a college degree, number of families and income all positively impacted a home's sales price.

The rental proximity variables were all significant at the 0.0001 level. A 1% increase in the number of rentals located within 500 feet decreased the home's price by 0.0439%. Price decreased by 0.0532% for each additional percent of rentals within a radius of 500 feet to ¼ mile, while a 1% increase in rentals located between ¼ mile and ½ mile of the home increased price by .0559%, all else equal. Putting this in the context of an example provides a clearer picture of what these results are saying. If a home has 100 rental properties within a ¼ to ½ mile radius, and 10 more homes become rentals (equivalent to a 10% increase), the sales price of the property is predicted to increase by 5.59%, holding other things constant. For a home that would have sold for $250,000, this translates into an increase in sales price of nearly $14,000.

Overall, these results indicate that while rental homes that are closely located to a property detract from its selling price, as distance from the home increases, the presence of rental homes increase its price. This relationship can be explained by considering how many home buyers shop for properties. If there is a rental directly across the street that perhaps is not well maintained, it is considered an eyesore, but a rental a block away, which the buyer doesn't see from the driveway, may not matter as much to the buyer. At the same time, if rental properties are considered an alternative to a short sale or foreclosure, an increase in the number of rentals would mean a decrease in the number of distressed sales, effectively increasing prices for surrounding homes overall if the negative impacts of foreclosure are

greater than the negative impacts of rentals. An interesting extension of this study would be to analyze proximity of foreclosures to the same sold homes to test for this type of scenario.

Policy Implications

In general, these findings can be used to assist policy makers, homeowner's associations and mortgage lenders in making sound decisions on rental regulation. The policy implications of these findings may be of particular interest to Fort Collins' policy makers given the three-unrelated ordinance. Passed in 2007, the three-unrelated ordinance (often referred to as U+2), limits the number of unrelated occupants in residential properties to no more than three. The ordinance was intended to reduce the number of people living in a single property, with the goal of reducing neighborhood problems and complaints, and preserving property values. A 2005 impact study conducted by Corona Research for the City predicted that ⅔ of households that would be considered in violation of the ordinance were living in single-family homes" (Corona Research, Inc., 2005).

While the ordinance may have limited the number of people living in any one rental property, (theoretically reducing complaints and problems), it likely lead to an increase in the number of rental homes overall, as households that were made up of more than three unrelated people were forced to split up. This appears to be the case based on interviews conducted in a 2009 follow up study during which several people commented that they had "seen a marked increase in the number of rental properties where they live" (Corona Research, Inc, 2009). Another consequence of the ordinance is that it likely contributed to the decrease in vacancy rates. Basic

supply and demand theory tells us that as the number of available properties falls, rents will increase. This means that in Fort Collins, the U+2 ordinance very likely exacerbated affordable housing problems.

Furthermore, if the ordinance resulted in additional rental households forming (which appears to be the case), the results of this analysis suggest that the U+2 ordinance may not have had the intended impact of preserving property values. Given these results, further research examining the full impact of the U+2 ordinance on both property values and housing affordability would be beneficial to local policy makers.

Conclusion

Single-family rental homes play a crucial role in providing quality, affordable housing to households that are unwilling or unable to purchase their own home. Literature in this area often overlooks the majority of the rental housing market as it typically focuses on low-income affordable housing or multi-unit apartment complexes. Sound housing policy requires a balance between the need for quality, affordable housing with the needs of homeowners seeking to preserve the quality of their neighborhood and protect the value of their homes.

This analysis extends the current literature by specifically measuring the impact of proximity to single-family rental homes on home sales price. In developing this model, GIS software was used to measure precise distances between rental properties and sold homes. This method resulted in rental density variables that were unique to each individual home, rather than taking the "blanket approach" of using census tract data typically found in the literature. By measuring both the

number of rentals and their distance from each sold single family home, I was able to explicitly identify both the location and concentration of rental homes for each sold property, rather than implicitly assuming a uniform impact as seen in most literature. Overall, these findings suggest that rental properties do have an impact on the selling price of nearby homes.

I find strong evidence that rental density plays an important role in determining a home's overall selling price; with rentals located within ¼ mile of a property negatively affecting price and rentals located between ¼ and ½ mile positively affecting selling price. If rental homes are considered an alternative to a foreclosure or short sale for sellers that are underwater on their homes, these results suggest that while an increase in the number of rental properties may negatively affect the price of homes within close proximity, by lowering the number of properties sold in short sale or foreclosure, they have a positive effect on the price of homes in the area overall. These findings suggest areas for additional research, including an analysis of the proximity of distressed sales on sold home prices.

The importance of this study is especially relevant in today's housing market. The foreclosure crisis and recession, along with declining homeownership rates, has led to record low rental vacancy rates and rapidly increasing rents. At a time when homeowners are still feeling the effects of the housing bust, policy makers and homeowner's associations are seeking to preserve property values, often through enacting rental restrictions. The results of this paper suggest that these restrictions may not necessarily be having the intended effect.

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APPENDIX A

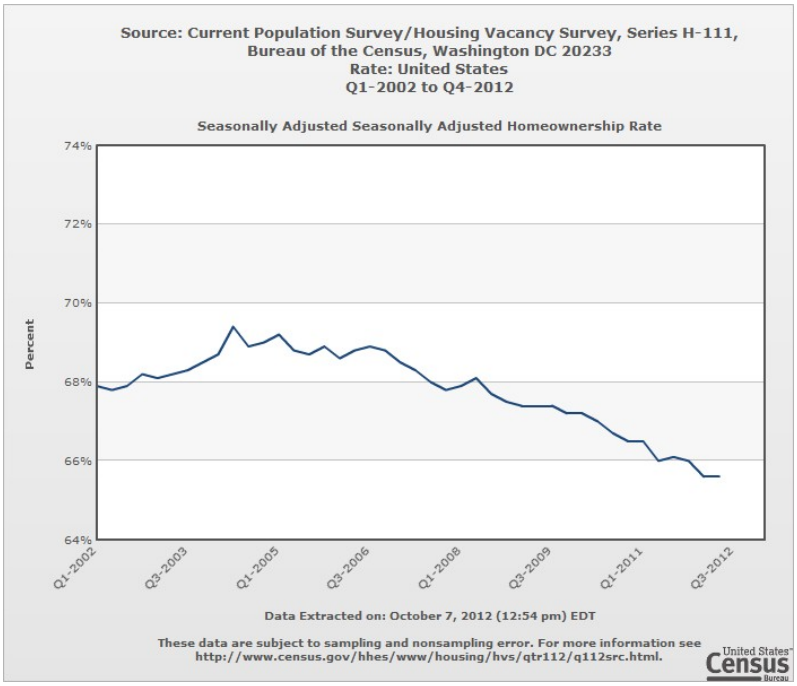

Figure A1: National Homeownership Rates
Source: U.S. Census Bureau

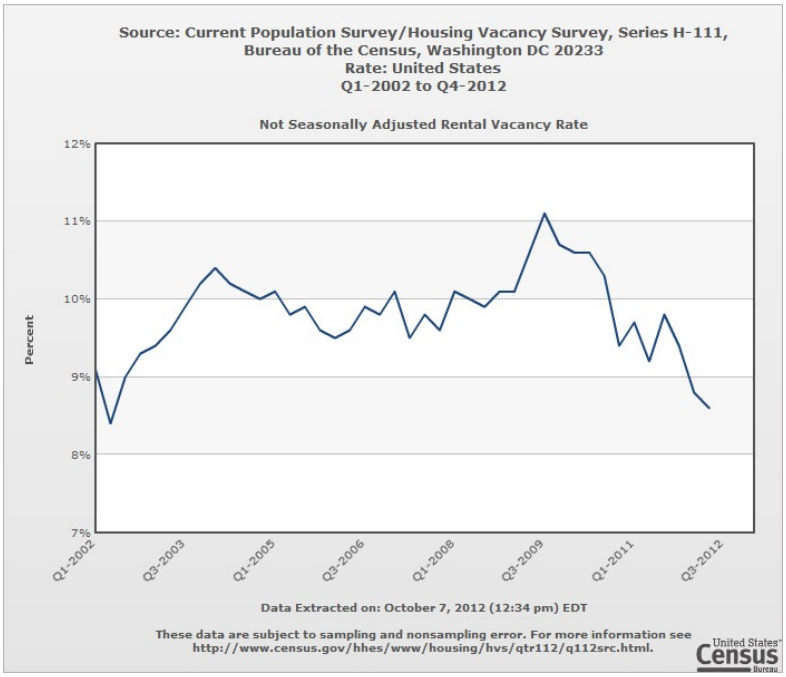

Figure A2: National Rental Vacancy Rate
Source: U.S. Census Bureau

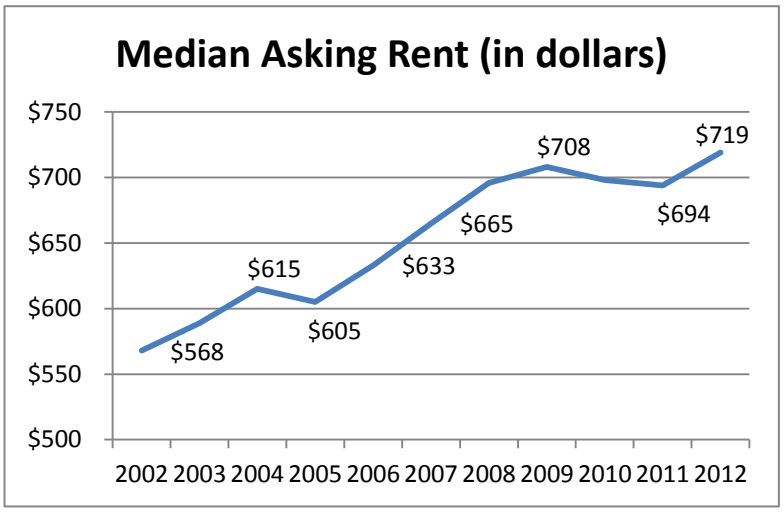

Figure A3: U.S. Median Asking Rent
Data Source: U.S. Census Bureau

The Colorado Division of Housing defines foreclosure filings and foreclosure sales as follows:

> *The foreclosure filings number provides a view of how many borrowers have become seriously delinquent on their loans. Foreclosure filings provide a good guide to foreclosure activity in a given county, and while a property may be withdrawn from the foreclosure process after a filing is made, the filings statistics nevertheless indicate where borrowers are delinquent and in default.*
>
> *The foreclosure sale numbers generally indicate how many borrowers have lost all equity in the property as the result of it being sold to another party at auction, including the mortgage company, an investor, or others. Many households in the foreclosure process lose their properties through a variety of processes such as short sales and deed-in-lieu-of-foreclosure agreements. Losing the property through a foreclosure sale, however, is generally most damaging to the credit of the borrower, and foreclosure (unless the property is sold at auction for more than the value of the loan) does not allow for the borrower to preserve any of the equity he or she might still have in that property.*
>
> (Colorado Division of Housing, 2012)

APPENDIX B

Table B1: TENURE BY HOUSING COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME– Occupied housing units

	Fort Collins-Loveland, CO Metro Area	
	Estimate	Margin of Error
Total:	121,911	+/-2,321
Owner-occupied housing units:	78,924	+/-2,725
Less than $20,000:	6,284	+/-1,053
Less than 20 percent	467	+/-256
20 to 29 percent	784	+/-437
30 percent or more	5,033	+/-960
$20,000 to $34,999:	8,188	+/-1,129
Less than 20 percent	2,311	+/-632
20 to 29 percent	1,185	+/-431
30 percent or more	4,692	+/-959
$35,000 to $49,999:	8,807	+/-1,451
Less than 20 percent	3,085	+/-832
20 to 29 percent	1,630	+/-611
30 percent or more	4,092	+/-1,162
$50,000 to $74,999:	18,798	+/-2,552
Less than 20 percent	7,106	+/-1,380
20 to 29 percent	6,489	+/-1,827
30 percent or more	5,203	+/-1,302
$75,000 or more:	36,466	+/-2,599
Less than 20 percent	23,512	+/-2,109
20 to 29 percent	9,912	+/-1,659
30 percent or more	3,042	+/-1,018
Zero or negative income	381	+/-396
Renter-occupied housing units:	42,987	+/-2,740
Less than $20,000:	12,143	+/-2,001
Less than 20 percent	172	+/-270
20 to 29 percent	810	+/-417
30 percent or more	11,161	+/-1,977
$20,000 to $34,999:	9,095	+/-1,830
Less than 20 percent	162	+/-216
20 to 29 percent	1,930	+/-855
30 percent or more	7,003	+/-1,633
$35,000 to $49,999:	6,902	+/-1,498
Less than 20 percent	1,006	+/-571
20 to 29 percent	2,944	+/-929
30 percent or more	2,952	+/-1,078
$50,000 to $74,999:	6,725	+/-1,397
Less than 20 percent	2,707	+/-812
20 to 29 percent	2,330	+/-831
30 percent or more	1,688	+/-758
$75,000 or more:	5,357	+/-1,374
Less than 20 percent	4,073	+/-1,209
20 to 29 percent	1,190	+/-607
30 percent or more	94	+/-109
Zero or negative income	1,197	+/-621
No cash rent	1,568	+/-651

Source: U.S. Census Bureau, 2011 American Community Survey