

A Comparative Study of Condominium and Single Family House Price Appreciation in
the Salt Lake Valley

by

John D. Billings

B.S. Finance, 1997
University of Utah

Submitted to the Department of Urban Studies and Planning in partial fulfillment of the
requirements for the degree of

Master of Science in Real Estate Development

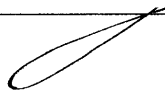
at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
September 2003

© 2003 John D. Billings. All Rights Reserved.

The author hereby grants MIT permission to reproduce and distribute publicly paper and
electronic copies of this thesis document in whole or in part.

Signature of Author: _____

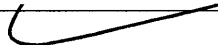


John D. Billings
Department of Urban Studies and Planning
Date August 1, 2003

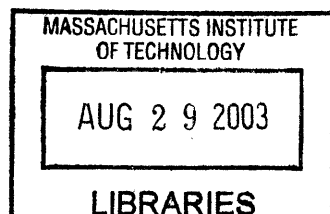
Certified by: _____

Dr. Henry O. Pollakowski
Visiting Scholar, Center for Real Estate
Thesis Advisor

Accepted by: _____



David Geltner
Chair, Interdepartmental Degree
Program in Real Estate Development



ROTCM

A Comparative Study of Condominium and Single Family House Price Appreciation in the Salt Lake Valley

by

John D. Billings

Submitted to the Department of Urban Studies and Planning on August 1, 2003 in partial fulfillment of the requirements for the degree of Master of Science in Real Estate Development.

ABSTRACT

This study examines whether the form of ownership affects the appreciation rate of housing units. The specific test conducted is whether condominiums and single family homes in the Salt Lake Valley have appreciated at the same rate over the past six and a half years. To test this hypothesis, a sample of 10,134 condominium and 48,913 house transactions was analyzed. The sales were grouped into eight geographic analysis areas. Hedonic models were used to quantify the contributory effect on value of the time of sale, age of the unit, and other significant housing characteristics. The price indices created by the hedonic models for each housing type are then compared within geographic areas and across the valley.

The paper shows that condominium price appreciation is significantly below the appreciation of single family houses in seven of the eight areas examined, which represents 80% of the sample. Valley wide regressions were then conducted utilizing geographic dummy variables for the individual analysis areas. These models indicate a strong premium for units of both housing types located in the downtown area.

Thesis Supervisor: Dr. Henry O. Pollakowski
Title: Visiting Scholar, Center for Real Estate

ACKNOWLEDGEMENTS

I gratefully acknowledge the valuable assistance of the following individuals:

Barrett Peterson – for aiding in the data identification and gathering.

Henry Pollakowski – for bringing a wealth of wisdom and a fresh viewpoint to the study.

My children Wendy, Mark, and Rachel – for helping Dad with his “homework”.

To Ralph and his motorcycle – who provided quiet moments for my children and me during this process.

And most of all, to my wife Mary – For always being such a great support and encouragement.

TABLE OF CONTENTS

CHAPTER 1	5
INTRODUCTION	5
OVERVIEW.....	5
BACKGROUND	5
<i>National Association of Realtors Index</i>	6
<i>Office of Federal Housing Enterprise Oversight</i>	9
LITERATURE REVIEW	12
RESEARCH DATA.....	13
ZIP CODE GROUPINGS	13
RESEARCH METHODOLOGY	17
<i>Hedonic Model</i>	17
<i>Regression Variable Definitions</i>	18
CHAPTER 2 - MODELING APPRECIATION RATES: AN ANALYSIS OF CONDOMINIUM AND SINGLE FAMILY HOUSE PRICE APPRECIATION	22
BACKGROUND	22
RESULTS AND ANALYSIS	22
<i>Condominium Regression Results</i>	23
<i>Single Family House Regression Results</i>	29
COMPARING HOUSING TYPES	33
<i>Sandy</i>	33
<i>West Jordan</i>	36
<i>West Valley</i>	38
<i>Downtown</i>	39
<i>Area Jefferson</i>	41
<i>Midvale West</i>	43
<i>Midvale East</i>	45
<i>Cottonwood</i>	47
CHAPTER 3 - CONCLUSIONS	49
APPENDIX A	53
APPENDIX B	55
APPENDIX C	56
APPENDIX D	57
APPENDIX E	59
BIBLIOGRAPHY	60

CHAPTER 1

INTRODUCTION

Overview

This study examines whether the form of ownership affects the appreciation rate of housing units. The specific test conducted is whether condominiums and single family homes in the Salt Lake Valley have appreciated at the same rate over the past six and a half years. To test the hypothesis that condominiums and single family houses have appreciated similarly, a sample of 10,134 condominium and 48,913 house transactions was analyzed. The sales were grouped into eight areas based upon the comparability of several characteristics, and to account for localized neighborhood factors. Hedonic models were used to quantify the contributory effect on value of the time of sale, age of the unit, and other significant housing characteristics. The price indices created by the hedonic models for each housing type are then compared within geographic areas and across the valley.

The paper shows that condominium price appreciation is significantly below the appreciation of single family houses in seven of the eight areas examined, which represents 80% of the sample. Valley wide regressions were then conducted utilizing geographic dummy variables for the individual analysis areas. These models indicate a strong premium for units of both housing types located in the downtown area.

Background

Purchasing a home is often the single largest expenditure made by households today. Most purchases are financed, with mortgage payments often representing 30% or more of total household income. This purchase not only represents an investment in shelter, but often is viewed, on an ex-ante basis, as an actual financial investment. Indeed, the popular press is full of reports from the National Association of Realtors (NAR), The Office of Federal Housing Enterprise Oversight (OFHEO), the U.S. Census Bureau, and others, on the rapidly escalating cost of housing. Often, these articles, along with

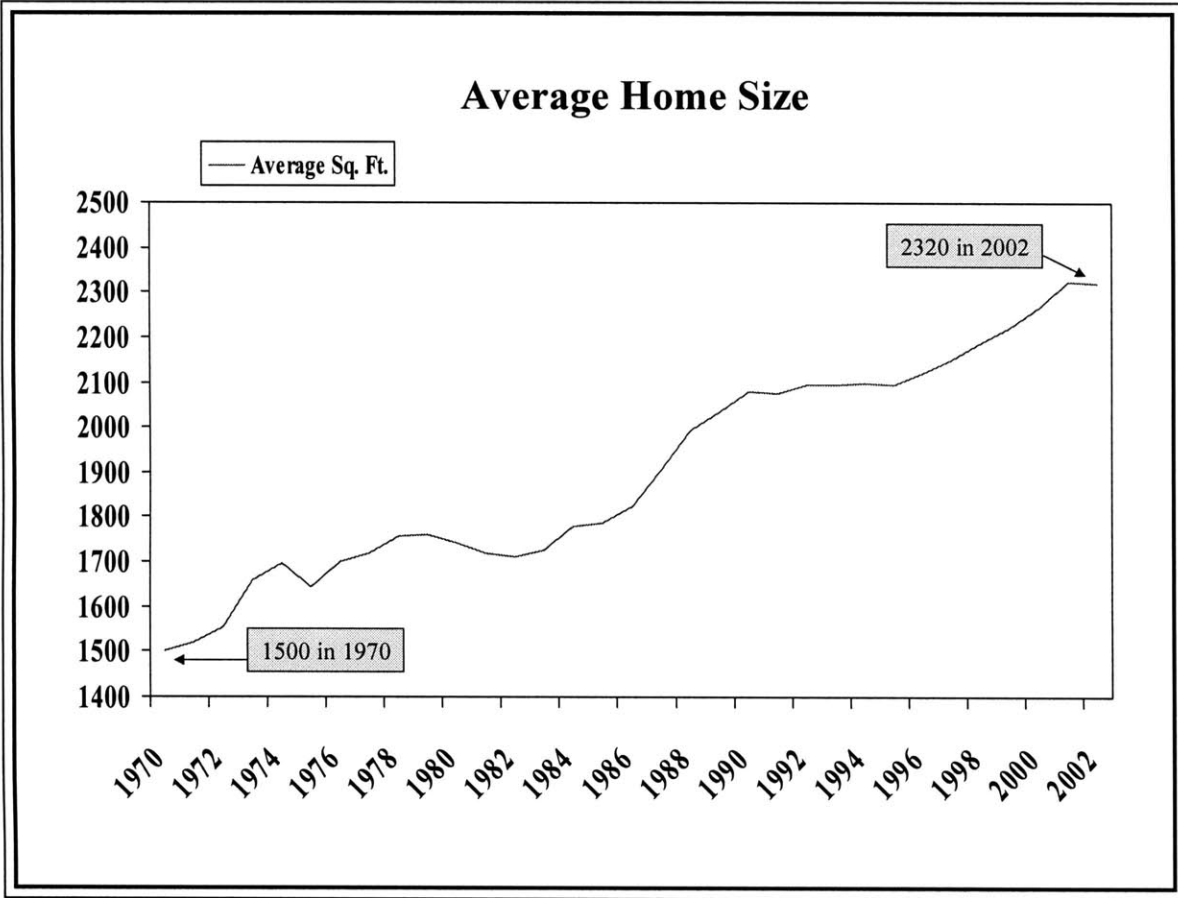
anecdotal evidence, form the basis of individual investors “expected return” on their home. Unfortunately, these reports are often based upon a limited or subjective data set, a certain property type, or a limited range of home values. The following paragraphs discuss these concerns in the context of the two most popular indices of housing appreciation.

National Association of Realtors Index

The National Association of Realtors, as a trade organization supporting real estate agents who make a living by selling homes, publishes periodic reports on house prices and appreciation levels. These reports are often cited in newspaper articles because they contain the easiest to understand statistics. House price reports typically include sales price averages or medians along with the volume of house sales. While easy to understand, these simple statistics fail to consider the price impact of changes to the housing stock or the relative selection bias of a constrained sales period sample.

Simple average or median sales price indices are highly sensitive to changes in housing stock. Over time, houses have gotten bigger and include more features. Consider Figure 1.1 which shows the average house size reported by the Census Bureau. Even if the price per square foot were held constant, tremendous appreciation would be shown simply due to the ever increasing size of homes.

Figure 1.1



On a more local basis, a more detailed analysis of the flaws of this methodology is possible. As a test, the sample data for this study was grouped into semi-annual periods. The simple average and median sales prices for condominiums and single family houses in the first half of 1996 and the first half of 2003 were then compared. Table 1.1 gives a summary of the results.

Table 1.1			
Salt Lake Valley Average and Median Sales Prices			
	First half 1996	First Half 2003	Implied Appreciation
SF House Average	\$ 142,677	\$ 161,993	13.54%
SF House Median	\$ 124,900	\$ 146,100	16.97%
Condo Average	\$ 96,836	\$ 125,960	30.08%
Condo Median	\$ 83,000	\$ 112,000	34.94%

As can be seen, even the choice of average or median sales price makes a significant difference. What is less evident, but more important, is that the change in sample

composition for condominiums and houses is very different. Table 1.2 summarizes the average unit characteristics for each unit type over the two timeframes.

Table 1.2				
Average Unit Characteristics				
	Condominium		Single Family Houses	
	First half 1996	First Half 2003	First half 1996	First Half 2003
Age at Sale (yrs)	18	21	32	37.8
Size Sq. Ft.	1,049	1,198	1,347	1,336
Garage	34.10%	48.70%	76.40%	76.40%
Family Room	16.20%	47.80%	71.80%	77.70%
Fireplace	46.90%	45.60%	61.90%	56.00%
Bathrooms 3+	18.10%	31.40%	26.00%	27.20%
Bedrooms	2.0	2.3	3.5	3.6
Acres			0.2	0.19

With this data in mind, the much larger implied appreciation rate for condominiums noted in Table 1.1 is partially explained. The sample in 1996 contains much smaller units with far less amenities than the 2003 sample. In effect, simple average or median based indices assume that equivalent random representative samples of properties transact each period, which obviously is not true for condominiums. However, the single family house samples are remarkably similar, lending some support to the NAR index.

A subtle selection bias may also influence the NAR index. While many factors lead to a decision to sell a house, three prominent groups may be overrepresented in simple averages or repeat sales indices: new homes, starter homes, and lemons (Clapp & Giaccotto [1992a and 1992b]). Starter homes and lemons are more likely to be moderately priced and exert possible downward pressure, while the increasing size of new homes may place upward pressure on such measures.

Office of Federal Housing Enterprise Oversight

Another widely used price appreciation measure is the Housing Price Index (HPI) published quarterly by OFHEO. According to the OFHEO web site¹, the HPI index is based on analysis of data from Fannie Mae and Freddie Mac from more than 21.2 million repeat transactions over the past 28 years. The HPI tracks average house price changes in repeat sales or refinancings on the same single-family properties using a modified version of the Case-Shiller geometric weighted repeat sales procedure.

The OFHEO web site indicates that the HPI is “a measure designed to capture changes in the value of single-family homes in the U.S. as a whole, in various regions of the country, and in the individual states and the District of Columbia.” However, the HPI only includes selected transactions. The web site indicates that “The House Price Index is based on transactions involving conforming, conventional mortgages purchased or securitized by Fannie Mae or Freddie Mac. Only mortgage transactions on single-family properties are included. Conforming refers to a mortgage that both meets the underwriting guidelines of Fannie Mae or Freddie Mac and that doesn't exceed the conforming loan limit, a figure linked to an index published by the Federal Housing Finance Board. The conforming limit for single-family homes is now \$322,700 as of January 2003. Conventional means that the mortgages are neither insured nor guaranteed by the FHA, VA, or other federal government entity. Mortgages on properties financed by government-insured loans, such as FHA or VA mortgages, are excluded from the HPI, as are properties with mortgages whose principal amount exceeds the conforming loan limit. Mortgage transactions on condominiums or multi-unit properties are also excluded.”

As a quick test of the capture rate of the OFHEO index, a sample of single family house sales was taken from the Salt Lake Valley. The sample contained 2,341 sales which occurred between January 1, 2003 and April 1, 2003. Of the sales, 1,307 were reported as conventional financing, 152 were reported as cash transactions, 651 received FHA financing, while 27 were VA financed, with the remaining 204 sales reported as “other”

¹ <http://www.ofheo.gov>

terms. The conventional mortgages are the only sales that could be included in the OFHEO index, and accounted for only 55.8% of the total sales.

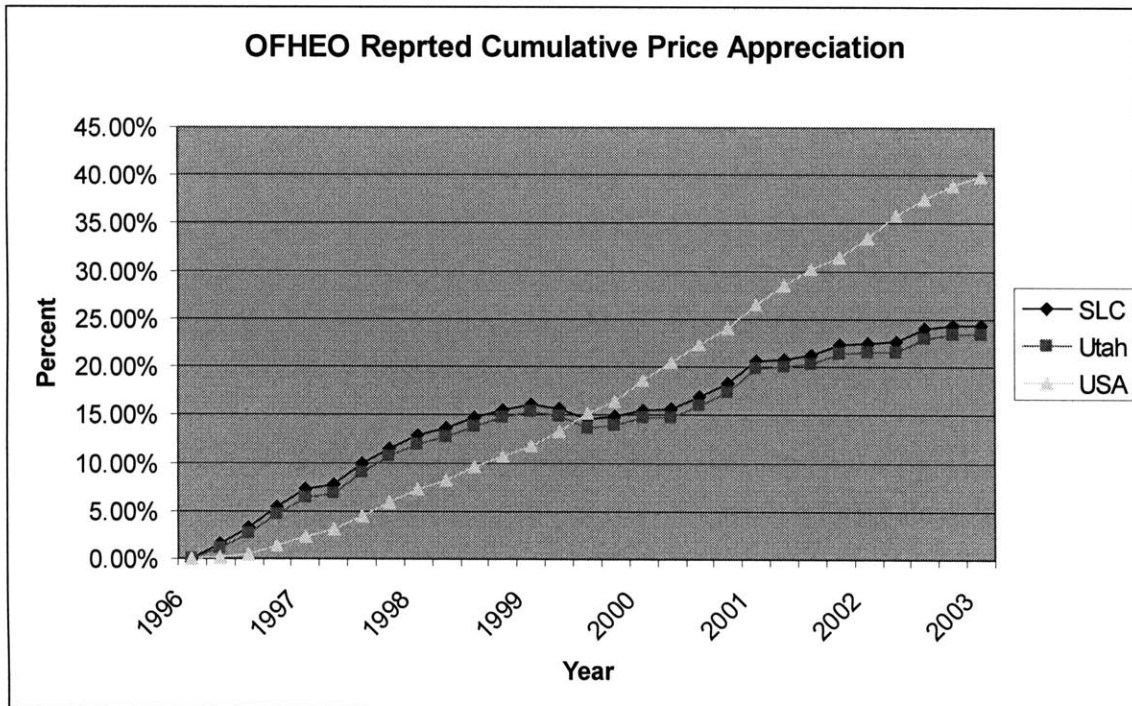
The OFHEO index also includes refinances of homes, using the appraised value as a transaction proxy. While specific figures on refinances in the Salt Lake Valley are not available, including these non-transaction data points can only further dilute the influence of actual sales in the HPI. Including appraisal data is also subject to selection bias. The three main reasons to refinance a home are to obtain a lower interest rate, draw down on home equity, or consolidate first and second mortgages. Of these three reasons, the second two depend largely on home appreciation. Unless an appraisal can evidence a value higher than the purchase price, the transaction is less likely to occur. If the transaction does not occur, the appraisal data does not have the opportunity to be included in the OFHEO database. Thus, it is possible that the appraisal data included in the index is biased toward houses that have appreciated, while under representing homes that have either not appreciated, or have actually depreciated. A possible occurrence of the “appraisal based appreciation” factor in the study area is discussed in Appendix A.

The OFHEO data base records the simple transaction price, and does not consider sales concessions. One estimate of the possible impact of sales concessions can be drawn from the previously discussed sample of house sales taken from the first three months of 2003. Of the 2,341 transactions, 1,233 sales reported seller-paid concessions, which averaged 3.3% of the reported sales price. Thus, over half of the transaction prices were overstated by an average of 3%.

The most recent OFHEO released report covers through the end of the first quarter of 2003. This report includes a ranking of the 50 states and the District of Columbia in terms of total appreciation for the past one and five year period. Utah ranks dead last in both categories, with appreciation rates of 1.98 and 12.19 percent for the past year and five years respectively. Not surprisingly, the Salt Lake Metropolitan Statistical Area (MSA) was ranked 215th out of 220 areas in the study with one year results of 1.84% and a five year increase of 12.11%. By comparison, the United States average figures were 6.48%

for the past year with the five year rate at 38.04%. Figure 1.2 presents a comparison of OFHEO reported appreciation for the nation, for Utah, and the Sale Lake area.

Figure 1.2



Literature Review

Housing economics is a complex topic that defies singular explanation. Many studies have attempted to concentrate on different facets of housing economics and housing markets. These studies run the gamut from the value impact on housing from surrounding open space to the impact of income restricted apartments on surrounding single family houses.

While any number of housing characteristics could be studied, the particular focus of this paper is on one of the less well explored topics, comparing appreciation rates on different housing types. One of the first studies of this type was conducted by Pollakowski, Stegman, and Rohe (1991) who compared price appreciation for lower and higher valued owner-occupied housing units. This study includes a dummy variable to differentiate detached from attached housing, but the main focus of the paper was on unit value, not unit type.

Different unit types were once again considered in work by Clapp, Giaccotto, and Tirtiroglu (1991). The condominiums covered in this study lag behind the single family homes in terms of price appreciation by about 20% over the five and a half year period covered. Other recent studies cover condominium appreciation in passing, including Thibodeau (1995) and Dubin (1998).

A study by Tong and Glascock (2000) examines price appreciation levels between single family houses, town homes, and condominiums, in the Baltimore-Washington area. Using almost a quarter million observations, they report significantly lower appreciation for condominiums than for houses. Further, town home results are mixed compared to houses, but are more than condominiums in all three study areas. However, the condominium sample in their study represents only 9% of the total observations and only about a quarter the size of the town house data pool.

Research Data

Utah is one of five states nationwide that operate under a non-disclosure policy, whereby parties to a transaction of real property are not required to disclose the agreed upon sales price. While this is often viewed as a privacy issue, the lack of ubiquitous data on transactions increases inefficiency in the real estate market. In Utah, the lack of open access to information has led to the creation of private data bases. The largest residential data base is maintained by the Wasatch Front Multiple Listing Service (MLS). The MLS data base was selected as the basis for this paper due to its position as the sole comprehensive provider of residential transaction data in the Salt Lake Valley.

Some particular considerations deserve attention regarding the MLS data. First, the data base covers transactions facilitated by a real estate agent. This leaves out sales “by owner” and often under represents new sales as many developers utilize in-house sales forces. Second, the data is as reported by real estate agents, and may not always represent full detail or accuracy. Third, the transaction data does not include any information on conditions of sale that may result in anomalous sales prices, such as a non-arms length transaction or an estate sale where the property is quickly liquidated. Fourth, the transaction data is only available for a certain time period. In the case of this study, adequate detail on sales was only available for the period between 1996 and the present.

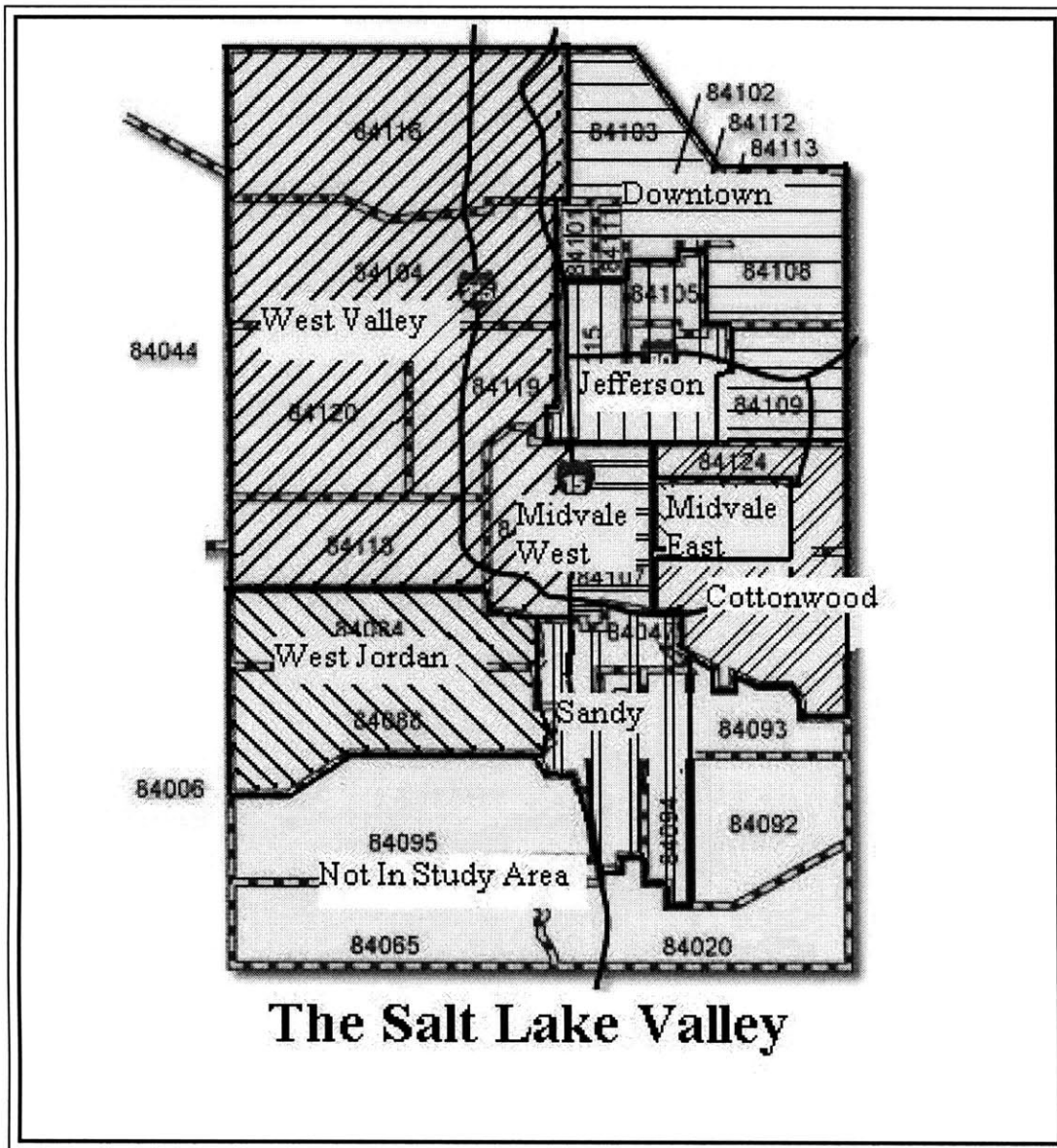
Once the research data was gathered, it was grouped into areas for statistical analysis. The following section describes the methodology used to form the groups.

Zip Code Groupings

Condominium sales data was available for 29 of the 33 zip codes in the Salt Lake Valley. Of the 29 zip codes, five had insufficient data to warrant inclusion in the study. Of the remaining 24 zip codes, two were found to contain a sufficient sample to be considered in isolation, while the remaining zip codes were agglomerated into zip code groups for analysis purposes. Zip code groupings were made among adjacent zip codes based upon the relative similarity to area statistics. Table 1.3 and Figure 1.3 give a brief summary of the zip codes included in each group:

Table 1.3			
Zip Code Groups			
Group Identification	Zip Codes Included	Location Description	Significant Area Features
Sandy	84047, 84070, 94094	South central valley	Significant recent retail and office development. This area is the southern terminus of the north/south light rail line
West Jordan	84088, 84084	Upper southwest quadrant	Substantial recent suburban residential growth. Significant undeveloped land.
West Valley	84120, 84119, 84123, 84118, 84104, 84116	Northwest quadrant	Mix of industrial and residential land use and recent development. Significant undeveloped land. Limited retail services due to low relative household income. The SLC International Airport is in this area.
Downtown	84102, 84103, 84111, 84108, 84109, 84101	Northeast quadrant	This area contains the Salt Lake City CBD and the University of Utah. This was the first area settled in the valley, and has many historic structures and sites. The area includes significant foothills which provide sweeping views of the valley. The area is served by both light rail lines. The area is currently experiencing significant loft conversion and new condominium construction.
Jefferson	84106, 84105, 84115	Central	This area is immediately south of the CBD periphery. The area is a mix of industrial, commercial, and residential uses. Low density residential is slowly being replaced by commercial and high density residential development. The area is served by the north/south light rail line.
Midvale West	84107	Central	This area has had little recent development. There is a significant retail presence in the area which includes the most prosperous regional mall in the valley. The area is served by the north/south light rail line.
Midvale East	84117	East central	Recent development is primarily moderate density multi-family. Historically, the area has been low-density single family development.
Cottonwood	84121, 84124	East central	This area includes significant foothills. It is predominantly single family residential. Recent development includes significant high end office and retail space.

Figure 1.3



Once the zip code groups were formed, careful analysis was undertaken to evaluate the consistency of the data. Based upon graphic and statistical analysis, data points that were clearly outliers were removed from the data set. For example, a house with a 25 acre lot, or a condominium that sold for three times as much as the next most expensive unit, was removed. The removed data comprised a minimal proportion of the overall data, with most zip code groups experiencing less than one percent reduction in sample size. Once

this process was complete, the scrubbed data for each zip code group was analyzed. Table 1.4 gives a basic overview of the evaluation results.

Table 1.4									
Zip Code Groups – Sample Statistics									
Area Name	Unit Type	Average/median sales price		Avg. bedrooms, bathrooms, and house lot size			Avg. size and age		Number of units included in sample
Sandy	Condo	\$108,007	\$97,900	2.2	2.0		1,198	1984	1,589
	House	\$149,862	\$143,850	3.7	2.3	0.21	1,344	1980	5,256
West Jordan	Condo	\$103,471	\$99,200	2.1	2.4		1,146	1992	449
	House	\$145,846	\$140,000	3.6	2.2	0.21	1,389	1987	8,013
West Valley	Condo	\$90,373	\$87,900	2.3	1.8		1,106	1983	2,132
	House	\$120,030	\$118,000	3.5	1.9	0.18	1,194	1972	16,391
Downtown	Condo	\$142,311	\$121,600	1.8	1.8		1,184	1973	2,005
	House	\$211,399	\$177,000	3.5	2.1	0.19	1,499	1940	5,862
Jefferson	Condo	\$111,812	\$104,500	2.2	1.9		1,243	1980	1,017
	House	\$146,743	\$138,500	3.0	1.6	0.15	1,142	1934	6,879
Midvale West	Condo	\$105,880	\$90,000	2.8	1.9		1,157	1977	1,166
	House	\$159,307	\$143,950	3.5	2.2	0.22	1,418	1963	1,178
Midvale East	Condo	\$131,491	\$115,000	2.2	2.1		1,206	1979	1057
	House	\$245,008	\$207,000	4.0	2.8	0.31	1,872	1965	1,105
Cottonwood	Condo	\$170,459	\$159,700	2.8	2.6		1,435	1982	782
	House	\$245,506	\$196,000	4.2	2.9	0.27	1,899	1971	4,229

With the data cleaned and grouped, with preliminary statistics calculated for each area, the formal analysis could be undertaken. The following section describes the framework for the formal price appreciation calculation that is the topic of this paper.

Research Methodology

Hedonic Model

Hedonic housing price models typically use sales price as the dependant variable, while observable house characteristics are utilized as independent variables. In keeping with the literature standard, I have chosen to use the natural log of the sales price as the dependent variable. In this way, the resulting coefficient of each independent variable may be interpreted as the percentage change in the overall house price caused by the change of one incremental unit in a dependant variable, keeping all other characteristics constant.

Dependant variables may be either continuous or binomial. This study utilizes a mix of the two types. For housing characteristics such as square footage, lot size, and number of bedrooms, continuous independent variables work well. For other characteristics, such as fireplaces, garages, and family rooms, binomial or dummy variables prove the most effective. The use of a dummy variable also allows the encapsulation of variables that are more significant when grouped, such as the date of sale or year of construction. Such variables may be grouped into ranges to provide sufficient similar data to be meaningful. When dummy variables are used, a base case is created, which is excluded from the regression analysis.

The specific independent variables used in each regression were tailored to each zip code group. Table 1.5 defines the basic variables used and is followed by a brief overview of the methodology behind selecting each group of variables.

Table 1.5	
Regression Variable Definitions	
Variable Name	Definition
Sales Period Variables	
1 st & 2 nd Qtr. 2003	Sale date occurred within the first two quarters of 2003.
3 rd & 4 th Qtr. 2002	Sale date occurred within the last two quarters of 2002.
1 st & 2 nd Qtr. 2002	Sale date occurred within the first two quarters of 2002.
3 rd & 4 th Qtr. 2001	Sale date occurred within the last two quarters of 2001.
1 st & 2 nd Qtr. 2001	Sale date occurred within the first two quarters of 2001.
3 rd & 4 th Qtr. 2000	Sale date occurred within the last two quarters of 2000.
1 st & 2 nd Qtr. 2000	Sale date occurred within the first two quarters of 2000.
3 rd & 4 th Qtr. 1999	Sale date occurred within the last two quarters of 1999.
1 st & 2 nd Qtr. 1999	Sale date occurred within the first two quarters of 1999.
3 rd & 4 th Qtr. 1998	Sale date occurred within the last two quarters of 1998.
1 st & 2 nd Qtr. 1998	Sale date occurred within the first two quarters of 1998.
3 rd & 4 th Qtr. 1997	Sale date occurred within the last two quarters of 1997.
1 st & 2 nd Qtr. 1997	Sale date occurred within the first two quarters of 1997.
3 rd & 4 th Qtr. 1996	Sale date occurred within the last two quarters of 1996.
Year 2002/2003	Sale date occurred within year 2002 and the first two quarters of 2003.
Year 2001	Sale date occurred within 2001.
Year 2000	Sale date occurred within 2000.
Year 1999	Sale date occurred within 1999.
Year 1998	Sale date occurred within 1998.
Year 1997	Sale date occurred within 1997.
Housing Unit Characteristics	
Acres	The total lot size of single family houses in acres.
Central Air	The unit has central air conditioning.
Evap. Cooler	The unit has a roof mounted evaporative cooler.
Patio 1+	The existence of one or more patios.
Deck 1+	The existence of one or more decks.
Garage 1+	The existence of one or more garage stalls.
Carport 1+	The existence of one or more carport stalls.
Tot. Sq. Ft.(Hundreds)	The total above grade size of the unit in hundreds of square feet.
Family 1+	The existence of one or more family rooms.
Fireplace 1+	The existence of one or more fireplaces
Bathroom 3+	The existence of three or more bathrooms. No differentiation is made for so called half-bathrooms.
Bathroom 2+	The existence of two or more bathrooms. No differentiation is made for so called half-bathrooms.
Bedrooms	The total number of bedrooms
Finished Basement Sq. Ft. (Hundreds)	The finished basement size in hundreds of square feet.
Age at Time of Sale Variables are located in Appendix B	

Sales Period Variables

As the purpose of this study is to compare the appreciation rate of single family and condominium units over time, the independent variable of date of sale is of utmost importance. A series of dummy variables were used to capture the time of sale. When the pool of available sales was of sufficient size and distribution, semi-annual dummy variables were used. In other cases, limited data or atypical distribution necessitated the use of annual dummy variables. In each of the zip code groups, consistency and ease of interpretation dictated that the same time basis be used to evaluate both condominiums and single family homes. As the data set contains sales from January 1, 1996 through May 31, 2003, the data for 2003 is constrained to a half year. In those models using semi-annual sales time dummy variables, 2003 is represented as a discrete time period. However, in models based upon annual sales time periods, the sales from 2003 were grouped with the 2002 year sales. Although this process may blend any recent volatility, it allows the most recent data to be included in the analysis. The base case for semi-annual sale periods is the first six months of 1996, while the entire year of 1996 is used as a base in the case of annual variables.

Age at Time of Sale Variables

Each zip code group used dummy variables for the age of the housing unit at the time of sale. The data vary significantly for each zip code group and housing type, which reflects the dynamic evolution of housing in the Salt Lake Valley. In an effort to accurately reflect the specific characteristics of each area, unique age ranges have been tailored for each data set.

In general, buildings physically deteriorate over time unless significant ongoing maintenance occurs. Even then, changing social or economic conditions may cause functional or economic depreciation to erode the value of a housing unit. Physical, functional, or economic obsolescence can jointly be observed as the discount in value between new, well built and designed units, and existing units of any given age. While the overall discount can be observed, allocating this discount among the three factors is

not possible without an in depth analysis of each individual property, and will not be attempted in this study.

The magnitude of this impact is anticipated to vary both between areas and between housing types. Further, it is possible that units of certain ages, locations, or characteristics, may be perceived as having an element of quality in construction, ambiance, or architectural character that provides a countervailing effect, and may partially offset the strict depreciation and obsolescence of the structure.

Housing Unit Characteristics

Consumers obviously consider many factors in selecting housing. Such location factors as proximity to schools and school test scores, access to parks and recreational amenities, perceived privacy, safety, or prestige are all obvious examples that exist in most communities. On a property specific level, a number of factors are also evidently important. These include the lot size, unit size, number of bedrooms and bathrooms, and the inclusion of such features as a family room, fireplace, a pool, a garage or carport, a basement, and may include mechanical systems such as central air conditioning or evaporative cooling. The list of possibilities is always changing as new features, such as advanced entertainment, communication, and data systems, become more commonplace.

As previously discussed, the data has been divided into zones, within which the appreciation rates of different unit types will be compared. This comparison methodology removes the necessity of isolating and analyzing all of the characteristics of each neighborhood. Indeed, each location or housing characteristic could be the topic of a complete study of its own. However, as the general appreciation rates are the focus of this paper, only the most significant property specific characteristics have been selected for analysis. These include family rooms, fireplaces, garages or carports, decks and patios, central air conditioning or evaporative cooling, and basements.

The literature suggests that the model for some continuous variables, such as unit size, may be refined by adding a variable which is the square of the variable. It is intuitive that

a house with a one acre lot would be valued more than an identical house with a half acre lot. However, the increase in value is not typically a linear function. In introducing a squared variable a quadratic function is formed, which models the diminishing marginal utility of consumers. However, in the case of the current study, successive iterations of the regressions showed minimal coefficients for the squared terms. These results indicate a largely linear function over the relative range included in the sample, and ultimately resulted in the decision to exclude squared terms from final analysis.

The following chapter outlines the hedonic model and results for each of the eight zip code groups.

CHAPTER 2

MODELING APPRECIATION RATES: AN ANALYSIS OF CONDOMINIUM AND SINGLE FAMILY HOUSE PRICE APPRECIATION

Background

This chapter presents an analysis of the calculation of appreciation rates for condominiums and single family homes for eight zip code groups in the Salt Lake Valley over the period of 1996 to mid-2003. This quantitative analysis uses a hedonic price model to estimate appreciation rates for either semi-annual or annual periods. The hedonic model is based on a regression calculations in which the sales price of each housing unit is the dependant variable, with other observable housing characteristics as independent variables. The sales price variable is taken as the natural log of the actual sales price, which allows the resulting coefficients of the independent variables to be interpreted as the percentage change in sales price which results from an incremental unit of that variable. This framework allows a regression which includes dummy variables for sales periods, which is the central focus of this study.

For these sales periods, the difference between the coefficients of successive periods provides a reasonable approximation of the appreciation which occurred during the latter period. A series of such point estimates allows trend analysis, and provides a reasonable basis for comparison across locations. The resulting rates between housing unit types can then be contrasted.

Results and Analysis

As previously discussed, the variables used in the hedonic models for this paper fall into three categories: sales periods, age at time of sale, and housing unit features and characteristics. Using these variables, regressions were performed for each housing type in each of the eight zip code groups. The exact specification of the variables was tailored to each data set to best represent the unique characteristics of the areas. Table 2.1 presents the results of the regressions for the condominiums, while Table 2.2 reports the results for single family houses. A discussion of the results follows each set of tables.

Table 2.1

Condominium Regression Results								
Area Name	Sandy	West Jordan	West Valley	Downtown	Jefferson	Midvale West	Midvale East	Cottonwood
Sample Size	1,585	449	2,122	1,991	1,013	1,154	1,053	767
R-squared	0.8108	0.5864	0.7661	0.7695	0.8118	0.8293	0.8595	0.7966
Adjusted R-squared	0.8345	0.5711	0.7634	0.7670	0.8080	0.8266	0.8572	0.7914
Sales Period Variables								
Variable name	Zip Code Group Name							
	Sandy	West Jordan	West Valley	Downtown	Jefferson	Midvale West	Midvale East	Cottonwood
1 st & 2 nd Qtr. 2003	0.1408 (.0184)		0.1288 (.0196)					
3 rd & 4 th Qtr. 2002	0.1287 (.0158)		0.1570 (.0184)					
1 st & 2 nd Qtr. 2002	0.1658 (.0215)		0.1457 (.0240)					
3 rd & 4 th Qtr. 2001	0.1100 (.0163)		0.1610 (.0188)					
1 st & 2 nd Qtr. 2001	0.0945 (.0163)		0.1814 (.0189)					
3 rd & 4 th Qtr. 2000	0.1097 (.0154)		0.1427 (.0190)					
1 st & 2 nd Qtr. 2000	0.1217 (.0169)		0.1260 (.0185)					
3 rd & 4 th Qtr. 1999	0.0898 (.0159)		0.1246 (.0189)					
1 st & 2 nd Qtr. 1999	0.1258 (.0167)		0.0949 (.0181)					
3 rd & 4 th Qtr. 1998	0.1050 (.0162)		0.0920 (.0187)					
1 st & 2 nd Qtr. 1998	0.0818 (.0161)		0.0774 (.0186)					
3 rd & 4 th Qtr. 1997	0.1012 (.0157)		0.0822 (.0187)					
1 st & 2 nd Qtr. 1997	0.0742 (.0156)		0.0488 (.0183)					
3 rd & 4 th Qtr. 1996	0.0487 (.0136)		0.0260 (.0191)					
Year 2002/2003		0.1225 (.0345)		0.1827 (.0204)	0.0650 (.0180)	0.0597 (.0153)	-0.0064 (.0190)	0.0446 (.0274)

Year 2001		0.1161 (.0374)		0.1528 (.0211)	0.0839 (.0183)	0.0849 (.0161)	-0.0327 (.0205)	0.0623 (.0279)
Year 2000		0.0875 (.0394)		0.1682 (.0216)	0.0738 (.0183)	0.0909 (.0162)	-0.0204 (.0201)	0.0258 (.0303)
Year 1999		0.1366 (.0429)		0.1357 (.0222)	0.0420 (.0179)	0.0614 (.0158)	-0.0012 (.0207)	0.0260 (.0286)
Year 1998		0.0744 (.0487)		0.1405 (.0220)	0.0731 (.0181)	0.0513 (.0166)	0.0147 (.0200)	0.0536 (.0296)
Year 1997		-0.0362 (.0432)		0.0602 (.0223)	0.0590 (.0175)	0.0473 (.0157)	0.0130 (.0196)	-0.0061 (.0283)

Housing Unit Characteristics

Variable name	Zip Code Group Name							
	Sandy	West Jordan	West Valley	Downtown	Jefferson	Midvale West	Midvale East	Cottonwood
Central Air	0.0813 (.0103)	0.0676 (.0297)	0.0888 (.0079)	0.1040 (.0186)	0.1466 (.0129)	0.0560 (.0119)		0.1174 (.0227)
Evap. Cooler				-0.0268 (.0259)				
Patio 1+		-0.0179 (.0254)	0.0454 (.0076)	-0.0079 (.0147)	0.0370 (.0106)			
Deck 1+	- 0.0515 (.0071)		0.0421 (.0076)	0.0224 (.0124)	0.0548 (.0112)	0.0099 (.0095)	-0.0180 (.0108)	-0.0183 (.0148)
Garage 1+	0.1298 (.0081)	0.1417 (.0379)	0.1356 (.0074)	0.0435 (.0133)	0.1776 (.0136)	0.1924 (.0099)	0.2615 (.0144)	0.2079 (.0265)
Tot. Sq. Ft. (Hundreds)	0.0333 (.0016)	0.0484 (.0064)	0.0403 (.0021)	0.0693 (.0016)	0.0417 (.0020)	0.0593 (.0023)	0.0458 (.0020)	0.0455 (.0029)
Family 1+	0.0536 (.0082)	0.0151 (.0205)	0.0374 (.0079)	0.0296 (.0145)		0.0241 (.0112)	0.0848 (.0122)	0.0697 (.0184)
Fireplace 1+	0.0155 (.0073)	0.0492 (.0238)	0.1109 (.0077)	0.0939 (.0141)	0.0569 (.0110)	0.0206 (.0092)	0.0149 (.0128)	0.0691 (.0216)
Bathrooms 2+				0.1303 (.0158)			0.1361 (.0164)	
Bathroom 3+	0.0381 (.0108)	-0.0454 (.0330)	0.0420 (.0101)		0.0256 (.0164)	0.1209 (.0162)		0.0727 (.0225)
Bedrooms	0.0931 (.0066)	-0.0056 (.0214)	0.0463 (.0077)	-0.0272 (.0099)	0.0306 (.0119)	0.0189 (.0109)	0.0784 (.0096)	0.0319 (.0121)
Finished Basement Sq. Ft. (Hundreds)			0.0151 (.0025)		0.0262 (.0029)	0.0261 (.0019)		

Age at Time of Sale Variables are located in Appendix C

The condominium models evidence varying degrees of explanatory ability. The adjusted R-squared figures range from 0.5711 to 0.8572, with most areas clustered around 0.800. The following paragraphs discuss and compare the coefficients for the areas.

Sale Periods

Over the six and a half year analysis period, the total appreciation for the eight areas ranges from -0.6% to 18.27%, with the lowest appreciation evident in the Midvale East area, and the highest appreciation in the Downtown area. The overall appreciation rates appear to cluster into four groups. As mentioned, the highest appreciation occurred in the Downtown area at about 18%, with three other groups (Sandy, West Jordan, & West Valley) in the range of 12-14%, and three more areas (Jefferson, Midvale West, & Cottonwood) evidencing a range of 4-6%. The remaining area, Midvale East, did not show any appreciable net change over the period. Figure 2.1 reviews the geographic distribution of the results.

which further suggests long term depressed appreciation in this area, rather than an isolated market shock such as introduction of new supply. One other interesting note is that this area has the greatest disparity between average sales prices of condominium and single family houses. As a percentage, the average condominium sold for about 53% of the sales price of the average house in this area. All of the other areas show an average price ratio between 66 and 76 percent. The abnormally large disparity between sales prices in this area may be a factor in the lack of appreciation in the condominiums.

Age at Sale

The time periods encapsulated by the age at time of sale variables are quite varied due to the limited size and distribution of the samples. However, some general trends are clear. First, all areas but one showed a negative coefficient for the oldest group of condominiums in the area. The one exception was the Downtown area which evidences a strongly negative (-23%) coefficient for units between 26 and 30 years old, but a slight positive factor for units 31 years and older. This effect is most likely due to a perceived historic character in the buildings containing the oldest units. This same pattern is also apparent in most of the other areas, with almost all areas experiencing a slight easing of the age discount in the oldest age group.

Housing Unit Characteristics

Some characteristics appear to hold universal appeal across areas, such as central air, a garage, family rooms, fireplaces, and larger units. Other features evidence mixed desirability, such as patios and decks. However, with some analysis, the patio and deck results become more intuitive. In this market, patios are physically comprised of a concrete slab on grade, while decks are unenclosed outdoor space above grade. With this in mind, areas such as downtown carry a potentially negative connotation to being on the ground floor from a safety perspective, while decks in this area may be proxies for views obtained on the upper levels of multi-story buildings. However, in lower density areas, the decks may be negative, once again acting as a proxy for upper level units, due to the lack of elevator service at most suburban developments.

The number of bathrooms and bedrooms also deserves some consideration. Keeping all else constant, a higher number of bedrooms may indicate a more constrained floor plan and less area devoted to common areas within the unit. However, the regression shows strong positive results in most areas. This may in part be due to the demographic composition of the valley. According to the 2000 Census², the average family in Salt Lake County is comprised of 3.5 people, which is well above the national average. With larger family sizes, the value placed on additional bedrooms becomes clear. Further, the only significant negative coefficient for bedrooms is in the Downtown area. A number of loft condominium projects have been developed over the past number of years in this area. This type of unit is often characterized by an open design without formal bedrooms, which increases the difficulty of including a valid bedroom variable for this sample.

The bathroom dummy variables were designed to isolate the units with a relatively higher than average number of bathrooms, which often serves as a proxy for overall unit quality. All but one area shows positive coefficient values for this trait, with the one remaining area evidencing a statistically insignificant negative value.

The samples from three of the areas also included enough condominium units with finished basements to warrant inclusion. In all cases, the coefficient is positive, and consistently runs about half the coefficient for above grade finished space.

² <http://www.census.gov>

Table 2.2

Single Family House Regression Results

Zip Code	Sandy	West Jordan	West Valley	Downtown	Jefferson	Midvale West	Midvale East	Cottonwood
Sample Size	5,256	8,013	16,391	5,862	6,879	1,178	1,105	4,229
R-squared	0.7990	0.7884	0.7324	0.7733	0.6308	0.8409	0.8334	0.8232
Adjusted R-squared	0.7977	0.7877	0.7318	0.7725	0.6296	0.8380	0.8305	0.8224
Sales Period Variables								
Variable name	Zip Code Group Name							
	Sandy	West Jordan	West Valley	Downtown	Jefferson	Midvale West	Midvale East	Cottonwood
1 st & 2 nd Qtr. 2003	0.2152 (.0092)		0.2053 (.0057)					
3 rd & 4 th Qtr. 2002	0.1791 (.0094)		0.2054 (.0052)					
1 st & 2 nd Qtr. 2002	0.1954 (.0089)		0.2255 (.0053)					
3 rd & 4 th Qtr. 2001	0.2025 (.0081)		0.2309 (.0052)					
1 st & 2 nd Qtr. 2001	0.1966 (.0082)		0.2300 (.0053)					
3 rd & 4 th Qtr. 2000	0.1717 (.0085)		0.2221 (.0052)					
1 st & 2 nd Qtr. 2000	0.1620 (.0084)		0.2088 (.0053)					
3 rd & 4 th Qtr. 1999	0.1410 (.0084)		0.1790 (.0052)					
1 st & 2 nd Qtr. 1999	0.1312 (.0085)		0.1525 (.0053)					
3 rd & 4 th Qtr. 1998	0.1206 (.0084)		0.1517 (.0057)					
1 st & 2 nd Qtr. 1998	0.0885 (.0086)		0.1120 (.0055)					

3 rd & 4 th Qtr. 1997	0.0559 (.0084)		0.0941 (.0055)					
1 st & 2 nd Qtr. 1997	0.0593 (.0089)		0.0803 (.0056)					
3 rd & 4 th Qtr. 1996	0.0329 (.0085)		0.0414 (.0053)					
Year 2002/2003		0.2124 (.0042)		0.1682 (.0115)	0.1671 (.0089)	0.1292 (.0148)	0.1307 (.0183)	0.1512 (.0109)
Year 2001		0.2011 (.0044)		0.1512 (.0117)	0.1603 (.0089)	0.1214 (.0150)	0.1236 (.0181)	0.1351 (.0108)
Year 2000		0.1755 (.0044)		0.1368 (.0120)	0.1396 (.0091)	0.0983 (.0148)	0.0907 (.0198)	0.1150 (.0110)
Year 1999		0.1358 (.0044)		0.1333 (.0120)	0.1213 (.0092)	0.0937 (.0154)	0.1042 (.0188)	0.0970 (.0108)
Year 1998		0.0888 (.0045)		0.1152 (.0120)	0.1092 (.0092)	0.0599 (.0155)	0.0503 (.0193)	0.0850 (.0111)
Year 1997		0.0536 (.0045)		0.0588 (.0124)	0.0567 (.0092)	0.0124 (.0154)	0.0157 (.0191)	0.0470 (.0108)

Housing Unit Characteristics

Variable name	Zip Code Group Name							
	Sandy	West Jordan	West Valley	Downtown	Jefferson	Midvale West	Midvale East	Cottonwood
Acres	0.3801 (.0212)	0.4867 (.0130)	0.4650 (.0177)	0.1959 (.0300)	0.1736 (.0418)	0.4476 (.0455)	0.7647 (.0325)	0.5103 (.0195)
Central Air	0.0220 (.0044)	0.0327 (.0034)	0.0584 (.0036)	0.1154 (.0085)	0.0990 (.0069)	0.0744 (.0102)	0.0479 (.0136)	0.0609 (.0079)
Evap. Cooler		-0.0099 (.0029)	0.0316 (.0026)	0.0562 (.0079)	0.0383 (.0056)		-0.0432 (.0139)	-0.0240 (.0079)
Patio 1+	0.0185 (.0035)	0.0154 (.0023)	0.0260 (.0021)		0.0532 (.0051)			
Deck 1+	0.0126 (.0037)			0.0753 (.0073)	0.0663 (.0063)	0.0211 (.0098)	0.0136 (.0108)	0.0503 (.0060)
Garage 1+	0.0894 (.0057)		0.0828 (.0027)	0.1271 (.0083)	0.0907 (.0060)	0.0474 (.0103)		0.0750 (.0092)
Carport 1+	0.0353 (.0056)		0.0345 (.0030)					
Tot. Sq. Ft. (Hundreds)	0.0200 (.0006)	0.0187 (.0005)	0.0188 (.0004)	0.0362 (.0008)	0.0361 (.0009)	0.0259 (.0012)	0.0269 (.0009)	0.0248 (.0005)

Family 1+	0.0209 (.0049)	0.0223 (.0032)	0.0187 (.0024)	0.0512 (.0080)	0.0295 (.0056)	0.0326 (.0108)		0.0549 (.0102)
Fireplace 1+	0.0483 (.0039)	0.0481 (.0024)	0.0335 (.0023)	0.1212 (.0080)	0.0884 (.0054)	0.0462 (.0098)		0.0694 (.0105)
Bathroom 3+	0.0128 (.0044)	0.0212 (.0031)	0.0316 (.0032)	0.0746 (.0102)	0.0153 (.0105)	0.0542 (.0117)	0.0687 (.0136)	0.0960 (.0081)
Bedrooms	0.0119 (.0023)	0.0031 (.0018)	0.0241 (.0015)	-0.0007 (.0040)	0.0158 (.0036)	0.0088 (.0058)	-0.0250 (.0067)	0.0368 (.0033)
Finished Basement Sq. Ft. (Hundreds)	0.0098 (.0005)	0.0100 (.0004)	0.0102 (.0003)	0.0176 (.0008)	0.0258 (.0009)	0.0129 (.0012)	0.0162 (.0011)	
Age at Time of Sale Variables are located in Appendix D								

The single family house models show a fairly robust explanatory ability and significance. The adjusted R-squared figures range from 0.6308 to 0.8409, once again with most areas clustered around 0.800. The following paragraphs discuss and compare the coefficients for the areas.

Sale Periods

Over the six and a half year analysis period, the total appreciation for the eight areas ranges from 13% to 21%, with the lowest appreciation evident in east central areas (Midvale West and East), and the highest appreciation in the areas on the outskirts of the analysis area. The overall appreciation rates appear to cluster into two groups. As mentioned, the highest appreciation occurred in the outlying areas at about 21%, with the other areas in the range of 13 to 17 percent. Unlike the condominiums, the single family homes in all areas evidenced significant appreciation over the period. It is interesting that the highest single family appreciation occurred in the areas that are also experiencing the greatest levels of construction. The Downtown area also evidenced significant appreciation, while the east-central areas had weaker increases.

Age at Sale

Once again, the time periods covered by the age at time of sale variables are quite varied due to the distribution of the samples; however, some general trends are evident. First, all

areas but one showed quite large negative coefficients for the oldest group of houses in the area. As with the condominiums, the Downtown area is an exception, showing only a slightly negative value (-4%) for units over 75 years old. The overall magnitude of value decline is larger than with condominiums, but may be due in part to the limited age of most of the current condominium stock.

Housing Unit Characteristics

All but two of the tested housing features appear to hold universal appeal across areas, with mixed signs for evaporative coolers and number of bedrooms. The two significant negative evaporative cooler coefficients are located in the areas with the highest average house prices. This may lead to a situation where the inclusion of such a feature is an additional proxy for older or lower quality houses. The two negative bedroom coefficients are relatively small and not of much significance.

One interesting consideration is the disparity between results for unit size. The condominium coefficients are generally larger than those for the houses, around twice as large in most areas. At least three possible factors may contribute to this situation. First, the single family houses are generally more expensive than the condominiums. Hence a larger percentage increase in the condominiums is necessary to yield a dollar for dollar comparison. Second, a considerable portion of house value is allocable to the lot on which it is built. The lot value is relatively fixed, within certain ranges, as increasing a house size does not require increasing the lot size. Third, condominiums are more static in design, which increases the value on additional space. Houses are routinely reconfigured or expanded to meet ongoing trends or needs, while considerably less flexibility is present in condominiums. However, in general terms, condominiums are less expensive to construct than single family houses due to economies of scale and shared building elements. In sum, while all intellectually appealing, none of these possible explanations seem to quite fit. A robust examination of construction and renovation costs and flexibility may shed further light on this subject.

Comparing Housing Types

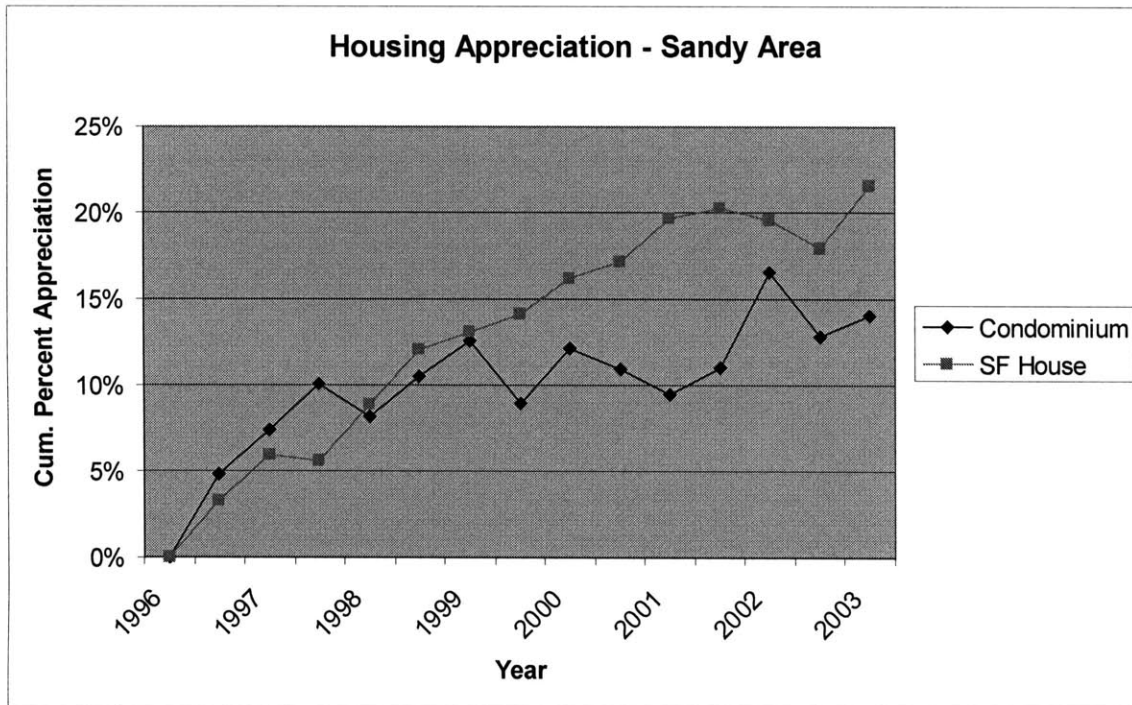
This section compares and discusses the appreciation rates for condominiums and single family houses within each of the eight areas. The purpose of this comparison is to test whether the two unit types have experienced similar appreciation rates over the time period covered by the sample. The threshold used in this test is the typical margin of two standard errors, which provides a 95% confidence interval. After discussing each area individually, common trends and overall results will be considered.

Sandy

This area is located in the south central section of the valley as shown in Figure 1.3. The area contains the embryo of a new CBD in the form of many new office structures and the largest agglomeration of retail space in the valley. The sample for this area includes 1,589 condominiums and 5,256 houses. Table 1.4 summarizes the average prices and characteristics for all of the areas.

The condominiums in this area evidenced overall appreciation of 14.1% over the test period, while the single family houses achieved a 21.5% increase in value. A graphic representation of the coefficients for each sale period is given in Figure 2.2.

Figure 1.2



As can be seen, the overall rates were reasonably matched during the early part of the analysis period, with the beginning of a significant difference occurring in late 1999. From roughly 1999 onward, the condominium units appear to underappreciate relative to the houses. While some noise is evident in the actual regression lines, the lower appreciation trend for condominiums is clear.

To test the similarity of the appreciation results, a 95% confidence interval is formed around the condominium result. This range is formed by adding and subtracting two standard errors from the coefficient. The final period coefficient for the condominiums is 14.08% with a standard error of 1.84%. The lower bound of the confidence interval is then calculated as $14.08\% - 2(1.84) = 10.40\%$, while the upper bound is calculated as $14.08\% + 2(1.84) = 17.76\%$. The ending coefficient for the houses is 21.52%. The single family house coefficient does not fall within the bounds of the condominium confidence interval; therefore we are able to conclude that the two housing types have not appreciated at the same rate.

However, this area also demonstrates the importance of considering the characteristics of the data and the analysis that has occurred. The distribution of condominium sales in this area allowed the use of semi annual time variables. If this had not been the case, and annual variables had been used, the 2002 and half year 2003 data would have been agglomerated, possibly yielding a different result. Further, if the study had started or ended at a different time, the results could also be very different

The condominium regression line in Figure 2.2 shows a level of volatility to be expected from a relatively small sample size. The individual period jumps and dives are not as significant as the overall trend. Nevertheless, to explore some of the issues regarding the subjectivity of the study period, confidence intervals were created for the last five semi-annual periods and are contained in Table 2.3. Using these confidence intervals, successive periods can be tested for appreciation parity. As Table 2.3 outlines, the single family house result is outside the confidence interval boundary for all of the periods except for the first half of 2002. As the data point in question appears to be somewhat of an anomaly, we can reject the hypothesis that the two housing types appreciated at the same rate over the test period.

Variable name	Sandy Area			
	Condominium Coefficients	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	House Coefficients
1 st & 2 nd Qtr. 2003	0.1408 (.0184)	0.1040	0.1776	0.2152 (.0092)
3 rd & 4 th Qtr. 2002	0.1287 (.0158)	0.0971	0.1603	0.1791 (.0094)
1 st & 2 nd Qtr. 2002	0.1658 (.0215)	0.1228	0.2088	0.1954 (.0089)
3 rd & 4 th Qtr. 2001	0.1100 (.0163)	0.0774	0.1426	0.2025 (.0081)
1 st & 2 nd Qtr. 2001	0.0945 (.0163)	0.0619	0.1271	0.1966 (.0082)

West Jordan

This area is located in the southwest section of the valley as shown in Figure 1.3. The area is predominantly residential with a few pockets of industrial and commercial use. The area also contains ample undeveloped land, though much of it is beyond the current infrastructure boundary. The sample for this area includes only 449 condominiums and 8,013 houses. Table 1.4 summarizes the average prices and characteristics for the housing units in this area.

The hedonic models indicate that condominiums in the West Jordan area experienced overall appreciation of 12.3% over the test period, while the single family houses achieved a 21.2% increase in value. The coefficients for each sale period are represented in Figure 2.4.

Figure 2.4

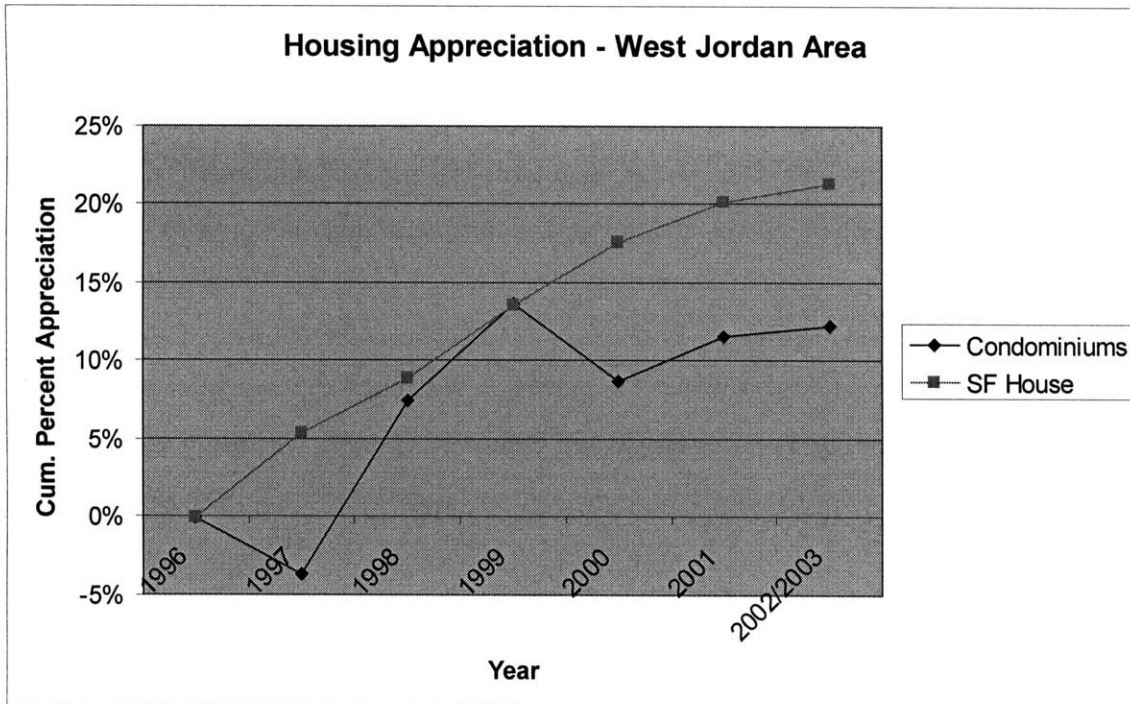


Table 2.3		
Variable name	West Jordan	
	Condominiums	Houses
Year 2002/2003	0.1225 (.0345)	0.2124 (.0042)
Year 2001	0.1161 (.0374)	0.2011 (.0044)
Year 2000	0.0875 (.0394)	0.1755 (.0044)
Year 1999	0.1366 (.0429)	0.1358 (.0044)
Year 1998	0.0744 (.0487)	0.0888 (.0045)
Year 1997	-0.0362 (.0432)	0.0536 (.0045)

The results for this area are interesting in that the trends visibly show a very similar pattern to the one just presented in Sandy. The two housing types appreciate at roughly the same rate through 1999 and then the condominium appreciation levels off, while houses continue to increase in value. As shown in Table 2.3, the final coefficient for the condominiums is 12.25% with a standard error of 3.45%. Even considering the magnitude of the standard error, which is the largest of any of the areas, the final condominium result is statistically different than the single family house result.

One is left to wonder what happened after 1999 to create such a significant leveling of the condominium index. The first issue that comes to mind is one of supply. Given the relatively small sample of condominiums in the area at only 449 units, a project of significance could conceivably glut the market, forcing prices down. Unfortunately, reliable condominium permit data is not available. Most municipalities in the Salt Lake Valley do not differentiate between permits for apartments and condominiums; they simply fall into a loosely defined “multi-family” category.

As a rough proxy of supply, the sample for this area was analyzed regarding the reported year of construction. The results from the sample are included in Table 2.4. As discussed previously, one possible flaw with the MLS data used in this study is that it may under-represent new units. While not a perfect measure, the relatively high number of new units sold in 1996 suggests a supply based

Table 2.4	
Number of Condominium Unit Sold as New Per Year	
Time Period	Units in Sample
2002/2003	16
2001	16
2000	27
1999	39
1998	39
1997	31
1996	89
1996	89

explanation for the temporary 1997 value decline. However, no such evidence is apparent for the year 2000 drop, which is compounded by the relatively stable magnitude of the discrepancy for three and a half years. Further research on the number of new units brought to market over the test period would aid further analysis of this area.

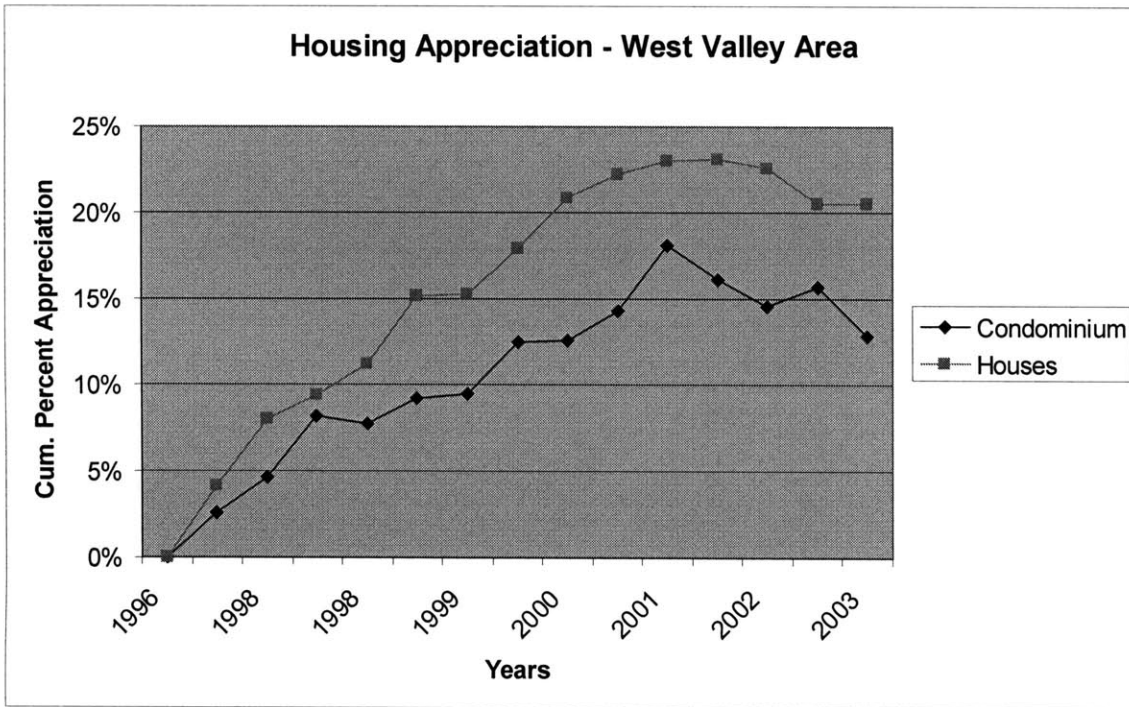
While some very interesting and valid questions remain about the rates over the test timeframe, it is clear that the appreciation results can be confidently stated as statistically different using the 95% confidence interval explained in the last section.

West Valley

The West Valley area encompasses the city of West Valley, the western half of Salt Lake City, and parts of the unincorporated county. Land use is mixed with substantial amounts of residential and industrial development. The Salt Lake International Airport is in this area, as are many trucking related warehouses. While ample undeveloped land remains in this area, much of it is classified as wetlands.

The sample for this area includes the most observations for both property types of any area in this study, with 2,132 condominium and 16,391 house transactions. The condominiums in this area evidenced overall appreciation of 12.9% over the test period, while the single family houses achieved a 20.5% increase in value. Figure 2.5 demonstrates the coefficients for each sale period.

Figure 2.5



The condominium and house appreciation rates in this area appear to trend slowly away from each other. This contrasts with the sudden leveling of condominium value increase in the previously discussed Sandy and West Jordan areas. The gradual widening trend in West Valley is more subject to issues of test period than the other areas discussed thus far. It is easy to see that the trend lines in Figure 2.5 might look essentially the same if 1999 or 2001 were the starting point.

The ultimate coefficient for the condominiums is 12.88% with a standard error of 1.96%. A 95% confidence interval around this value does not include the observed single family house coefficient, leading to the conclusion that the two appreciation rates are not the same.

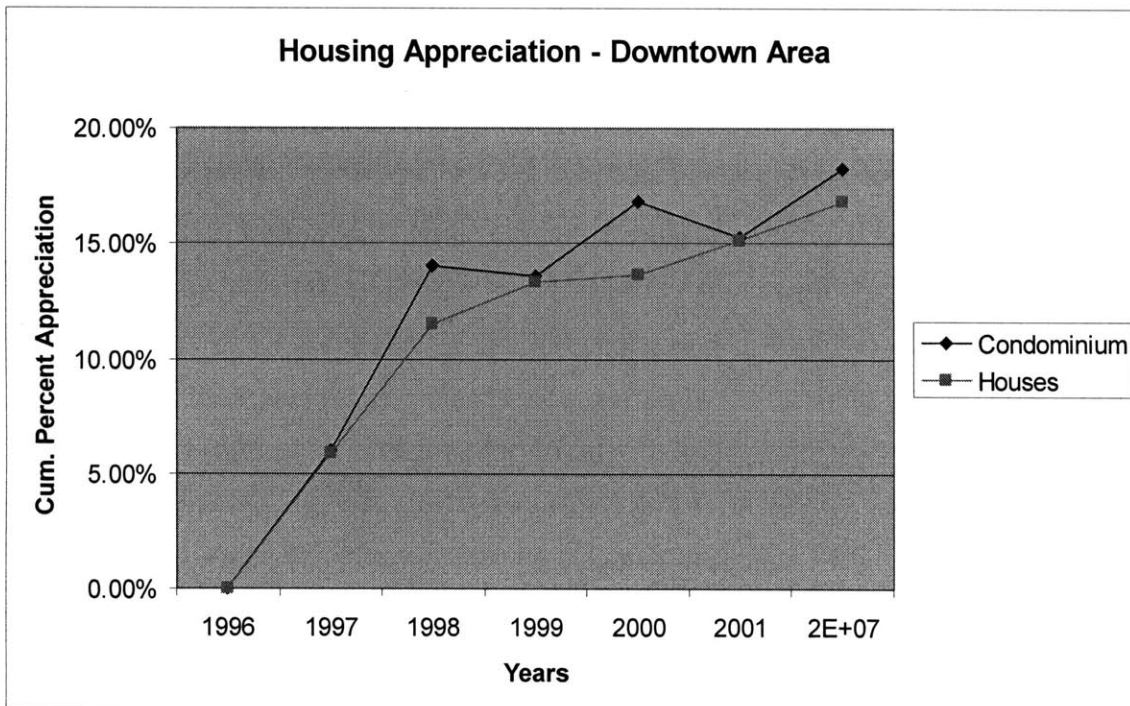
Downtown

The downtown area includes the Salt Lake City CBD, the University of Utah, and much of the east foothill area. Limited undeveloped land remains, with most recent development occurring as a third or fourth generation land use. The single family houses

are primarily first and second generation uses, with many neighborhoods composed of late 1800's vintage houses. Condominium development is a mix of high density towers, loft conversions, and scattered low-rise complexes. The sample for this area includes 2,005 condominium sales and 5,862 single family house transactions.

Overall appreciation for the two housing types in this area appears to be very similar. From 1996 to late 1998 a rapid trajectory is evident, followed by a steady but lower pace thereafter. This shift in trend approximately matches the time that appreciation rates for the condominiums in Sandy and West Jordan leveled off. However, Sandy and West Jordan single family houses continued upward from the 1999 transition point while both housing types in the downtown area increased at a more moderate pace. Over the study period, condominiums and houses appreciated at 18.3% and 16.8% respectively. The coefficients for each sale period are represented in Figure 2.6.

Figure 2.6



The results for this area are of great interest in part because this is the only area in which condominiums evidence a slight advantage over houses. While the appreciation

difference between the two housing types is negligible, it is interesting in the broader picture. The condominium appreciation is the highest of any of the areas, leading the next closest area by over four percent. On the other hand the house appreciation is fourth, trailing the leader by over four percent. While four percent may not appear to be much in abstract, it represents about a fifth of the total increase over the six and a half year period. What is clear, however, is that the unknown impact of 1999 slowed condominium appreciation less in this area, and depressed single family house rates more, than in the Sandy and West Jordan area.

An area of further research would be to obtain building classification data for the sales, from which it may be possible to analyze the appreciation impact of the three distinct types of condominiums in this area.

Jefferson Area

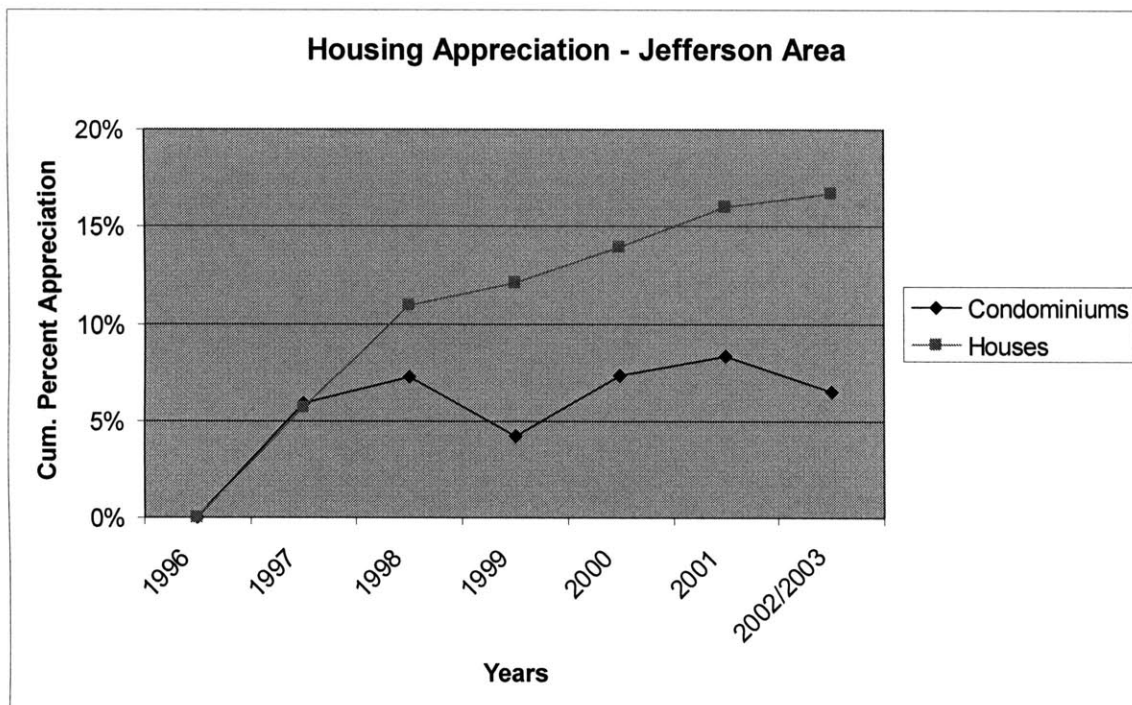
This area represents the southern periphery of the CBD and is immediately south of the Downtown area discussed in the last section. This area is primarily residential and commercial, with some industrial uses along the western edge. Overall, the dominant single family houses are quite old, with the average house built in 1934.

Over time the commercial and industrial uses have encroached into formerly residential areas as the highest and best use of the land has changed. Further, higher density housing has replaced low density housing. As an example, consider 200 West Street, between 900 and 1000 South. This block was originally developed with single family houses, but now, the street is a mix of houses, small offices, a dry cleaner and a printing shop. Over the past two years, two of the remaining house lots were replaced with apartment buildings, one containing 14 units, the other 25. The land use in parts of this area will continue to change as the houses become more physically and economically obsolete.

The sample for this area contains 1,017 condominium transactions and 6,879 single family house sales. The condominiums in this area achieved appreciation of 6.5% over the test period, while the single family houses increased 16.7%. The condominium result

is only about a third of the neighboring Downtown area, while houses increased by practically the same amount in both areas. Once again, the condominiums evidence a shift toward lower appreciation, though it appears to start earlier in this area, at about 1998. The coefficients for this area for each sale period are represented in Figure 2.7.

Figure 2.7



Despite close results in the early part of the study, condominiums never really appreciated after the mid-study split that seems to be affecting many of the areas. As mentioned, the cause of this shift is unknown. One other possible trend is that the early part of the study period is an anomalous increase for condominiums, with the later part representing the steady state. Research based upon a longer timeframe data set would aid this analysis. As with the West Jordan area, the shock could be due to supply issues, though the rudimentary test for supply developed for that area fails to turn up significant amounts of new construction here.

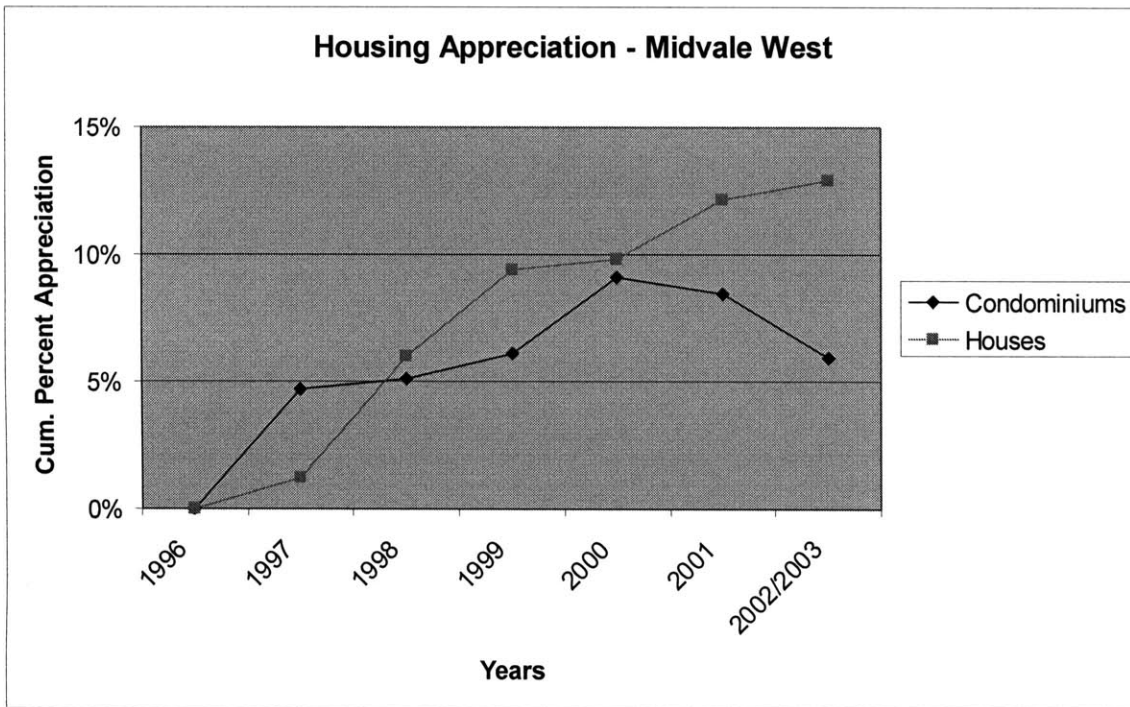
In any case, it is clear that the condominium result at 6.5% with its standard error of 1.8% is statistically different than the result for houses at 16.71%.

Midvale West

This area, as with Midvale East, was specifically created to test a unique set of circumstances, parity between the number of condominiums and houses. The Midvale West area represents a single zip code which contains a sample of 1,013 condominium sales and 1,178 house transactions, while Midvale East contains 1,053 and 1,105 respective sales for the two housing types. What is more, the two areas are contiguous. The opportunity to analyze such an even mix in two small adjacent geographic areas simply could not be passed over and, as will be detailed in this and the Midvale East section, was richly rewarded with more questions posed than answers given.

As indicated in Figure 1.3, this area is located in the geographic center of the valley. Land use is a relatively stable mix of residential, commercial, and retail. The condominiums in this area evidenced overall appreciation of 6% over the test period, while the single family houses achieved a 12.9% increase in value. Figure 2.8 demonstrates the coefficients for each sale period.

Figure 2.8



As can be seen, the overall rates mean revert around a common appreciation function until the year 2000. At that point they dramatically diverge, with condominiums ending at less than half the house appreciation. Once again, detailed construction data would allow an analysis of whether this sudden shift was caused by new construction, or is a reflection of the more widespread shift in trends observed in other areas.

Table 2.6 reviews the coefficients for each housing type for each year. The final condominium result with a two standard error

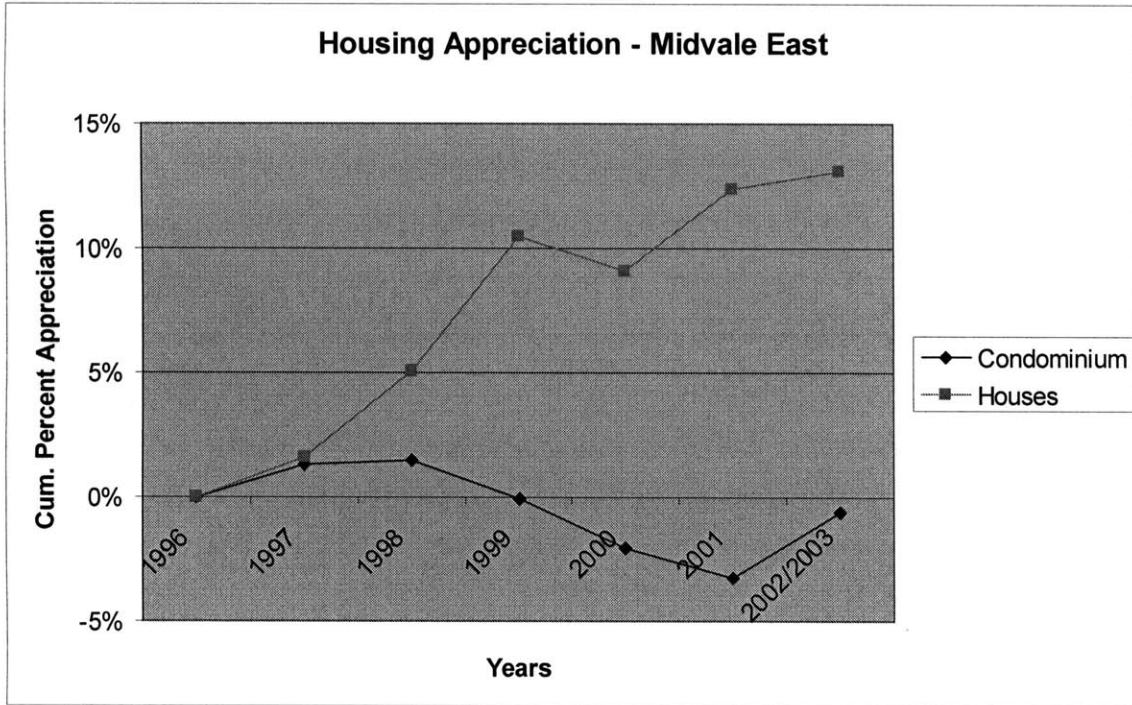
Variable name	Midvale West	
	Condominiums	Houses
Year 2002/2003	0.0597 (.0153)	0.1292 (.0148)
Year 2001	0.0849 (.0161)	0.1214 (.0150)
Year 2000	0.0909 (.0162)	0.0983 (.0148)
Year 1999	0.0614 (.0158)	0.0937 (.0154)
Year 1998	0.0513 (.0166)	0.0599 (.0155)
Year 1997	0.0473 (.0157)	0.0124 (.0154)

confidence interval is statistically below the single family house result for each of the last two periods.

Midvale East

As mentioned, this area and Midvale West were specifically created to allow analysis of appreciation rates in areas with similar numbers of condominiums and houses. Like Midvale West, this area contains between 1,000 and 1,100 condominiums and house sales. Both areas have experienced single family house appreciation at 13%. However, the condominium results are very different. As previously described, the condominium units in Midvale West evidenced appreciation at almost 6%, while this area has no net appreciation over the study timeframe. Figure 2.9 demonstrates the condominium and house coefficients for each sale period for this area.

Figure 2.9



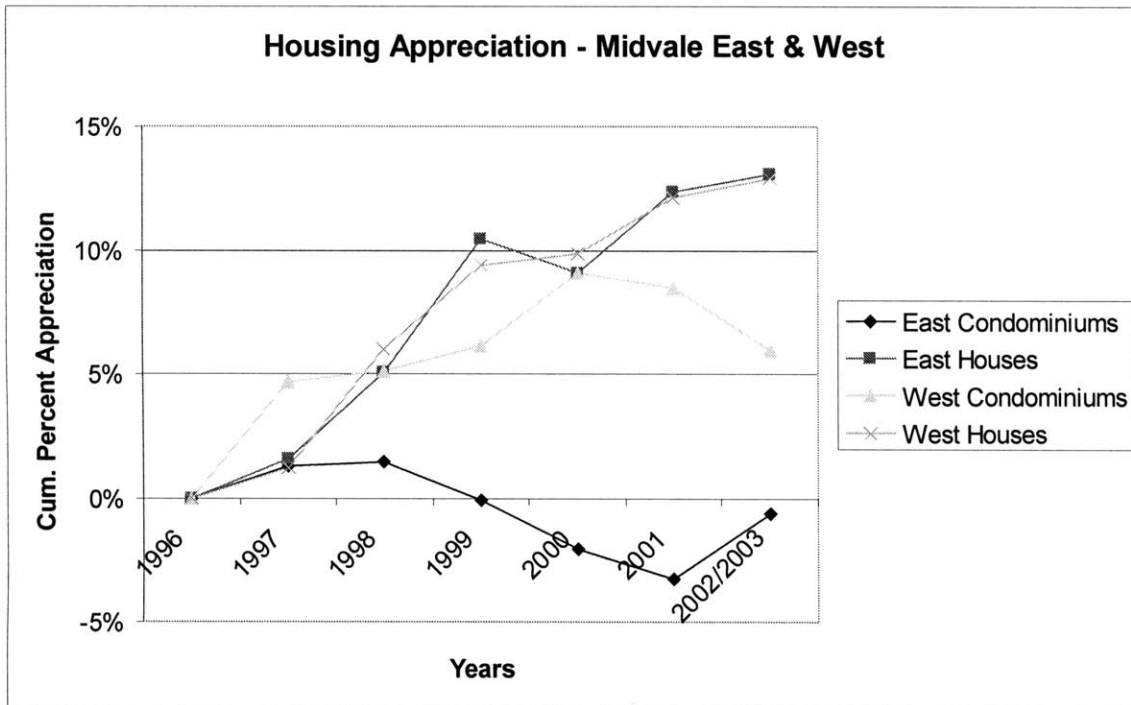
The houses follow a similar pattern to other areas, while the condominiums appear to mean revert around zero. Table 2.7 reviews the coefficients for each housing type for each year. Obviously, the final condominium coefficient results in a confidence interval

Table 2.7		
Variable name	Midvale East	
	Condominiums	Houses
Year 2002/2003	-0.0064 (.0190)	0.1307 (.0183)
Year 2001	-0.0327 (.0205)	0.1236 (.0181)
Year 2000	-0.0204 (.0201)	0.0907 (.0198)
Year 1999	-0.0012 (.0207)	0.1042 (.0188)
Year 1998	0.0147 (.0200)	0.0503 (.0193)
Year 1997	0.0130 (.0196)	0.0157 (.0191)

that is statistically different than the single family house coefficient for every period since 1999. In considering the dramatic difference between the two appreciation rates, the subjectivity of the study period should be remembered. Were the analysis to start or end at different times, the results could be substantially different. Using the new construction proxy developed in the West Jordan area, no significant supply based reasons are found for the lackluster performance of the condominiums.

The appreciation rates for Midvale West and East are represented jointly in Figure 2.10. As has been discussed, the houses appear to have appreciated almost identically, while the condominiums have been relatively flat during the last half of the study. The reason for this seeming discrepancy is unclear. Neither area is dominated by a single condominium complex, though both contain a number of sizeable developments. In fact, the data suggests that several of the developments straddle the zip code boundary line, which further obscures explanation of the analysis results.

Figure 2.10

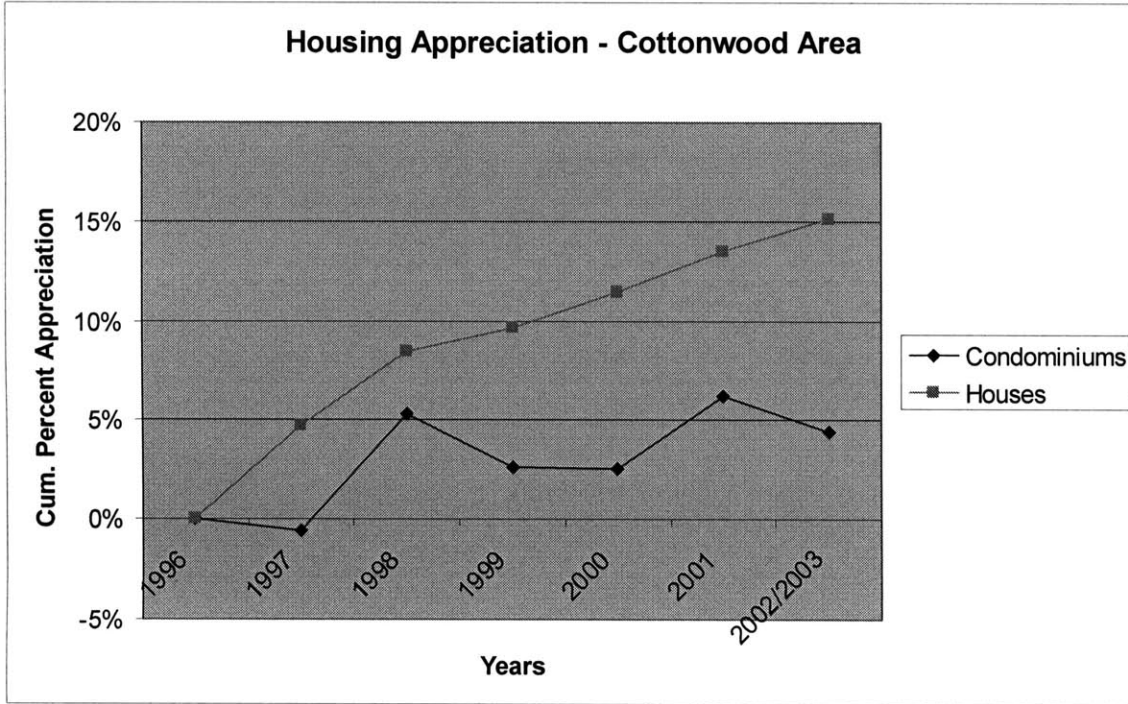


Cottonwood

The Cottonwood area is located in the foothills on the east edge of the valley. Land use in the area is primarily upscale housing, with an increasing supply of top tier office space as well. The sample is relatively modest, encompassing 782 condominiums and 4,229 single family houses.

The condominium results for the Cottonwood area are relatively flat, like those for Midvale East, which it partially surrounds. The condominiums in this area achieved overall appreciation of just 4.5% over the test period, while the single family houses increased 15.1%. The single family house trend follows that observed in the Downtown area, of a moderation of appreciation rate in the vicinity of 1999. Figure 2.11 and Table 2.8 demonstrate the coefficients for each sale period.

Figure 2.11



The appreciation indexes are very different. The single family houses follow the standard pattern exhibited in most other areas, while the condominiums follow a much lower course. Even with the comparatively large standard error of the condominium coefficient, it is clear that the two housing types have not appreciated equally.

Variable name	Cottonwood	
	Condominiums	Houses
Year 2002/2003	0.0446 (.0274)	0.1512 (.0109)
Year 2001	0.0623 (.0279)	0.1351 (.0108)
Year 2000	0.0258 (.0303)	0.1150 (.0110)
Year 1999	0.0260 (.0286)	0.0970 (.0108)
Year 1998	0.0536 (.0296)	0.0850 (.0111)
Year 1997	-0.0061 (.0283)	0.0470 (.0108)

CHAPTER 3

CONCLUSIONS

After carefully sifting through the data, creating closely aligned zip code groups and developing individualized hedonic models, the results are clear: of the eight areas examined, condominium price appreciation in seven areas is significantly different than the appreciation of single family houses. However, not all of the sample areas are of equal size. The Downtown area, in which appreciation parity exists, represents 20% of the total condominium sample size; the remaining 80% of the condominiums have not appreciated at the same rate as their single family house counterparts.

Additional perspective is gained when we take a step back from the narrow geographical areas created in this study. The zip code group areas allow us to hold neighborhood specific factors equal through comparison between property types within each area. Further, while the specific factors influencing each neighborhood need not be delineated, the overall data set can be compared when the neighborhood factor is quantified. To do this, all of the zip code area data sub-sets were recombined into a valley wide data set, which included dummy variables representing the sub-area location for each sale. Hedonic models were then created for the valley wide samples, with results reported in Table 3.1.

Table 3.1					
Valley Wide Regression Results					
Housing Type	Condominiums		Houses		
Sample Size	10,134		48,913		
R-squared	0.8293		0.8093		
Adjusted R-squared	0.8287		0.9091		
Sales Period Variables			Housing Unit Characteristics		
Variable name	Condominiums	Houses	Variable name	Condominiums	Houses
1 st & 2 nd Qtr. 2003	0.1188 (.0095)	0.2205 (.0044)	Central Air	0.0963 (.0046)	0.0772 (.0024)
3 rd & 4 th Qtr. 2002	0.1448 (.0090)	0.1895 (.0042)	Evap. Cooler		0.0344 (.0020)

1 st & 2 nd Qtr. 2002	0.1338 (.0114)	0.1948 (.0041)	Patio 1+		0.0364 (.0016)
3 rd & 4 th Qtr. 2001	0.1244 (.0091)	0.2003 (.0039)	Deck 1+	-0.0010 (.0036)	0.0425 (.0018)
1 st & 2 nd Qtr. 2001	0.1274 (.0091)	0.1927 (.0040)	Carport 1+		0.0331 (.0026)
3 rd & 4 th Qtr. 2000	0.1147 (.0092)	0.1808 (.0040)	Garage 1+	0.1122 (.0040)	0.0851 (.0022)
1 st & 2 nd Qtr. 2000	0.1206 (.0092)	0.1746 (.0041)	Tot. Sq. Ft. (Hundreds)	0.0598 (.0007)	0.0292 (.0002)
3 rd & 4 th Qtr. 1999	0.0990 (.0092)	0.1549 (.0040)	Finished Basement Sq. Ft. (Hundreds)	0.0279 (.0008)	0.0154 (.0002)
1 st & 2 nd Qtr. 1999	0.0917 (.0093)	0.1353 (.0041)	Family 1+	0.0158 (.0042)	0.0265 (.0020)
3 rd & 4 th Qtr. 1998	0.0844 (.0093)	0.1441 (.0043)	Fireplace 1+	0.0541 (.0038)	0.0547 (.0018)
1 st & 2 nd Qtr. 1998	0.0971 (.0094)	0.0994 (.0041)	Acres		0.4044 (.0085)
3 rd & 4 th Qtr. 1997	0.0837 (.0092)	0.0776 (.0041)	Bathroom 3+	0.0042 (.0055)	0.0057 (.0023)
1 st & 2 nd Qtr. 1997	0.0493 (.0089)	0.0654 (.0042)	Bedrooms	-0.0046 (.0034)	0.0111 (.0011)
3 rd & 4 th Qtr. 1996	0.0125 (.0089)	0.0368 (.0041)	Sandy	-0.2152 (0.0064)	-0.2970 (0.0037)
			West Jordan	-0.2938 (0.0099)	-0.3745 (0.0038)
			West Valley	-0.3037 (0.0060)	-0.3930 (0.0032)
			Jefferson	-0.1802 (0.0067)	-0.1001 (0.0031)
			Midvale West	-0.1976 (0.0068)	-0.2423 (0.0055)
			Midvale East	-0.1123 (0.0074)	-0.0918 (0.0057)
			Cottonwood	-0.1171 (0.0078)	-0.1398 (0.0038)
Age at Time of Sale Variables are reported in Appendix E					

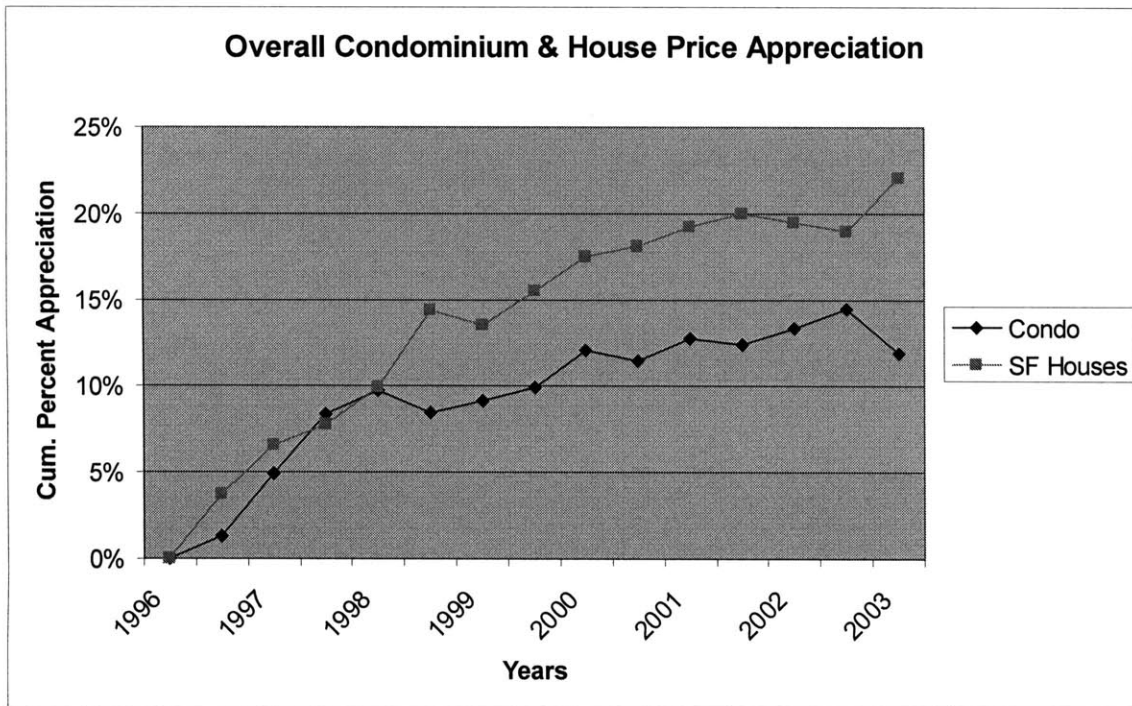
Housing Unit Characteristics

In addition to the variables used in the individual area pairings, the overall regression utilizes a location dummy variable based upon zip code group. The base case for this set of variables is the Downtown area. Not surprisingly, the coefficients for all areas are negative, which evidences a strong centrality premium. Different value discounts are apparent for each area; with a mix of unit types affected the most. Extensive further comparisons between the models could be made, but are largely outside the focus of this paper.

Sales Period

As indicate in Table 3.1, the price appreciation coefficients for condominiums and houses are significantly different, which is to be expected given the trends already identified in the individual area analyses. As observed in Sandy, West Jordan, Downtown, Jefferson, and Midvale West, a significant split in rates appears in earnest in 1999, and continues relatively unabated thereafter. The actual level of appreciation difference between the two housing types varies a fair bit by period. However, over the past five semi-annual periods, the average appreciation gap has been around 7%. Figure 3.1 provides an overview of the two price appreciation indices over time.

Figure 3.1



The sudden decoupling of the two housing types raises many questions. Many obvious avenues of inquiry could be mapped out, such as interest rates, economic vibrancy, supply of housing units, legal or zoning changes, and demographic shifts. As the scope of this paper is limited, these lines must be left to further research. Overall, this paper provides solid evidence that most condominiums in the Salt Lake Valley have not appreciated at the same rate as single family houses.

Appendix A

The unique data set used in this study allows an in depth analysis of the house appreciation in a non-disclosure environment. The lack of ubiquitous market data places increased reliance upon the few available indices made public. Of these, perhaps none have gained so much press as the OFHEO produced HPI. In addition to calling the data capture rate in the HPI into question in the body of this paper, consideration is warranted here of what I will term “appraisal based appreciation”. The HPI utilizes appraised values from refinances, along with actual transactions, in a modified version of the Case-Shiller geometric weighted repeat sales procedure. I suggest that inclusion of the appraisal data may create a significant selection bias in the data and results.

Contrasting a composite graph of the most recent HPI data for the Salt Lake area and the price appreciation rates calculated in this study (Figure A.1) with a graph of fixed rate mortgage interest rates (Figure A.2), yields some interesting results.

Figure A.1

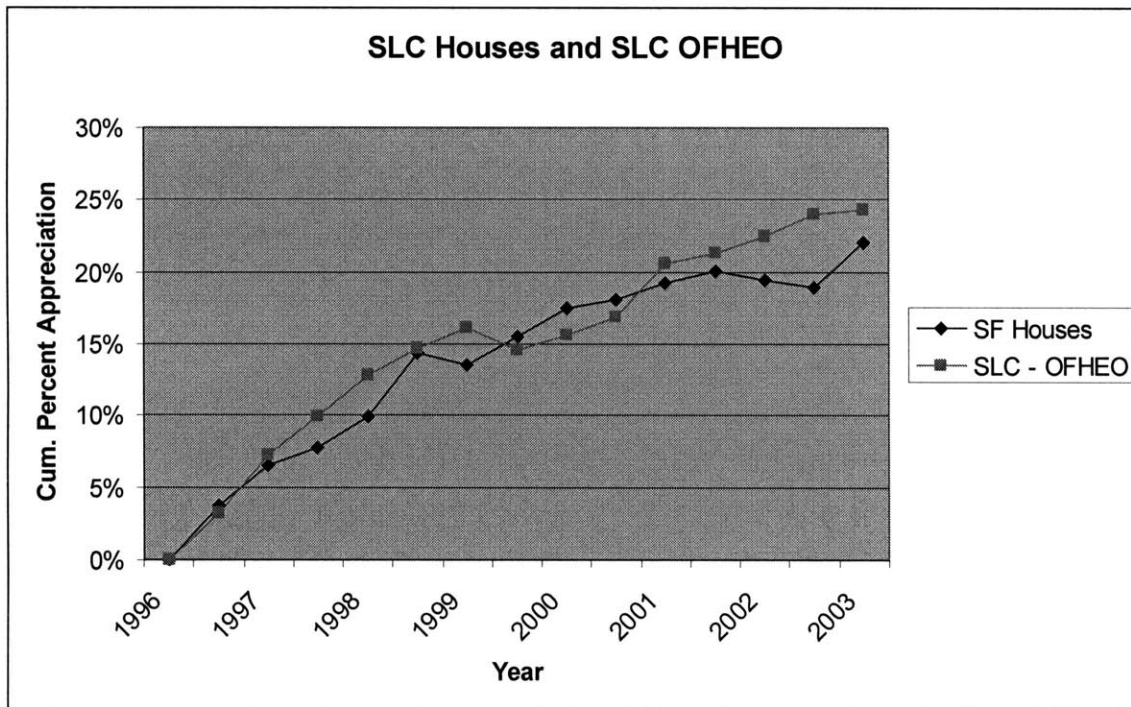
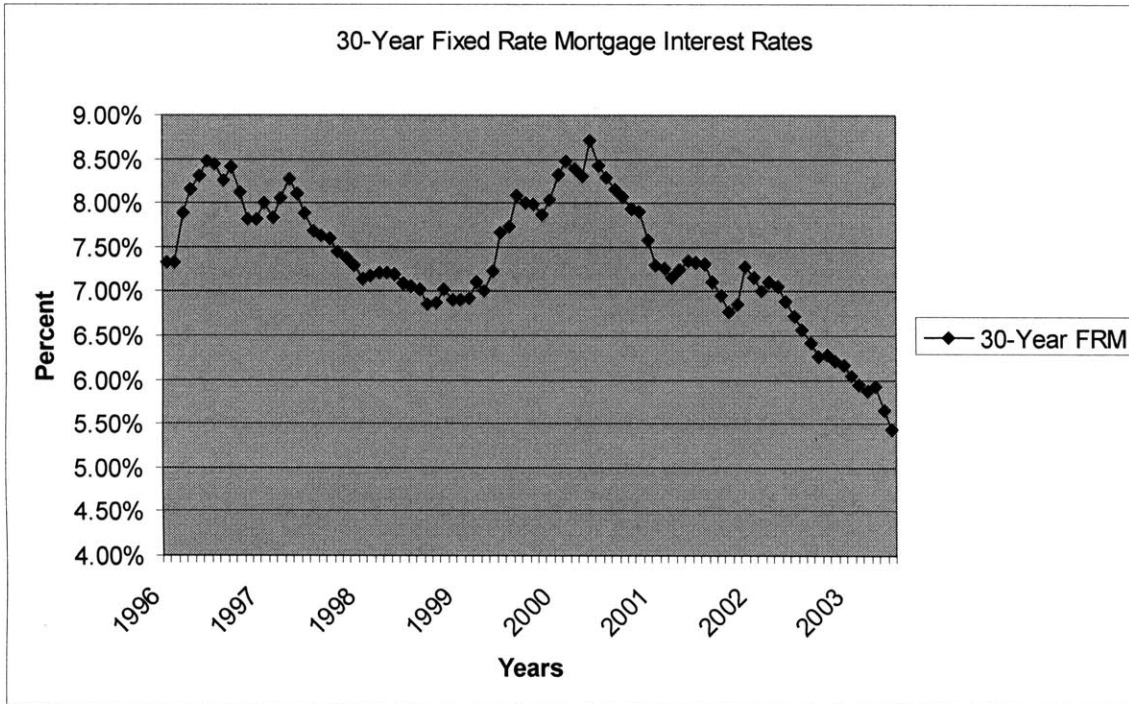


Figure A.2



The graph in Figure A.1 clearly shows a distinct drop in the OFHEO index between 1999 and 2001, after which the former trend line is resumed. This is opposed to the findings in this study, which concludes that valley wide appreciation for houses actually increased in 1999 period, and was considerably more moderate in the 2001 result than reported in the HPI. The HPI drop is well timed, both on entry and exit, with a slight increase in mortgage rates during the same period, as shown in Figure A.2.

The steady decline in mortgage rates during the study period must have fueled a significant amount of refinancing. However, this slight increase in rates likely brought the velocity of refinance to a standstill. Devoid of the lift of appraisal selection bias, the HPI dropped significantly, only to fully recover in 2001 when interest rates once again trended downward. It logically follows that the HPI, by including appraisal based data may well be artificially inflated above the true appreciation rates of houses in the area, possibly by several percentage points as seen in this example. Further study on this topic would be significantly aided by a reliable tabulation of refinancing volume over the study period.

Appendix B

Age at Time of Sale Variables	
1-4 Yr. at Sale	Housing units that were one to four years old at time of sale.
1-5 Yr. at Sale	Housing units that were one to five years old at time of sale.
3-10 Yr. at Sale	Housing units that were three to ten years old at time of sale.
5-10 Yr. at Sale	Housing units that were five to ten years old at time of sale.
6-10 Yr. at Sale	Housing units that were six to ten years old at time of sale.
6-15 Yr. at Sale	Housing units that were six to 20 years old at time of sale.
6-20 Yr. at Sale	Housing units that were six to 20 years old at time of sale.
11-15Yr. at Sale	Housing units that were 11 to 15 years old at time of sale.
16-20 Yr. at Sale	Housing units that were 16 to 20 years old at time of sale.
16-25 Yr. at Sale	Housing units that were 16 to 25 years old at time of sale.
16+ Yr. at Sale	Housing units that were 16 or more years old at time of sale.
21-25 Yr. at Sale	Housing units that were 21 to 25 years old at time of sale.
21-30 Yr. at Sale	Housing units that were 21 to 30 years old at time of sale.
21-35 Yr. at Sale	Housing units that were 21 to 35 years old at time of sale.
21+ Yr. at Sale	Housing units that were 21 or more years old at time of sale.
26-30 Yr. at Sale	Housing units that were 26 to 30 years old at time of sale.
26-35 Yr. at Sale	Housing units that were 26 to 35 years old at time of sale.
26+ Yr. at Sale	Housing units that were 26 or more years old at time of sale.
31-40 Yr. at Sale	Housing units that were 31 to 40 years old at time of sale.
31-50 Yr. at Sale	Housing units that were 31 to 50 years old at time of sale.
31+ Yr. at Sale	Housing units that were 31 or more years old at time of sale.
36-50 Yr. at Sale	Housing units that were 36 to 50 years old at time of sale.
41-50 Yr. at Sale	Housing units that were 41 to 50 years old at time of sale.
41-60 Yr. at Sale	Housing units that were 41 to 60 years old at time of sale.
51-70 Yr. at Sale	Housing units that were 51 to 70 years old at time of sale.
51-75 Yr. at Sale	Housing units that were 51 to 75 years old at time of sale.
51+ Yr. at Sale	Housing units that were 51 or more years old at time of sale.
60+ Yr. at Sale	Housing units that were 60 or more years old at time of sale.
71+ Yr. at Sale	Housing units that were 71 or more years old at time of sale.
76+ Yr. at Sale	Housing units that were 76 or more years old at time of sale.

Appendix C

Condominium Age at Time of Sale Variables								
Variable name	Zip Code Group Name							
	Sandy	West Jordan	West Valley	Downtown	Jefferson	Midvale West	Midvale East	Cottonwood
1-5 Yr. at Sale			0.0459 (.0133)					
3-10 Yr. at Sale					0.0113 (.0184)			
6-10 Yr. at Sale	-0.0615 (.0172)		0.0088 (.0177)					
6-15 Yr. at Sale		-0.0256 (.0381)		0.0027 (.0181)			-0.0204 (.0184)	-0.0690 (.0262)
6-20 Yr. at Sale						0.0715 (.0156)		
11-15Yr. at Sale	-0.1386 (.0135)		0.0221 (.0125)		0.0149 (.0196)			
16-20 Yr. at Sale	-0.1483 (.0121)		- 0.0597 (.0126)	-0.0700 (.0171)	-0.0672 (.0185)		-0.0848 (.0169)	-0.1513 (.0253)
16+ Yr. at Sale		-0.0313 (.0381)						
21-25 Yr. at Sale			- 0.1085 (.0126)	-0.1135 (.0194)	-0.1084 (.0200)	0.0605 (.0138)	-0.1096 (.0155)	-0.1411 (.0222)
21+ Yr. at Sale	-0.2023 (.0134)							
26-30 Yr. at Sale				-0.2318 (.0231)				
26+ Yr. at Sale			- 0.2097 (.0141)		-0.0837 (.0180)	-0.0396 (.0132)	-0.0778 (.0163)	-0.1265 (.0243)
31+ Yr. at Sale				0.0038 (.0231)				

Appendix D

Single Family House Age at Time of Sale Variables								
Variable name	Zip Code Group Name							
	Sandy	West Jordan	West Valley	Downtown	Jefferson	Midvale West	Midvale East	Cottonwood
1-4 Yr. at Sale			- 0.0736 (.0067)					
5-10 Yr. at Sale		-0.0894 (.0036)	- 0.1328 (.0065)					
6-10 Yr. at Sale	-0.1227 (.0066)							
6-15 Yr. at Sale							-0.1592 (.0244)	
6-20 Yr. at Sale						-0.1673 (.0170)		-0.1343 (.0111)
11-15Yr. at Sale	-0.1987 (.0074)	-0.1598 (.0041)	- 0.1819 (.0068)					
16-20 Yr. at Sale	-0.2546 (.0077)	-0.1974 (.0045)	- 0.2190 (.0067)					
16-25 Yr. at Sale							-0.2509 (.0251)	
21-25 Yr. at Sale	-0.2808 (.0073)	-0.2374 (.0050)	- 0.2400 (.0067)					
21-30 Yr. at Sale				-0.0924 (.0208)		-0.2589 (.0191)		-0.2728 (.0120)
21-35 Yr. at Sale					-0.1193 (.0208)			
26-30 Yr. at Sale	-0.2846 (.0080)							

26-35 Yr. at Sale		-0.2782 (.0056)	- 0.2633 (.0067)				-0.2568 (.0224)	
31-40 Yr. at Sale						-0.2731 (.0174)		-0.2318 (.0126)
31-50 Yr. at Sale	-0.3424 (.0072)			-0.0857 (.0156)				
36-50 Yr. at Sale		-0.3375 (.0144)	- 0.3298 (.0062)		-0.0753 (.0139)		-0.2870 (.0214)	
41-50 Yr. at Sale								-0.2343 (.0133)
41-60 Yr. at Sale						-0.3000 (.0167)		
51-70 Yr. at Sale	-0.4168 (.0102)			0.0034 (.0167)				
51-75 Yr. at Sale		-0.4092 (.0172)	- 0.3995 (.0073)		0.0096 (.0130)			
51+ Yr. at Sale							-0.2870 (.0259)	-0.2439 (.0203)
60+ Yr. at Sale						-0.3884 (.0211)		
71+ Yr. at Sale	-0.4846 (.0102)			-0.1655 (.0168)				
76+ Yr. at Sale		-0.4198 (.0245)	- 0.5082 (.0075)		-0.0357 (.0129)			

Appendix E

Valley Wide Condominium and Single Family Age at Time of Sale Variables		
Variable name	Condominiums	Single Family Houses
6-10 Yr. at Sale	-0.0804 (0.0095)	-0.0927 (0.0035)
11-15 Yr. at Sale	-0.0993 (0.0062)	-0.1508 (0.0037)
16-20 Yr. at Sale	-0.1538 (0.0058)	-0.1860 (0.0037)
21-25 Yr. at Sale	-0.2018 (0.0059)	-0.2128 (0.0037)
26-30 Yr. at Sale	-0.2766 (0.0067)	-0.2136 (0.0041)
31-35Yr. at Sale	-0.2831 (0.0083)	-0.2388 (0.0047)
36-40 Yr. at Sale	-0.3068 (0.0106)	-0.2494 (0.0044)
41+ Yr. at Sale	-0.2088 (0.0122)	
41-45 Yr. at Sale		-0.2635 (0.0039)
46-50 Yr. at Sale		-0.2698 (0.0041)
41-55 Yr. at Sale		-0.2676 (0.0050)
56-60 Yr. at Sale		-0.2461 (0.0054)
61-65 Yr. at Sale		-0.2250 (0.0056)
71-75 Yr. at Sale		-0.2468 (0.0059)
76+ Yr. at Sale		-0.3471 (0.0041)

BIBLIOGRAPHY

- Clapp, John M., and Carmelo Giaccotto. 1992a. Estimating Price Indices for Residential Property: A Comparison of Repeat Sales and Assessed Value Methods. *Journal of the American Statistical Association* 87(418):300–6.
- Clapp, John M., and Carmelo Giaccotto. 1992b. Estimating Price Trends for Residential Property: A Comparison of Repeat Sales and Assessed Value Methods. *Journal of Real Estate Finance and Economics* 5(4):357–74.
- Clapp, John M., Carmelo Giaccotto, and Dogan Tirtiroglu. 1991. Housing Price Indices Based on All Transactions Compared to Repeat Subsamples. *AREUEA Journal* 9(3):270–85.
- Dubin, Robin A. 1998. Predicting House Price Using Multiple Listings Data. *Journal of Real Estate Finance and Economics* 17(1):35–59.
- Pollakowski, Henry O. 1995. Data Sources for Measuring House Price Changes. *Journal of Housing Research* 6(3):377–88.
- Pollakowski, Henry O., Michael A. Stegman, and William Rohe. 1991. Rates of Return on Housing of Low- and Moderate-Income Owners. *AREUEA Journal* 19(3):417–25.
- Thibodeau, Thomas. 1995. House Price Indices from the 1984–1992 MSA American Housing Surveys. *Journal of Housing Research* 6(3):439–81.
- Zhong Yi Tong, John L. Glascock. 2000. Price Dynamics of Owner-Occupied Housing in the Baltimore-Washington Area: Does Structure Type Matter? *Journal of Housing Research* 11(1): 29-66