

Zoning Regulation and Property Values

An Empirical Analysis of Eugene, Oregon

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Abstract: We analyze the effect of recent changes in Eugene’s zoning codes and regulations, as well as overall trends and levels of property prices. Using hedonic price regression, we estimate the affects of specific variables on commercial property sales prices. We find that although there is not a significant trend in the downtown core since the change in zoning regulations since 2001, there is evidence of depressed values in the downtown core relative to the surrounding area. We find that there is also a large and significant difference between the downtown core and Oakway and Gateway area prices.

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I. Introduction

Cities across the nation are faced with the dilemma of balancing economic growth and the negative impacts associated with growth. Cities would like a strong local economy, with growth and development, and the subsequent tax revenues that fund further growth and development. Yet, cities would also like clean air, green space, and vibrant communities. There can be a conflict between these two desires, and a delicate balance must be struck between them. The primary tool that city planners can use to exact this balance is zoning regulations.

Zoning serves to regulate free market forces by minimizing negative externalities. In the early 1900s, zoning was a response to a change in the nature of urban environments (Fischel, 2001). The free market forces that drove urban development failed to account for the negative externalities caused by incompatible land use. Originally zoning controlled for land use, but soon broadened scope to control growth, as increased transportation led to suburban development. Presently, by zoning a city for specific uses, planners can force residential, commercial, and industrial sectors to work in harmony with one another, and more recently, can be used to control urban growth and urban sprawl. Succinctly, zoning is a way of controlling market forces¹ as means to the ends decided upon by municipalities in their quest for balance.

The City of Eugene is a city defined by its divergence in opinions. Specifically, the issue of zoning has become a touchstone in a much bigger discussion on growth vs. environmental welfare. Some in Eugene believe that significant regulation should be used to limit urban sprawl, traffic congestion, pollution and rapid development. Others believe that market forces should be allowed to operate freely in Eugene. Free markets may not account for externalities when left to their own devices. Regulation

¹ Some would say “market failures”

may not provide efficient allocation of resources when too heavy handed. Zoning should be used as a liaison between the two ends, providing an optimal solution.

In 2001 the city of Eugene's zoning codes were amended. Two very specific amendments to Eugene's core were highlighted by Prichard (2007) as unusual and likely to significantly restrict development in Eugene's downtown. The first was the implementation of a floor-to-area (F.A.R.) ratio minimum of 2.0². Implementation of a F.A.R. ratio is not uncommon, but in Eugene's case, the "area" is defined as all contiguous lots owned by the same developer, including across streets and alleyways. Typically, the "area" is defined as the lot the building stands on or the footprint of the building itself. It is specifically Eugene's definition of "area" that was a concern to Prichard. This regulation is focused on encouraging developers to build "up", thus limiting the need for more buildings in the future. The second amendment was the limitation of twenty off-street surface parking spaces per building, no matter the size, for the Eugene downtown core. This regulation is focused on encouraging public transportation use in Eugene, but may significantly harm the viability of new medicine to large-scale commercial developments in the downtown.

This paper will examine the effect of these regulations on those businesses inside the downtown core relative to commercial properties in other areas of Eugene that were not affected by these zoning changes. Using a hedonic price regression on commercial property sales data from the City of Eugene and the Lane Council of Governments will allow a comparison of property values across time inside and outside of the downtown core. Additionally, we plan to examine the broader trends of property values over time in each zone. Have the amendments in 2001 negatively affected the property values in the downtown core? Are certain zones more valuable than others? Are there broader trends in Eugene over time?

²This means that any new development in the downtown core must have floor space that is twice the measurement of the "area"—thus an "area" of 1000 ft² must have minimum floor space of 2000 ft².

II. Literature Review

Zoning laws and literature analyzing these laws have existed since the beginning of the twentieth century. Some studies have analyzed the efficiency of zoning as a solution to externalities. Fischel (1978) argued that efficient zoning should have no effect on land values because the gains from the restrictions would match the losses from the restrictions. He continues by arguing that there are price differentials created by zoning because they fail to fully satisfy a Coasian solution³. Most theoretical models, including White (1975), Ohlset *al.* (1974), Henderson (1985) and Courant (1976) argue a link between price and zoning should be present⁴ because zoning changes the relative scarcity of competing uses, commercial, residential, and industrial.

Yet most empirical work has a hard time verifying predictions of these theoretical models. For example Maser *et al.* (1974) looked at the whether or not zoning had changed the market allocation. To examine this they used a random sample of arms length real estate transactions from the years 1950, 1960, and 1971. They then ran a regression with the real estate prices of residential single family homes on zoning variables, externality variables and other factors that affect price. However, they could not find any significant correlation between zoning and property values. They do admit that the scope of the study was limited. Similarly Mark and Golberg (1986) looked at the effects of zoning and house values in Vancouver, Canada over a 24 year period. In this study they focus mainly on residential properties but they do look at the effects of re-zoning. They use a hedonic regression, but the results are not strong. The problem is that although they have a large data set that spans a long period of time, the sample characteristics are not consistent from year to year so the sample was simply insufficient. As a result they were unable to find any solid link between property prices and zoning.

Because of the trouble researchers have had in finding a correlation between residential property and zoning, the trend has been to alter their studies in small ways. Instead of focusing on the

³ Zoning laws give property rights that cannot be transferred.

⁴ Given certain market conditions are specified.

zoning codes themselves, some looked at the effect externalities had on property values and found interesting results. Irwin (2002) studied the value of open space on nearby property values. Using a hedonic regression on residential housing transactions in the Washington D.C. area over a five year period she found that proximity to open space statistically significantly increased housing values. Moreover she found that proximity to land that was unable to be developed⁵ at any time had a higher effect on property values than simply undeveloped land. This suggests that zoning, which has an effect on open spaces, should in turn have an effect on prices. Grether and Mieszkowski (1980) examined the effect of nonresidential property on residential housing prices. They used a mix of assessed and actual transaction prices in the New Haven, Connecticut area from 1955-1970. They then broke the data down into 16 case studies in which single family housing bordered a nonresidential use. Here they pinpointed natural experiments in order to hopefully control for some of the periphery effects. Unfortunately the results are inconclusive, and they admit that the sample sizes are somewhat small. However, it could just be the case that commercial use or low-density apartments don't have a big effect on single-family home property values. McMillen and McDonald (1991) used land value estimates from the Chicago area to assess the history of development. They use a statistical model in which they control for every type of zoning⁶ and estimate the land value equations for each separately. Their results are interesting in that they are able to show the effects different municipal features had on property values. They are then able to go through each year and hypothesize on the dependence of price for different land uses on different proximities.⁷ They then used zoning information to correct for the 'selectivity biases' of the local government, which in turn only strengthened most of their statistical findings. This study shows the power of hedonic regressions and also argues that some zoning codes reveal a selectivity bias that the government imposes on zoned properties. A study by Asabere and Colwell (1984) looked at whether

⁵ i.e. public land or private wildlife reserves

⁶ A Multinomial Logit Model

⁷ i.e. nonresidential land values have become more dependent on distance to O'hare over time.

zoning in Champaign, Illinois had caused an over-supply of residential properties and an under-supply of commercial use property. They used data from all recorded sales of vacant lots in the city over a two-year period and ran a standard hedonic price regression on it. This study is interesting because they had to overcome the complication of the University of Illinois campus, which had to be built into their model. They found that commercial use property was under-supplied, and the relative price was too high. They also found other interesting results involving the distance to campus and the effect a busy street had on differently zoned land. Finally, ECONorthwest a local firm did a study on the Portland, Oregon metro area that looked at why development was not occurring at the required densities. They found several possible reasons for the possible problem, the most pertinent being “that zoning is ahead of the market.” Meaning that developers did not find it profitable to invest in development at the given density requirements because demand is insufficient. This study gives us a useful look at the dynamics of zoning in the area, and by looking at the problems they underwent with their data sets we can find a remedy. However it does not examine the link between zoning and land values which our study hopes to weigh. If we do find a correlation, our study will then act as a supplement to this study, to possibly explain why density requirements are not being met.

After looking at the literature on this subject, four conclusions can be made. First almost all of the studies focusing on the effects of zoning have focused on the zoning of residential properties, whereas this study will focus on commercial properties. The few studies that expanded beyond solely residential uses were able to find more statistically significant results. Second, little work has been done on the effects of re-zoning. Third, almost all of the theoretical work suggests that restrictive zoning should increase urban core property values, so if we find that an overly restrictive code has retarded property values our results would be that much more significant. Finally, because none of the empirical or theoretical work has been pertinent to the problems facing Eugene, adding another case study will expand the scope of the literature on the subject.

III. Problem Statement and Hypothesis

Developers in the Eugene area have expressed concern that the definition of a 2.0 FAR and the twenty parking spot maximum limit have prevented development opportunities in the core of downtown Eugene. If this is the case, then we believe that property values in the downtown core should reflect this. Thus, this paper asks; “Have the re-zoning regulations implemented in the core of downtown Eugene, Oregon in 2001 negatively impacted the market value of the properties in the downtown relative to other commercial properties in the area?” Additionally, this paper asks; “Are there overall trends in property values in Eugene/Springfield?”; “Have property premiums migrated?”.

We hypothesize that the re-zoning regulations of 2001 have negatively impacted the property values within the core of downtown Eugene relative to other areas in the Eugene/Springfield area. Alternatively, we believe that over time, there has been a decline in relative property values, as well as migration of premiums from one zone to another. Using hedonic price regression with the use of zone dummy variables and trend variables we expect to find a significant difference between values in the downtown core vs. select comparables such as Oakway and Gateway. Additionally, we expect to find significant trends in Eugene over time in the premiums of select zones, namely the migration of positive coefficients from downtown zones to surrounding area zones such as Oakway, as well as an overall decrease in property values in Eugene/Springfield as a whole.

There are however other factors that could interfere with the results. The first is that the code change was not an overnight event; it was a long process that culminated in 2001. The 2.0 FAR was already in place by 2001 and could have had an effect on properties. Another factor is the pedestrian mall in part of downtown Eugene. On September 23, 2002, Broadway St. that had previously been the all-pedestrian mall was opened to cars (Carlson, 2004). This mall had been in place since 1969 and could have affected property values in the downtown area (Welch, 2006). The downtown mall was actually put in place to combat the loss in retail business due to the opening of Oakway Center in the early 1960s

(Fickes, 1997), and the Valley River Center which opened in 1969. Over 200 cities put pedestrian malls in during the 60s and 70s to compete against the new suburban shopping malls, however most have now been re-opened to automobiles (Robertson, 1997). The general consensus is that the malls were unsuccessful and only hindered development. A Professor at Saint Cloud State University, Kent Robertson (1997) believes these malls failed for several reasons. "Pedestrian malls could not provide free parking, weather protection, an environment perceived to be safe by middle class patrons, a mix of stores that provide national chains, or unified management structure." The failure of the pedestrian mall in downtowns has led to 60%-70% vacancy rates in many of the downtowns that had them (Roads & Bridges, 1996). With the removal of this mall in Eugene starting before 2001 and being finalized in 2002, the effect of the zoning code might be muddied. Presumably the opening of Broadway has impacted the downtown property values positively, for example in St. Charles, Missouri the vacancy rate has dropped nearly 50% within 6 years of the opening of their pedestrian mall (Roads & Bridges, 1996). Due to the fact that Broadway was opened so close to the zone change, the data might be insufficient to isolate each effect.

IV. Data

In order to successfully examine the effect the zoning change had on property values we needed a data set that would show how the price of properties have changed over time. It needed to have sufficient observation before the zone change to give us a baseline, and also sufficient data after the change occurred to correctly identify any change in the values. We examined the idea of using rental prices because they presumably reflected the value of the property and would be a more common form of operation for commercial business in the area. However attempts to find data regarding rental prices were fruitless, as it either was none existent or we were not granted access. Another source of data that we examined was county tax assessors' data that provides estimated valuations on all properties. We knew it would be easier to find, but were worried that the added non-controlled factor of a human's

opinion was an unnecessary risk to take. If they were using comparables from outside the zoning area to assess a building inside the core⁸, our data would become biased and the relationship would be compromised. Since the tax assessor would need to use actual sales anyway in order to do his job we decided that actual transactions would be the simplest and soundest way to go. Our data set was obtained from the Regional Land Information Database of Lane County. It is similar to the data set used by ECONorthwest in their study. It consists of actual transactions of commercial properties from the years 1997 to 2006. All of the data include the location, the price and the date. The data set becomes more complete as you progress towards more recent years. Most of the entries have the year built, square feet, arms length information, school district, and stat class⁹. Starting in 2001¹⁰, the data contains the usable lot size, the legal lot size, the number of units, the building condition, the effective age, the occupancy code, analysis code, and the zoning code.

There are 3127 transactions in total, but the majority (2737) is after 2001. While looking only in the Eugene area before 2001, the number is dwindled to 177 from 394. We also noticed that of the entries before 2001, about half are double entered, meaning they are cloned entries in the set. This led us to seek additional data from another source. The Lane County Tax Assessors office was not able to supply us with the information we needed as they only had data going back about 7 years, however they did suggest that the commercial real estate companies in the area would have the data we needed. Although this may have been true, many companies were unwilling or simply too busy to share their data with us. Fortunately, Duncan and Brown a real estate consulting firm from the area supplied us with 155 transactions that took place from 1993 to 2000; of which only 8 were repeated in the RLID data. The data included all of the attributes that we needed yet was formatted differently than the RLID data. This meant we had to reformat all of the D&B data to match the RLID and then reformat both so

⁸ In some places this could be across the street or around the corner.

⁹ Statistical class code is assigned by Lane County Assessment and Taxation.

¹⁰ This is because the data set was started in 2001, and the pre-2001 entries were entered after the fact.

they would comply with Stata and GIS as well as delete any duplicate entries. The sets were then combined into one set. After that, we finished deleting duplicate entries and cleaning out all the transactions that took place outside the Eugene/Springfield area we were left with 1553 observations that included: sale date, maplot #, property use code, sale price, square feet, year built and whether it was a arms length deal or not.

V. Methodology

In order to establish the property values of downtown core versus the non-downtown core we used a hedonic price regression. A fundamental complexity in comparing property values is that properties tend to be heterogeneous. How can you compare a city hall building, for instance, to a 7-Eleven? You can't without the use of hedonic price regression as a means of comparison. We can decompose each of these buildings into an array of characteristics, and by using multiple variable regressions, isolate each characteristic and estimate its independent effect on our dependent variable, ceteris paribus.

The first step was to put our cleaned data into a GIS¹¹ program that would allow us to flag all the transactions that took place within a given area. GIS then put a dummy variable into our data set that would signify whether the observation was inside the downtown core zone, Oakway zone, or Gateway Zone. We chose the areas Oakway and Gateway because they were two areas outside of the downtown zone with large commercial sectors. This would give us further information about what was happening to the satellite sectors of the metropolitan area over time. It will show if the central and periphery zones were moving in unison with each other, or there was a substitution effect taking place.

property values = f(characteristics, zone dummy variables, trend term)

¹¹ Geographical Information System

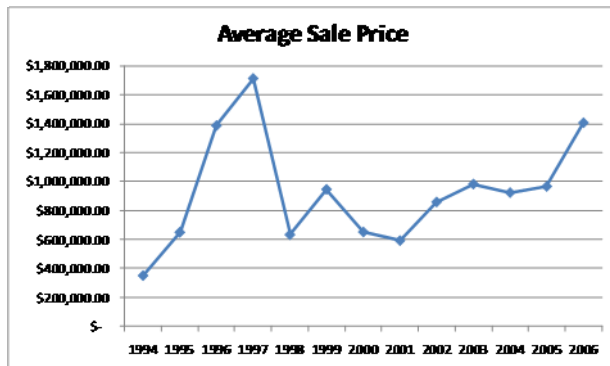
This shows the idea behind our hedonic price regression, that property values are a function of the characteristics of the property along with the zoning codes and the trend over time.

$$\text{Sale Price} = \alpha + \beta_1(\text{yrblt}) + \beta_2(\text{sqft}) + \beta_3(\text{armlngt}) + \beta_4(\text{unemp}) + \beta_5(\text{oakz}) + \beta_6(\text{gatez}) + \beta_7(\text{dtz}) + \beta_8(\text{dtzchange}) + \beta_9(\text{oakzchange}) + \beta_{10}(\text{gatezchange}) + \beta_{11}(\text{trend}) + \mu$$

This is an example of our basic model. The 'change' terms represent the transactions that took place after 2001 in the specified area. The coefficient we are most concerned with is β_{10} , which will show the effect the zone change had on downtown properties. If this coefficient is negative and significant then our hypothesis will be proven. Unemp is the unemployment rate in the county over that time period. We added this in order to see if there was a macro economic effect taking place on the property values, leaving one less factor omitted.

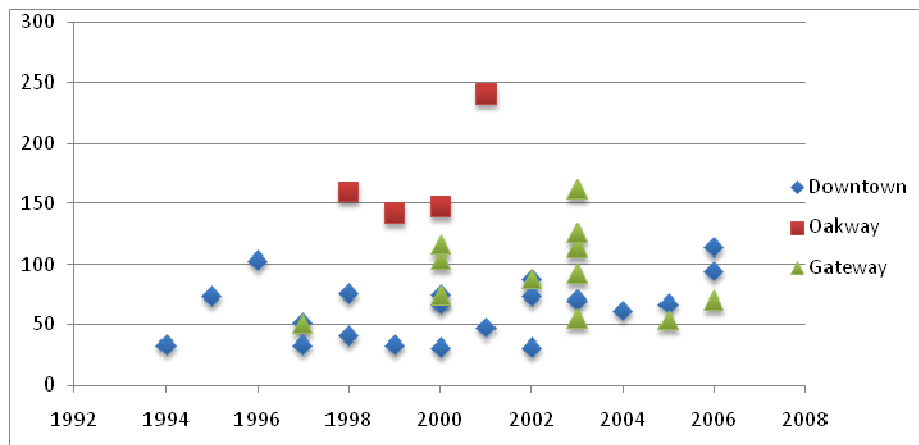
Regression analysis was done in Stata. We used a basic *reg* function of multiple variables involved in hedonic price regression (see *appendix*). Strings were converted into variables, and the data was cleaned by removing error-prone variables. Finally, the variables were transformed to log variables to get a tighter variation and more accurate results.

VI. General Analysis



The average price of properties in Eugene sold has varied over the last decade. Some obvious factors are present here, such as the national economic boom of the late nineties and the resulting slump in the early 2000s. Average property sales price have climbed since this dip, and seem to be on a strong upward trend.

Property values in the downtown core are lower than those in Gateway and Oakway.



The above graph shows the dollar-per-square-foot in each area over time. Oakway and Gateway areas both hold higher ratios than the downtown area both before and after the zone change. This is interesting because all prior economic studies suggest that the downtown core should be the ideal location for a commercial business and also should be the location with the highest density of properties. This however does not show in the graph because property value per square foot is highest in Oakway, a suburban area.

VII. Econometric Analysis

The Basic Model

The first step in our econometric analysis is a basic hedonic price regression. In order to establish the legitimacy of our chosen variables and regression model, we ran a basic regression as

Table 1

Hedonic Regressions of Commercial Properties - Basic Regressions			
	Simple		Incl. Uses
Year Built	0.9691***		1.1569***
		(0.2068)	(0.1987)
Square Feet	0.7806***		0.8159***
		(0.0167)	(0.0169)
Not "Arm's Length"	-0.0167		-0.0214
		(0.0608)	(0.0575)
In Eugene	0.2187***		0.2369***
		(0.0396)	(0.0385)
Oregon Unemp. Rate	-0.6716***		-0.5714***
		(0.1236)	(0.1179)
Year Trend	0.0428***		0.0484***
		(0.0074)	(0.0070)
Observations	803		803
R-squared	0.75		0.78
Standard errors in parentheses			
* significant at 10%; ** significant at 5%; *** significant at 1%			

shown in Table 1. In the primary regression, three-quarters of the variability in commercial property price change can be explained by age, size, category of sale, if it's in Eugene, the unemployment rate and what year it is. A one percent increase in age would indicate an almost 1 percent increase in price. A one percent increase in square feet should return a 0.78% increase in price. The fact that a transaction is not arm's length is not statistically significant. Property values in Eugene are statistically significant—property values in Eugene are on average 24% higher than property values in Springfield. The unemployment rate in Oregon has a significant impact on Eugene property values: a one percent increase in the unemployment rate nets a 0.67% decrease in property values in Eugene. Finally, there is a trend in Eugene worth mentioning—property values on average have increased by almost a half a percent.

The next step was to try to explain away more variability using the hedonic use variables. Use codes were added to the regression in Table 1. A few of the use codes were significant, and this new

regression explained about 78% of price variability. Additionally, the effect of age, size and city increased while unemployment's effect decreased and the trend remained roughly the same.

Testing our Hypothesis

Table 2

Table 2 Hedonic Regressions of Commercial Properties - Zone Change			
	Downtown v. Rest		Downtown v. Gateway/Oakway v. Rest
Year Built	1.1644***		1.1369***
		(0.1987)	(0.1950)
Square Feet	0.8193***		0.8089***
		(0.0169)	(0.0167)
Not "Arm's Length"	-0.0182		-0.0477
		(0.0579)	(0.0572)
Since 2001, not trend	0.0197		0.048
		(0.1005)	(0.0989)
Downtown Core	-0.2975		-0.2604
		(0.1816)	(0.1783)
Downtown Core since 2001	0.0934		0.0733
		(0.2335)	(0.2292)
In Eugene	0.2424***		0.2780***
		(0.0386)	(0.0384)
Oregon Unemp. Rate	-0.6136***		-0.6700***
		(0.1863)	(0.1831)
oakgate			0.5446***
			(0.1801)
oakgate_zchg			0.1562
			(0.2284)
Constant	-2.4267		-2.0573
		(1.5649)	(1.5368)
Observations	803		803
R-squared	0.78		0.79

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

We have established the hedonic price regression can effectively estimate the effects of specific variables and that the variables that we chose to use were significant. The next step is to test our primary hypothesis. As Table 2 shows, we included zoning trend variables as well as specific zones. The first regression just compares the downtown core zone to the rest of the property sales data contained

in the sample. Although the downtown core data is not significant in this regression it was close enough and significant in other regressions, showing that downtown core properties are on average 32% less valuable than the rest of the sample. Realizing the need to for more explanation, we included a new variable of both Gateway and Oakway areas for comparison. The Gateway/Oakway zone is statistically significant, and is positive—property sales values in these areas were on average 72% higher than the rest of the Eugene/Springfield area! Upon further analysis¹² we were able to reject the hypothesis that the difference between the downtown and Oakway/Gateway areas was not significant. The difference between the Gateway/Oakway prices and the downtown core prices is over 100%!

The next analysis involved analyzing any trends in the zones before and after 2001. This would account for any change that we couldn't see in the blanket analysis done above. This regression yielded no significant results. Additionally, we tested a second hypothesis relating to trends in general, which again yielded no results.

VIII. Conclusion

Although hedonic price regression is a valuable tool in analyzing the natural experiments provided by city zoning and regulation, a lack of data and a few key variables kept this regression from showing clear results. It may be the case that the zoning codes did not have an impact on the economics of downtown or it may be the case that we had insufficient data. Although we were not able to statistically prove that the zoning change had a negative effect on property values it does seem to be the case that the downtown is worse of economically than other areas of the city—at least the property values are lower. This simple fact coupled with the theoretical work done on the subject is a case against such zoning codes in such a key area. McMillen and McDonald (1990) argue that “there is a trade-off between environmental quality and tax base,” and this trade-off faces every city. Having a downtown that is vibrant yet dense is a great goal for every city, but zoning regulation in the Eugene downtown

¹² Using an F-Test

core that serve as constraints while property values are already depressed could serve as a final blow to its economic vitality. Taking clues from Oakway and Gateway could help rejuvenate the downtown core.

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