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Municipal and Statewide Land Use Regulations and Housing Prices Across 250 Major US Cities♣♦

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Previous studies of housing price determinants focus either on specific regulations in particular cities/regions, or on cross sections that cover a subset of major cities and regulations. I examine the impact of over 70 indicators of land use regulations on housing prices in 250 major US cities from 1989 to 2006. Cost-increasing municipal regulations (zoning and permit approval delays) and statewide growth/density regulations are shown to be robustly associated with changes in housing prices. In addition, there is also a highly statistically significant effect of statewide executive, legislative, and judicial land use activities on housing prices. Land use regulations are shown to explain a different dimension of the housing price data than demand factors (income, population growth, and population density). However, the estimated increase in housing prices associated with regulations is, on average (over 250 cities), substantial larger than housing demand effects. While the estimated dollar cost associated with regulations may be sizable at times, the results are remarkably consistent with previous studies that were based on smaller cross sections.

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1. Introduction

Much of the empirical housing price literature focuses on the exact determinants of housing supply and demand. As Glaeser (2004) points out, housing demand factors have long been considered essential. In the early 1980s, Poterba (1980) and Summers (1981) documented that inflation increased the interest rate subsidy on mortgages to such an extent that the resulting shift in housing demand explained much of the previous decade's housing price growth. In the 1990s, Mankiw and Weil (1989) highlighted that demographics also drive housing demand. Given the aging of the US population, their results led them to the ominous prediction that, "real housing prices will fall substantially over the next two decades." Contrary to their prediction, housing prices in major US cities rose 54 percent (after accounting for inflation).[1]

Housing supply determinants have only recently received intense scrutiny. As late as 2005, systematic housing supply research was still characterized by prominent authors as "at best described as thin" (Green et al., 2005). Seminal was the special journal issue edited by Rosenthal (1999), which contains several surveys that cover distinct dimensions of housing supply. Subsequently, Green et al. (2005), estimate a detailed housing supply function for 45 major cities. This line of research culminates with the finding that the crucial ingredient to understanding housing supply is the stringency of land use regulations. Glaeser (2004) summarizes the evidence and provides broad and compelling support for the hypothesis from studies of US regions and cities. He finds that the negative correlation between housing price growth and new home construction (even after accounting for density) can be explained by regulatory environments (e.g., zoning and permit time costs) in 70 metropolitan areas and their suburbs (Glaeser and Gyourko, 2002).

The data on land use regulations has been a major bottleneck in the study of housing supply. It is unusually time consuming to obtain objective and comparative land use regulation data for informative, representative samples. Objective and comparative data is crucial, and the housing price literature is characterized by an abundance of studies that focus on the effects of specific regulations in particular cities or regions. In surveying the literature, it is tempting to generalize results from the numerous city/region specific studies, and to establish general patterns of how regulations affect housing prices (e.g., Nelson et al. 2001). Although studies of

[1] Based on Census data for median real price of owner-occupied housing described in detail below.

individual jurisdictions are informative, it is unclear whether it is indeed possible to generalize their findings. For example, the economic impact of zoning restrictions that affect lot sizes in California or greenbelts in Colorado are certainly distinct from height restrictions in New York.

From a research design point of view, individual city studies may also be susceptible to selection bias. When researchers select their own housing price indicator(s) the selection may reflect the subset of regulations that are expected, *ex ante*, to be especially relevant to the region. This may lead researchers to neglect other indicators that also hold explanatory power, or inflate their impact as results are generalized *ex post* to other cities in the region or state. The danger is then that the researchers' data selection (and creation) may influence the subsequent results in a systematic manner, validating researchers' prior expectations with unusual frequency.

In contrast, the focus of this paper is to accurately identify variables that are associated with changes in housing prices across 250 major US cities using a land use database that was constructed with a consistent methodology for all cities, and that features over 70 regulatory indicators (Gyourko et al., 2007). The dataset provides a first opportunity to examine the specific regulations that can be tightly associated with changes in housing prices across a large number of US cities. The broad cross section approach eliminates nagging doubts as to whether the impact of a particular regulations in specific city/region studies can be generalized. My empirical strategy, using growth rates rather than price levels as the dependent variable, also mitigates the influence of city-specific fixed effects.

In the public debate, the spectacular run up of US housing prices in the past 20 years has given rise to a number of explanatory hypotheses in the popular literature. Lower mortgage rates, easier access to more creative mortgages, and income/employment growth are only some of the frequently cited explanations. These factors may well contribute to increasing housing prices, but it is noteworthy that they also relate exclusively to housing *demand*. Housing *supply* is not only harder to quantify, but supply hypotheses also reflect opposing view points: environment vs. sprawl, builders vs. planners, parks vs. high-rises, and most divisively: state vs. local growth management.

Growth management is a catch all term for several types of land use regulations at the regional, if not the state, level. In his review of the effects of land use regulations, Brueckner (2007) groups these restrictions into three categories: 1) *urban growth boundaries*, 2) *regulation* *of development densities* (e.g., minimum lot-size rules), and 3) *cost-increasing regulations* (facility development and/or regulatory delays in the approval process). The new Wharton database is vitally important because it features an extensive array of land use regulations that cover growth boundaries, density, and cost-increasing regulations at the state and municipal level.

The results from the regression analysis are not only highly statistically significant, but the estimates are also economically significant in that they imply a sizable association between regulations and housing prices. After controlling for demand factors, both state and municipal regulations are shown to affect housing prices. Statewide regulations impact the major cities on three levels: first via growth management plans, second, via specific land use regulations, and third, via the state court's stance on upholding municipal regulations. At the municipal level, the permit and zoning approval delays are associated with changes in housing prices. On average, regulatory measures clearly dominate the demand side effects over the 17 year period under examination. The magnitudes I report are in line with the results of previous, careful studies that were based on smaller cross sections of cities.

Section 2 commences with a brief survey of housing studies to provide the context for the approach taken in this paper. Section 3 reviews the simple theoretical backbone, and Section 4 introduces the empirical implementation. Section 5 discusses the data and Section 6 reports the results. Section 7 reports a battery of tests to examine the robustness of the regression results. Section 8 calculates the dollar costs of regulations and Section 9 discusses their interpretation. Finally, Section 10 highlights policy relevance and summarizes conclusions.

2. Previous Comparative Studies of Housing Prices and Regulations

The method, data, and approach applied in this study must be viewed within the context of the current state of the art of the empirical housing price literature. Therefore, it is important to provide a succinct review of recent housing price studies that include regulations.[2] In terms of

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[2] Pogodzinski and Sass (1991) provide a structured review of diverse approaches to modeling the effect of housing supply on housing prices. They highlight the multitude of different regulation criteria that have been employed in regional studies, which emphasizes how tenuous the generalizations are that link "regulations" to housing prices, based on individual city studies. Green et al. (2005) provide the most sophisticated empirical implementation of a theory based housing supply model. Although they control for regulations, it is not the objective of their paper to quantify the effects of regulations on housing prices.

broad comparative studies that examine the relationship between land use regulations and housing prices, the seminal papers are Black and Hoben (1985) and Segal and Srinivasan (1985).

Black and Hoben (1985), develop a measure of "restrictive", "normal", or "permissive" regulations for 30 US metropolitan areas. They report a correlation of –0.7 between their regulation index and 1980 prices for developable lots. Segal and Srinivasan (1985) survey planning officials in 51 metropolitan areas to find the percentage of undeveloped land taken out of production due to land use regulations. They estimate that regulated cities have 1.7 percent faster annual housing price increases than unregulated cities. Shilling, Sirmans, and Guidry (1991) also employ land use and environmental data from the American Institute of Planners (AIP, 1976) to find that land prices in cities with more stringent land use controls increased 16 percent for every 10 percent increase in regulations. The same authors also examine regulation data from the Urban Land Institute[3] to find that average 1990 lot prices in the most restrictive cities were about $26,000 higher than the average lot price in the least restrictive cities.

Malpezzi (1996) produced one of the most influential comparative studies of the effects of regulations on housing prices using a sample of 56 major US metropolitan areas. He built his analysis on regulatory data collected by the *Wharton Urban Decentralization Project* carried out by Linneman et al. (1990).[4] His focus was on cost-increasing regulations (zoning/permit delays and approval rates), available land, and adequate infrastructure, aggregated into one index. He also adds a dummy variable to identify when states regulate environmental impact (coastal, wetland or floodplain management) to find that housing permits decline by 42 percent and housing prices increase by 51 percent when one compares lightly and highly regulated cities. Glaeser and Gyourko (2002) examine lot prices in 40 US cities, controlling for the change in the cost of construction. They label the gap between the actual housing prices and the cost of construction (minus the lot price) provocatively the "zoning tax" which is then shown to be associated with cost-increasing regulations (permit and zoning time costs).

[3] The data is based on a survey of 11 real estate experts who ranked land use restrictiveness of 30 metropolitan areas on a 10-point scale. Instead of a single regulation criterion, the survey covered 6 broad areas of land use regulations. The Urban Land Institute data covers: 1) wet land management, 2) power plant regulation, 3) critical areas and wilderness, 4) strip mining, 5) flood plains, and 6) tax incentives. The data is binary, indicating only whether regulations exist or not.

[4] Unfortunately, communication with the authors of the study indicates that this data has been lost.

Other larger scale studies are regional, such as Katz and Rosen's (1987), who analyze 85 cities in the San Francisco Bay area. They find that the selling price of houses increased between 17-38 percent in communities with growth control measures. Levine (1999) expand Katz and Rosen’s approach to 490 Californian cities and 18 different land use measures, and reports that land use restrictions “displaced new construction, particularly rental housing, possibly exacerbating the expansion of the metropolitan areas into the interiors of the state.” Pollakowski and Wachter (1990) focus on 17 zoning jurisdictions in Montgomery County, Maryland, over a period of 8 years and found that a 10 percent increase in their zoning restriction index increased their housing price index by 27 percent. Interestingly, they also provided the first evidence of spatial externalities associated with regulations: housing prices are shown to rise when the restrictiveness of zoning measures in adjacent jurisdictions increased.

Most recently, Glaeser et al. (2006) assembled a database on zoning codes, subdivision requirements, and environmental regulations in 187 communities in eastern and central Massachusetts to find that regulations reduced the increase in the housing stock from a predicted 27 percent to an actual 9 percent. They predict that, in the absence of regulations, housing prices in Boston’s suburbs would have been 23-36 percent lower than observed. In terms of dollar values, they find that the median housing price increased $155,000 due to regulations from 1990 to 2004. Gyourko and Summers (2006) analyze 218 jurisdictions in the Philadelphia area to show that jurisdictions with average land use regulations saw slightly negative increases in the real cost of single family lots, while municipalities with that most restrictive land use regulations saw lot cost increases of up to 70 percent over 10 years.

My sample features about the same sample size as Gyourko and Sommers (2006), and Glaeser et al. (2006); instead of covering one region, however, my sample is comprised of 250 major US cities. It shares with previous comparative studies of major cities that zoning restrictions and approval delays are considered, but it also extends the focus of previous analyses to include statewide measures, such as growth management plans and even court rulings regarding regulatory enforcement. Malpezzi (1996) also considers statewide measures, but the structure of his data assumes that the effect of such regulations is identical across cities. Instead, the Wharton database provides information on the degree to which each city is impacted by statewide regulations. Finally, instead of focusing on only one or a couple of regulations, I allow all regulations in the Wharton database to potentially affect housing prices.

3. A Simple Model of Housing Prices

The housing model presented below is fundamentally identical to Malpezzi (1996). More complex models of housing prices can certainly be constructed; however, they often produce insurmountable obstacles when one attempts to take them to the data.[5] The below is therefore a compromise that acknowledges the tradeoff between model complexity and data availability. The standard model of the owner-occupied housing market depends on the demand and supply of owner occupied housing, Q_{ho}^{D} and Q_{ho}^{S}, respectively. Demand is a function of the relative price of housing, P_{ho}, income, I_{ho}, and demographic variables, D_{ho}, that relate to density and population size. The demand relationship can be formally represented as

$$Q_{ho}^{D} = F^{D}\left[P_{ho}, I_{ho}, D_{ho}\right]. \tag{1}$$

The supply of owner occupied housing, Q_{ho}^{S}, is assumed to depend on the relative price of housing, P_{ho}, land use regulations, R_{ho}, and the prices of all *i* inputs, P_{i}^{S}. The latter reflects, for example, construction and land cost indices.

$$Q_{ho}^{S} = F^{S}\left[P_{ho}, R_{ho}, P_{i}^{S}\right]. \tag{2}$$

Malpezzi (1996) argues that good data for input price indices, especially land, are not available. When prices of inputs are associated with regulations, Malpezzi suggests to rewrite (2) by substituting for P_{i}^{S} to represent the supply side equation as the following reduced form

$$Q_{ho}^{S} = F^{S}\left[P_{ho}, R_{ho}\right]. \tag{2'}$$

This specification highlights that regulatory changes affect housing prices both directly and indirectly. The direct effect of regulations reduces the supply of housing to increase the price of housing. An indirect effect of regulations is a change in input prices, which would then affect the supply of housing. The statistical analysis below captures the net impact of both the direct and indirect effects. The reduced form in equation (2') has received additional validity from Green et al. (2005). They estimate extensively detailed, theory based housing supply equations and find that regulations and supply elasticities are highly correlated in that heavily regulated metropolitan areas always exhibited low housing supply elasticities.

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[5] Here I refer the interested reader to Pogodzinski and Sass (1991) for a detailed review.

In equilibrium, supply and demand are equalized, allowing us to solve equations (1) and (2') simultaneously for the housing price. This renders housing prices as a function of land use regulations, income, and demographic variables

$$P_{ho} = F\left[R_{ho}, I_{ho}, D_{ho}, \varepsilon\right]. \tag{3}$$

To translate the structural model into a statistical regression model in Section 5, I add a stochastic term, ε, which represents the error introduced to the analysis by, for example, omitted variables or measurement error. The properties of the error term are examined extensively below to explore the validity of the proposed empirical model.

4. Econometric Implementation of the Housing Model

Most authors in the land use literature estimate the reduced form in (3) in levels, where P_{ho} is the price level, which is to be explained as a function of income levels and population levels. At times, changes in demand are also introduced as additional explanatory variables. In terms of the econometrics, the standard cross-section estimator (be it ordinary least squares, or any variant that allows for non-spherical disturbances) is only consistent when individual city effects can be assumed to be uncorrelated with the variable of interest. It is unclear, however, if this assumption is valid in the context of housing prices. Individual city effects, such as the designation as state capital, proximity to Disney World, or to nature, may well drive the *level* of housing prices. One approach to mitigate individual effects is to estimate (3) in terms of growth rates, so that these associated omitted variable biases wash out. While "nature" and "geographical characteristics" of cities may determine its price level, it is a much taller order to link them to changes in prices.

The second issue is that level regressions are generally thought to be susceptible to reporting spurious correlations in the absence of actual causal relationships. Causality is certainly not guaranteed in growth regressions; however, the issue of spurious correlation is mitigated, which renders growth regressions a more stringent empirical test than pure cross-sectional comparisons. Third, in contrast to level regressions, growth regressions can address the frequent confusion in the public debate about the short and long term drivers of housing. The demand for housing – as have seen above – is determined by variables that can change quite quickly over time (income, migration, and density). Housing supply is much more inelastic, especially in the short run. Examining the *change* in housing prices over long time periods (17 years, in my sample below) allows me to capture the effects of both supply and demand measures with some confidence.[6]

Most importantly, however, I find that growth regressions actually speak most effectively to the question at hand: *what drives the change in housing prices*? Or: *did housing prices increase because of land use restrictions and/or income/population growth*? Level regressions, instead, speak only to the question of whether housing prices are high in cities with high incomes, large populations, and extensive regulations. The estimates below are therefore based on growth regressions where the variable of interest is the *annual compounded growth rate* of housing prices from 1989-2006. This renders the regression to be estimated

$$\hat{P}_{ho} = \alpha + \beta_1 R_{ho} + \beta_2 \hat{I}_{ho} + \beta_3 \hat{Pop}_{ho} + \beta_4 Density + \varepsilon \qquad (4)$$

where "^" variables represent the compounded growth rate over 17 years. I also include a constant, α, to account for effects that were common to all cities over this period of time. Such common effects might represent changes in the national level of unemployment, changes in mortgage rates, or lending procedures, or liquidity in the mortgage market.[7]

5. Data

5.1 Housing Price Data

Much of the housing price literature wrestles not only with the development of meaningful land use regulation data, but the key variable of interest, housing prices, is also not without issues. There are three alternative approaches to housing prices: *i*) median housing prices for owner occupied homes as reported by the Census, *ii*) sales price data collected by the National Association of Realtors, and *iii*) so called "hedonic" price indices that take into account the characteristics of the housing unit. All three measures are used in the literature, and they feature distinctly different advantages.

It is comforting that the correlation among these three housing prices measures is so high that one should not expect the choice of the type of price data does to drive qualitative results

[6] For a complete discussion of growth vs. level regressions I refer the interested reader to Caselli et al. (1996).
[7] At times the relationship between prices and regulations is seen to be nonlinear (e.g., Malpezzi, 1996). I discuss this possible specification in the robustness section below.

(Malpezzi, 1996). Prices given by *i*) and *ii*) suffer the drawback that they do not control for quality increases (such as larger homes, smaller lots, or nicer appliances in houses sold over time). While Census data has the broadest coverage, it reports only median owner occupied housing prices. The National Association of Realtor data features a broader breadth of data, since it is based on multiple listings. However, multiple listing data does not capture the entire market, so *ii*) also does not constitute a representative sample. Hedonic price indices require the correct theoretical specification to capture all housing qualities. If the true model is not known, the estimated valuation is subject to measurement error that then contaminates the coefficient estimates of both housing demand and supply. I follow Malpezzi (1996) and choose Census housing price data.

5.2 Housing Demand Data

I commence with the entire Wharton database sample of 2730 jurisdiction. Census data for all municipalities is available only from the decennial Census. To provide a timely analysis, I use the 2006 Census *5 percent State Level Public-Use Microdata Sample* (PUMS), which covers cities with a minimum of 10,000 inhabitants to maintain the confidentiality of responses, while providing the greatest possible detail to the user. The intersection between the 2730 jurisdictions in the Wharton Database and the 2006 PUMS Microdata renders a data universe of 259 cities for the study below. The Census is also the source of the population data that was used to calculate population and land area (to obtain city density). Finally, the Census also provided data on median household income. At times the regressions below feature less than 259 observations when data on regulations is missing for particular cities. The minimum sample size is 248 cities.

5.3 Regulation Data

As mentioned in the introduction, the current land use literature is fortunate enough to find at its disposal a full dataset of 70 land use indicators for 2730 jurisdictions provided by Gyourko et al. (2007). The 2007 Wharton Regulatory Database speaks to all three major components of land use regulations: urban growth boundaries, regulation of development densities, and cost-increasing regulations. A list of the data collected in the Wharton database is provided in Table 1. Many of these variables are highly correlated, that is why Gyourko et al. (2007) suggest the construction of a “Wharton Index” (formally the *Wharton Residential Land Use Regulation Index).*

The Wharton Index itself is composed of 11 sub-indices that reflect *i) Local Political Pressure, ii) State Political Involvement Index, iii) State Court Involvement Index, iv) Local Zoning Approval Index, v) Local Project Approval Index, vi) Local Assembly Index, vii) Density Restrictions Index, viii) Open Space Index, ix) Exactions Index, x) Supply Restrictions Index, and xi) Approval Delay Index.* The exact definitions of these indices are documented in Gyourko et al. (2007). One key sub-index is the *Approval Delay Index*, which will be of consequence below. It is defined as the average time lag (in months) for three types of projects: i) relatively small, single-family project involving fewer than 50 units; ii) a larger single-family development with more than 50 units, and iii) a multifamily project of indeterminate size.

Gyourko et al. (2007) report average regulatory statistics by state and by metropolitan area. While it is common to use major metropolitan areas as the unit of analysis in cross sectional studies, I prefer to use the actual city limits, since some important metropolitan areas are missing data for cities that constitute substantial segments parts of the metropolitan region. In addition, the data was collected at the city level; hence a city-level analysis reflects the relationship between the observed prices and regulations.

While the Wharton Index is informative as a broad measure of regulations, I am also interested in a deeper analysis that identifies exactly which of the 79 subcomponents of the index seem to be related to changes in housing price. One alternative would be to use similar data reduction methods as Gyourko et al. (2007). This approach is limited to providing yet another *type* of "sub-index" for regulations. Instead I am interested in examining *which exact subcomponent* holds explanatory power using a stepwise algorithm I outline below. I hope to present as my final result a set of specific, clearly defined and readily interpretable regulations that are associated with changes in housing prices.

6. Empirical Results

Figure 1 reports the simple correlations between the annual compounded growth in housing prices and a) the Wharton Index, b) income growth, c) population growth, and d) population density. All four are clearly positively correlated with the variable of interest. On the other hand, all four figures also indicate that there is noise in the data that must be picked up by additional regressors in multiple regression analysis. The most tenuous correlation with the growth in housing prices seems to be density, but exact statements to that effect require multiple regression analysis.

A regression that features demand factors (income growth, population growth and density) and their influence on housing prices is provided in Table 2a. In total, these factors explain about 20 percent of the variation in the data (as indicated by the adjusted R^2), and all three demand factors are highly significant. In the next stage I add the supply side to the equation and allow the Wharton Index to proxy for regulatory measures. The results in Table 2b indicate that the proportion of the variation in housing prices that is explained by the regression jumps by 20 percent when regulatory measures are included. The mean square error declines, indicating that accounting for the association between land use regulations and housing prices improves the statistical model. Finally, the F-test indicates that regressors included in Table 2 provide a good fit in explaining housing prices, and indeed a better fit than the regressors in Table 2a. Thus there is clear evidence that land use regulations are tightly associated with the growth of housing prices in the broad cross section of 250 major US cities.

Note that the coefficients for the demand side regressors (income, population, and density) hardly change from Table 2a to Table 2b. This is a crucial insight, since it implies that land use regulations explain a *different dimension* of the variation in housing prices (e.g., the supply side). The invariance of the demand side coefficient estimates to the inclusion of land use regulation indicates also that the supply factors do not explain variation in housing prices at the expense of demand side measures. Instead, supply factors *complement* the insights derived from the effects of demand side measures on housing prices. Complementary here means that they improve the statistical model and the prediction of the model without detracting from the demand side effects that had been identified in the pure demand side model in Table 2a.

Since the coefficient associated with the Wharton Index in Table 2b is positive and highly statistically significant, more stringent land use regulations are associated with an increase in housing prices. The standard in the housing literature has been to examine *how much* housing prices change when the value of the regulatory variable goes from lowest to highest (see Malpezzi 1996). The low value for the Wharton Index in the dataset is -2.12, and the maximum is 4.65. From the coefficients in Table 2b, we then find that housing prices in the most highly regulated cities are about 50 percent higher than in the least regulated cities.[8] Interestingly, this implied increase in housing prices between lowest and highest regulated cities is identical to the finding in Malpezzi (1996), who based his study on 56 (vs. 250) cities, different regulation measures, and a regression in levels.

The analysis can be taken one step further in an attempt to identify exactly which subcomponent(s) of the Wharton Index is (are) closely related to the change in housing prices. The advantage of constructing indices is that they summarize a wealth of information in a single number; the disadvantage is that, for policy purposes, an index is difficult to interpret. The Wharton database holds a wealth of information on 70 different types of land use regulations and it seems natural to ask whether specific regulations are particularly closely associated with changes in housing princes? Are prices driven, for example, by state or local policies, citizen opposition or growth management regulations, cost-increasing permit delays or limits on lot size?

To achieve this level of detail, I first disaggregate the Wharton Index into its subindices and then each subindex into its subcomponents (see Gyourko et al., 2007 for the decomposition of each subindex). I then use a simple stepwise algorithm where I examine one subcomponent after the other to see which actual subcomponent matters to housing prices. If any one of the subcomponents is significant, I maintain it in the regression; if not it is discarded. In one case, the approval delay subindex, I find that the eight variables that comprise the index are highly correlated and the stepwise procedure produces partial correlations that are significant only at around the 10 percent level. I surmise their explanatory power may be impacted by multicollinearity; therefore I maintain the approval delay index as a whole in this case.

The result of the disaggregation exercise in Table 2c shows that a remarkably concise but diverse set of regulations can be shown to exhibit an economic and statistically significant association with housing prices. In analyzing the fit of the regression model in Table 2c, I find that that it explains 61 percent more variation in housing prices than the pure demand side regression in Table 2a. Table 2c also explains about 35 percent more variation in housing prices

[8] Since the low value for the Wharton Index is -2.12, and the maximum is 4.65 in the dataset, I can substitute for these values in Table 2b and find that the annual compounded growth rates in highly regulated cities is 2.41 percent higher than the growth rate in a city with the most permissive land use regulations. Over 17 years this implies that the difference in the annual compounded growth rate raises the level of housing prices in the most regulated city 50 percent above the level of housing prices in the least regulated cities.

than the regression model that is based on the composite Wharton Index alone (Table 2b). Decomposing the index to allow the individual dimensions of land use regulation to covary with housing prices thus clearly improved the regression model.

Let us examine the specific regulatory variables from the Wharton database that have been substituted for the Wharton Index. The variables consist of statewide indicators, specifically indicators that speak to the executive, legislative and judicial branches of government. In addition, the type of regulations that are associated with changes in housing prices also speak to local regulations, specifically to cost-increasing regulations that involve permit and zoning delays:

I) **Autonomous Change in Housing Prices** is the intercept, or constant, term that picks up autonomous changes that are common to all cities, such as changes in the national unemployment rate, changes in mortgage interest rates or changes in the availability of credit over the period.

II) **Increase in Income and Population**

III) **Density** (Population per Square Mile)

IV) **Land Use Regulations** imposed by

IVa) **Statewide Land Use Restrictions Imposed by Executive and Legislature**, defined as the effects on major cities due to the level of activity in the executive and legislative branches over the past ten years, which were directed toward enacting greater statewide land use regulations.

IVb) **Municipal Land Use Restrictions Upheld by Courts**, defined as the effects on major cities due to the tendency of appellate courts to uphold or restrain land use regulation.

IVc) **Involvement of Growth Management and Residential Building Restrictions,** defined as the effects on cities dues to the involvement of the state legislature in affecting residential building activities and/or growth management procedures.

IVd) **Approval Delays,** given by 8 indicators that measure the average duration of the review process, the time between application for rezoning and issuance of a building permit, the time between application for subdivision approval and the issuance of a building permit conditional on proper zoning being in place. Each indicator considers three types of projects:

i) Small single-family projects involving fewer than 50 units
ii) Larger single-family developments with more than 50 units
iii) Multifamily projects of indeterminate size

The statistical significance of each land use regressor is strong; all but Approval Delays are significant at the 99.99 percent confidence level (Approval Delays are significant at the 90 percent level).[9] Before I discuss the coefficient estimates and the implied association between regulations on housing prices, it is important to examine regression diagnostics to examine whether the regression model is valid.

7. Regression Diagnostics

If the regression model in equation (4) and its empirical implementation in Table 2c are both missing vital explanatory variables, the coefficient estimates may be biased. Diagnostic tests exist to examine whether an explanatory variable may have been omitted, although it is systematically related to the variable of interest. Visual inspection of the residuals in Figure 2 shows a largely random pattern and provides no indication of an omitted explanatory variable (the R^2 associated with Figure 2 is 0.0000). A more stringent test than the visual examination of the errors is to examine the normal probability plot for the residuals in Figure 3, to see whether the residuals are approximately normally distributed (e. g., random). Given Figure 3, it seems hard to argue that the residuals are not normally distributed, which provides confidence that no obvious variable has been omitted from the regression model.

After ascertaining that there is no obvious evidence for omitted variable bias, it is important to examine the validity of the assumed functional form. Malpezzi (1996) proposes a nonlinear relationship between housing prices and regulations, which is suggested by the visual inspection of his data. Having extended his sample from about 50 to 250 major cities seems to have removed the apparent nonlinearity – at least according to a visual inspection of Figure 1, which seems to indicate linear rather than nonlinear relationships. The STATA *ovtest* routine tests for omitted variables by examining alternative specifications of the baseline model that also feature polynomials. Adding polynomials for regulations does not improve the regression. The STATA *reset* test for regression specification errors (Ramsey 1969) also shows no evidence for nonlinearities in regulations in the sample of 250 cities. Malpezzi (1996) also used the log of housing price, presumably to address heteroskedasticity in his sample. I use the *Breusch-Pagan*

[9] All regressors except one are found to be highly robust to alternative specifications and iterations of the stepwise procedure. The Approval Delays subindex of the Wharton Index is sensitive to the inclusion of other cost increasing measures, for example, impact fees or lot development costs. I decided to maintain the Approval Delay subindex, because it is broad in its interpretation and because it maintains the largest possible sample (several alternative cost increasing measures are often not available for a sizable number of cities). I should note that I explored (unsuccessfully) alternative model selection methods such as Bayesian Model Averaging (BMA) to examine whether I could improve on the variation explained by the model in Table 2c.

tests for the constancy of the error variance and find that the null hypothesis of homoskedasticity cannot be rejected.

8. The Dollar Cost of Regulations

One approach to gauge the cost of regulations is to examine the different housing price growth rates associated with high or low levels of land use regulations. This measure is ubiquitous in the literature and it is easily constructed when only one regulation is considered. The regression model above identifies, however, 4 different types of regulations that speak to different dimensions of regulations. In this case, a more informative statistic is the actual estimated dollar value that regulations add to housing prices in a city, given each city's particular set of housing regulations (and demand factors, of course). This data is provided in Table 3. The values are obtained by first calculating each variable's average contribution to the annual increase in housing prices (using Table 2c). Using this contribution to the annual growth rate together with 1989 housing values, I can calculate how much each regulation contributed to the total increase in housing prices from 1989-2006.

Here it is helpful to discuss one specific city from Table 3 as an example (see Tables 4a, b that summarize San Francisco's column values from Table 3). The Census reported that the price of an owner occupied home in San Francisco was $479,237 in 1989 (in 2006 dollars). As shown in Table 4a, the Census reports that the price of a median owner occupied home had risen to $806,700 by 2006. This represents a real increase of $327,463 (68 percent). The statistical model in Table 2c then implies that San Francisco saw a $60,144 increase in housing prices due to its higher than average population and income growth over that period (see Table 4b). This is much higher than the $3,840 observed for the average major US city, which experienced much lower income and population growth. The same dynamic is true when we examine population density. While San Francisco's density added $82,205 to the price of a house, in the average city the contribution was only $8,624, indicating the greater population density in San Francisco.

Regulations contributed the lion's share of the increase in housing prices in San Francisco; indeed the city is ranked first among all cities in terms of the contribution of land use regulations to housing prices (note that the ranking is in terms of the absolute increase, not the percentage increase). In total, all land use regulations taken together contributed just about $400,000 to the increase in housing prices in San Francisco. Here, statewide regulatory measures are particularly strongly associated with changes in San Francisco's housing prices, although the local approval delays also contributed an estimated $63,211.

In examining Table 3, it is striking that not one city exhibits a *negative* effect of regulatory land use measures on housing prices, firmly ruling out the case of positive housing externalities in this dataset. These specific figures for San Francisco or for other cities in Table 3 may seem high, but they are actually surprisingly close to previous estimates in smaller studies. Glaeser and Gyourko (2002) examine the effects of zoning on land values (not housing prices); the overall correlation coefficient between the increase in land prices in Glaeser and Gyourko (2002) and the increase in housing prices in the relevant cities in Table 3 is an astonishing 0.91. I also calculated the correlation between the implied impact of regulations on housing prices in Malpezzi's (1996) study of 56 cities and the same cities in Table 3 to be 0.81. Again this is a surprisingly high correlation given that the model specifications and the types of regulations examined differ across studies.

9. Explaining the Effects of Statewide Regulations

The natural question to put forth is how one would think about the effect of statewide regulations on major cities. What would be the reasons that statewide regulations seem to be so robustly associated with such strong increases in housing prices in the sample? Most important in this discussion is that while growth management plans may be regional or even state wide, they affect each city differently. This is reflected in the assessment of the planners surveyed by the Wharton survey. At first it may seem counterintuitive that the effects of statewide regulations differ by city. As will be discussed below, it is not only plausible, but it is imperative that statewide measures have a distinct effect on individual cities. Even the state courts' regulatory stances should be expected to have a different impact on cities in the same region/state.

To stay with our San Francisco example, Fouton et al. (2002) provide a survey of the various growth management measures in California and the factors that determined their stringency. Statewide growth management plans can affect all jurisdictions identically in terms of the letter of the law. However, to adhere to the letter of the law, individual jurisdictions have to pass their own land use regulations to accommodate the growth targets. If statewide land use restrictions limit sprawl to create distinct high/low population density areas, each city is affected differently, depending on its supply and demand for housing.

This effect is shown in the large variation observed in the Wharton database's Stateleg variable. Growth limits affect metropolitan areas in particular, since these areas are already subject to strong agglomeration dynamics. Rosenthal and Strange (2003) survey the agglomeration literature and highlight the relationship between land use regulations and the industrial, spatial, and temporal dimensions of agglomeration. Statewide housing supply growth limits in the metropolitan periphery then simply redirect housing demand and housing price pressures to the metropolitan core. In essence, statewide land use regulations may remove a "housing supply safety valve" where increased housing demand can be accommodated with little increase in price, if adjacent rural areas can be absorbed by sprawl (or increased density). In the absence of such land use restrictions, cities such as New York or Las Vegas have been documented to easily grow without price pressures (see Glaeser, Gyourko and Sachs, 2005) presumably through increased height, density, and sprawl.

Statewide regulations as catalysts of agglomeration cannot explain, however, why the regression implies that courts are so strongly associated with housing prices. Here the answer may be that courts play a crucial role in complementing statewide growth management plans. The statewide plans force municipal regulations, as discussed above, which in turn force greater density in major metropolitan areas. It is difficult to see that such a supply restriction should not be accompanied by a housing price response. It was important, however, that challenges to the constitutionality of the local land use regulations or growth management plans have been rejected by the State Supreme courts. For example, the impact of courts may have been particularly dramatic in San Francisco (and other Californian cities in the sample) because the California Supreme court invalidated only one of dozens of growth management measures in the state (and this was because the measure was found to be arbitrary and discriminatory, see Note, 1995).

Clearly the state courts are the "teeth" of each growth management measure that restricts housing and the more likely the courts are to uphold such measures, the greater the effect on each municipality in general, and the more pronounced the effects on those major cities that are already subject to strong agglomeration externalities. Note the importance of the interaction between state legislature and courts: state law forced local land use regulations, and the state court upheld *local* land use regulations, *because* these local regulations were forced by state laws.

10. Concluding Remarks and Policy Implications

Both theory and empirics clearly associate housing prices with variables that represent the supply and demand for housing. Aside from the well established demand determinants of housing price changes (income growth, population growth, and density) the analysis in this paper documents evidence that is both statistically and economically significant, confirming a tight association between land use regulations and housing price growth. The analysis also holds strong explanatory power, because it is based on data that was uniformly collected for all cities so that the results can be generalized.

The land use regulations examined in this study cover all dimensions. They speak to statewide regulations, municipal regulations, growth management plans, and the involvement of the executive/legislative/judicial branches in establishing land use regulations. The regulations also highlight the importance of cost-increasing regulations at the local level that relate to permit delays and zoning hurdles. Statewide land use decisions are shown to be profoundly correlated with housing price growth in major cities because they force density in urban centers, which are already subject to strong agglomeration effects, and negate sprawl in the suburbs. Ultimately these dynamics are reflected in the change of housing prices. The data also indicate that when courts reject challenges to municipal land use restrictions, which may have been created to adhere to statewide laws, the effect of regulations on housing prices is amplified.

From a policy point of view, this paper documents the success of growth management plans that have been designed to increase density at the core and limit sprawl to maintain greenbelts in the periphery. The analysis cannot address, however, whether more regulation is better or worse for major US Cities. This question involves a value judgment that requires the documentation of both, costs *and* benefits of regulations. The increase in housing prices may actually be below the valuation that society places on parks, environment, and the absence of sprawl.

Eliciting the social value that citizens place on the effects of regulations is beyond the scope of this research project. Economic methods to study the contingent valuation of regulations are widespread in environmental economics, but they are time intensive (and costly) and infrequently used in the housing regulation literature to establish the benefits of regulations.[10] At this point, economists must only rely on the electorate to indicate a desire for more or less regulations, after having been informed about the costs. Note that this line of research opens a new frontier in housing price research that has been laid out by Glaeser (2004): if electorates prefer more costly regulations, what is the source of the dramatic increase in the stringency of these regulations in the past 20-30 years?

More controversial regulations are ones that are of the cost increasing type. Approval Delay is presumably not the type of land use regulation that citizens support as easily as open spaces such as parks and green spaces. Economists might also question whether this is the most effective method to raise revenue for municipalities. On the other hand, some cities may find that their specific geography requires longer permit processes (certifying earthquake designs, water rights, or slope stability, for example). In this case an effective alternative would be to allow agents to pay an increased administrative cost to expedient service rather than incur the time cost of the delay.

The design of public policy is, of course hampered by the complexity of the urban housing market, which is difficult to model and predict (for economists and policy makers alike). It is therefore imperative to evaluate whether policies designed to maximize the citizens' welfare actually achieve the policy goal without unintended side effects (e.g., additional social costs). For example, jurisdictions may seek to aid their residents through local regulations – but these same regulations can also impose costs on adjacent communities, for example, by adding to commuting costs and transportation related pollution (Gyourko and Summers, 2006).

Finally, an additional social cost of regulations not considered in this study relates to intertemporal costs. While higher housing prices benefit sellers, they induce serious social costs and reduce housing affordability. This highlights the intertemporal dimension of land use regulations: current owners are the beneficiaries of such regulations, but their children and future migrants to the area bear the costs in terms of a redistribution of gains from home buyers to sellers. This cost is exacerbated when it also affects the location decisions individuals and companies to limit the productive the potential of the region.

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[10] See, for example, Beasley et al. (1986), Breffle et al. (1998) , Ready et al. (1997) and Geoghegan (2002)

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Table 1
Land Use Variables Collected in the Wharton Land Use Database

	Variable Name	Value Explanation
1	Local	local council involvement in regulation (1-not at all, 5-very)
2	pressure	community pressure involvement in regulation (1-not at all, 5-very)
3	countyleg	county legislature involvement in regulation (1-not at all, 5-very)
4	Stateleg	state legislature involvement in regulation (1-not at all, 5-very)
5	localcourts	local courts involvement in regulation (1-not at all, 5-very)
6	statecourts	state courts involvement in regulation (1-not at all, 5-very)
7	commission	planning commission approval required for rezoning, 0=no, 1=yes, 2=yes by superm
8	loczoning	local zoning board approval required for rezoning, 0=no, 1=yes, 2=yes by superma
9	Council	local council approval required for rezoning, 0=no, 1=yes, 2=yes by supermajorit
10	cntyboard	county board approval required for rezoning, 0=no, 1=yes, 2=yes by supermajority
11	cntyzoning	county zoning board approval required for rezoning, 0=no, 1=yes, 2=yes by superm
12	envboard	environmental review board approval required for rezoning, 0=no, 1=yes, 2=yes by
13	commission_no~z	planning commission approval required (norezoning), 0=no, 1=yes, 2=yes by superm
14	Council_norez	local council approval required (norezoning), 0=no, 1=yes, 2=yes by supermajorit
15	cntyboard_norez	county board approval required (norezoning), 0=no, 1=yes, 2=yes by supermajority
16	envboard_norez	environ review board approval required (norezoning), 0=no, 1=yes, 2=yes by super
17	publhlth_norez	public health off approval required (norezoning), 0=no, 1=yes, 2=yes by supermaj
18	dsgnrev_norez	design review board approval required (norezoning), 0=no, 1=yes, 2=yes by superm
19	sfulandsupply	supply of land importance (single family) 1-not at all, 5-very
20	mfulandsupply	supply of land importance (multi family) 1-not at all, 5-very
21	sfudensrestr	density restrictions importance (single family) 1-not at all, 5-very
22	mfudensrestr	density restrictions importance (multi family) 1-not at all, 5-very
23	sfuimpact	impact fees/exactions importance (single family) 1-not at all, 5-very
24	mfuimpact	impact fees/exactions importance (multi family) 1-not at all, 5-very
25	sfucouncil	council opposition importance (single family) 1-not at all, 5-very
26	mfucouncil	council opposition importance (multi family) 1-not at all, 5-very
27	sfucitizen	citizen opposition importance (single family) 1-not at all, 5-very
28	mfucitizen	question4 citizen opposition importance (multi family) 1-not at all, 5-very
29	sfulengthzoning	length zoning process importance (single family) 1-not at all, 5-very
30	mfulengthzoning	length zoning process importance (multi family) 1-not at all, 5-very
31	sfulengthpermit	length permit process importance (single family) 1-not at all, 5-very
32	mfulengthpermit	length permit process importance (multi family) 1-not at all, 5-very
33	sfulengthdvlp	length development process importance (single family) 1-not at all, 5-very
34	mfulengthdvlp	length development process importance (multi family) 1-not at all, 5-very
35	sfupermitlimit	sf annual permit limit, 0=no, 1=yes
36	mfupermitlimit	mf annual permit limit, 0=no, 1=yes
37	Sfuconstrlimit	sf annual construction units limit, 0=no, 1=yes
38	mfuconstrlimit	mf annual construction units limit, 0=no, 1=yes
39	mfudwelllimit	mf dwelling limit, 0=no, 1=yes
40	mfudwellunitl~t	num. of units in mf dwelling limit, 0=no, 1=yes
41	minlotsize	min lot size requirement, 0=no, 1=yes
42	minlotsize_lh~e	<=0.5 acre minlotsize requirement, 0=no, 1=yes
43	minlotsize_mh~e	question6 >0.5 acre minlotsize requirement, 0=no, 1=yes
44	minlotsize_on~e	question6 >1 acre minlotsize requirement, 0=no, 1=yes
45	minlotsize_tw~s	question6 >2 acres minlotsize requirement, 0=no, 1=yes
46	affordable	question6 affordable housing requirement, 0=no, 1=yes
47	sfusupply	question7 sf zoned land supply compared to demand, 1=far more, 5=far less
48	mfusupply	question7 mf zoned land supply compared to demand, 1=far more, 5=far less
49	commsupply	question7 commercially zoned land supply compared to demand, 1=far more, 5=far less
50	indsupply	question7 industrially zoned land supply compared to demand, 1=far more, 5=far less
51	lotdevcostinc~e	questions8_9 lot development cost increase (last 10 years)
52	sflotdevcosti~e	questions8_9 single family lot development cost increase (last 10 years)
53	time_sfu	review time for single family units (months)
54	time_mfu	review time for multi family units (months)
55	timechg_sfu	change in review/appr time for sf projects over decade, 0=none, 1=longer, 2=much
56	timechg_mfu	change in review/appr time for mf projects over decade, 0=none, 1=longer, 2=much
57	time1_l50sfu	permit lag for rezoning, <50 sf units, mths-midpoint
58	time1_m50sfu	permit lag for rezoning, >50 sf units, mths-midpoint
59	time1_mfu	permit lag for rezoning, mf project, mths-midpoint
60	time2_l50sfu	permit lag for subdivision appr (norezoning), <50 sf units, mths-midpoint
61	time2_m50sfu	permit lag for subdivision appr (norezoning), >50 sf units, mths-midpoint
62	time2_mfu	permit lag for subdivision appr (norezoning), mf project, mths-midpoint
63	submitted	# applications for zoning changes submitted (last 12 months)
64	approved	# applications for zoning changes approved (last 12 months)
65	execrating	State Legislative Profile (Foster and Summers)
66	judicialrating	State Judicial Profile (Foster and Summers)
67	town_meet	Town Meeting for of Government
68	zonvote	Town Meeting Aproves Zoning Changes
69	zonvote_super	Town Meeting Aproves Zoning Changes by a Super-Majority
70	totinitiatives	Total number of initiatives from 1996-2005
71	LPPI	Local Political Pressure Index
72	SPII	State Political Involvement Index
73	SCII	State Court Involvement Index
74	LZAI	Local Zoning Approval Index
75	LPAI	Local Project Approval Index
76	LAI	Local Assembly Index
77	DRI	Density Restrictions Index
78	OSI	Open Space Index
79	EI	Exactions Index
80	SRI	Supply Restrictions Index
81	ADI	Approval Delay Index
82	WRLURI	"Wharton Index" or *Wharton Residential Land Use Regulation Index*

Source Gyourko *et al.* (2007). Note: SF and MF are single and multi family units

Figure 1
Simple Correlations Between Housing Prices and Explanatory Variables

Figure 1a

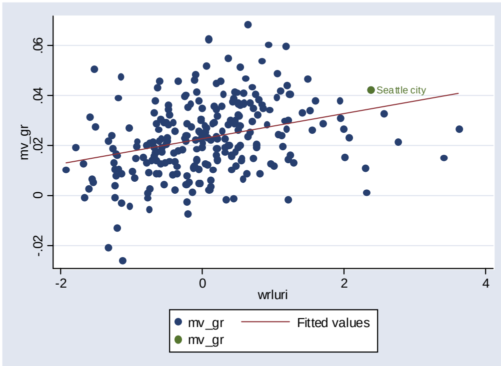

Figure 1b

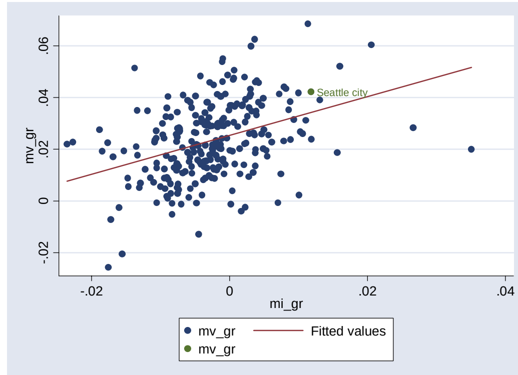

Figure 1c

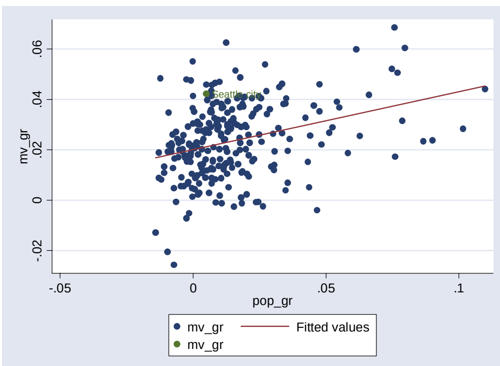

Figure 1d

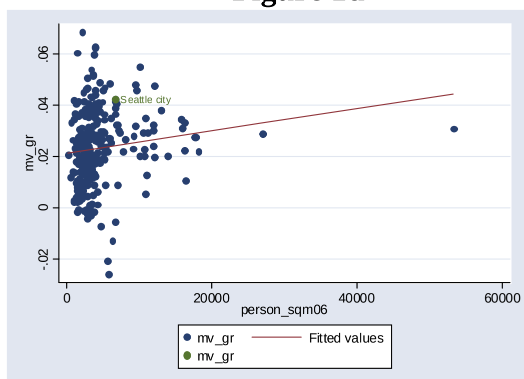

Figure 1e

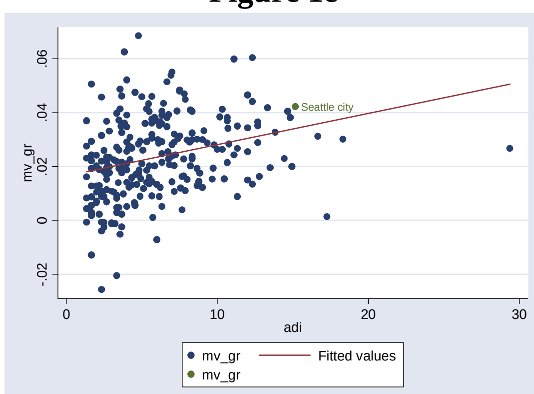

Table 2a

Dependent Variable: Real Median Owner Occupied Housing Price Growth, 1989-2007

	Coefficient Estimates	t	P>|t|
constant	.0193488	12.65	0.000
income growth	.5630443	4.46	0.000
pop growth	.1668316	3.63	0.000
pop density	6.80e-07	3.81	0.000

Source	SS	df	MS
Model	.012000729	3	.004000243
Residual	.043880102	252	.000174127
Total	.055880831	255	.000219141

Number of obs =	256
F(3, 253) =	22.97
Prob > F =	0.0000
R-squared =	0.2148
Adj R-squared =	0.2054
Root MSE =	.0132

Table 2b

Dependent Variable: Real Median Owner Occupied Housing Price Growth, 1989-2007

	Coefficient Estimates	t	P>|t|
constant	.0188231	12.45	0.000
income growth	.4547656	3.64	0.000
pop growth	.1657526	3.66	0.000
pop density	6.18e-07	3.53	0.000
Wharton Index	.0035666	3.98	0.000

Source	SS	df	MS
Model	.01437519	4	.003593797
Residual	.040016016	243	.000164675
Total	.054391206	247	.000220207

Number of obs =	248
F(4, 243) =	21.82
Prob > F =	0.0000
R-squared =	0.2643
Adj R-squared =	0.2522
Root MSE =	.01283

Table 2c

Dependent Variable: Real Median Owner Occupied Housing Price Growth, 1989-2007

	Coef.	t	P>|t|
I) constant	-.0066093	-1.58	0.116
IIa) income growth	.4924133	4.04	0.000
IIb) pop growth	.1504203	3.50	0.001
III) pop density	4.87e-07	2.79	0.006
IVa) reg courts	.0040291	2.97	0.003
IVb) reg executive	.0018928	2.58	0.010
IVc) reg stateleg	.0048541	3.81	0.000
IVd) permit delay	.0003677	1.65	0.100

Source	SS	df	MS
Model	.019031105	7	.002718729
Residual	.035351407	240	.000147298
Total	.054382512	247	.000220172

Number of obs =	248
F(7, 240) =	18.46
Prob > F =	0.0000
R-squared =	0.3499
Adj R-squared =	0.3310
Root MSE =	.01214

Figure 2
Analysis of Residuals:
Prediction Errors of the Regression Model in Table 2c

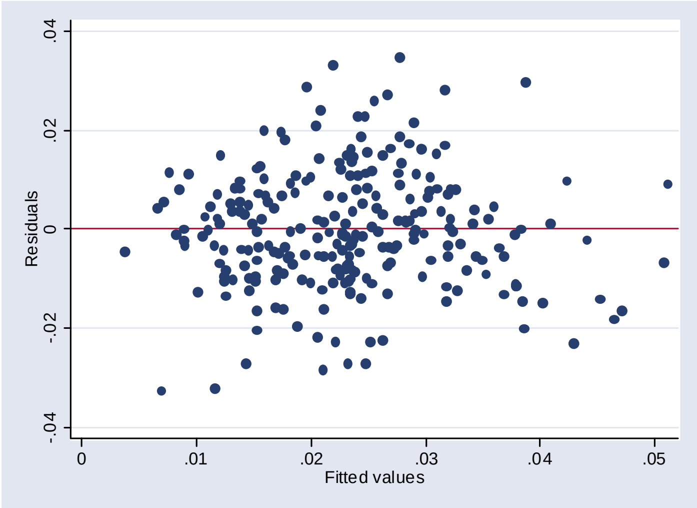

Figure 3
Analysis of Residuals:
Normal Probability Plot of the Regression Model in Table 2c

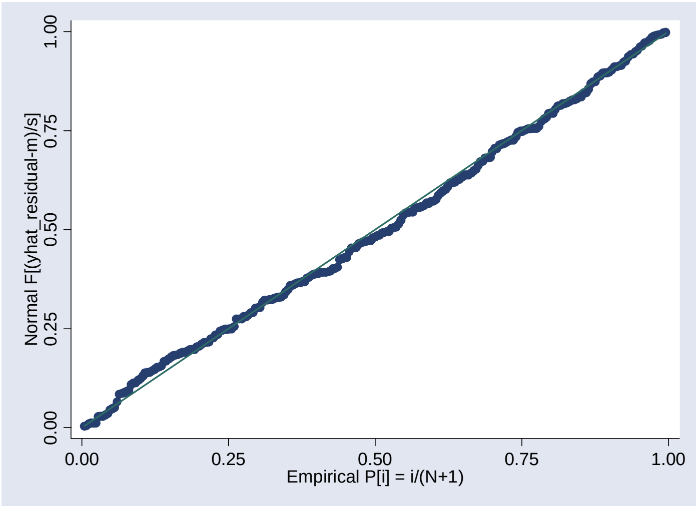

Table3

Estimated Contributions to Change in Housing Prices 1989-2006 (in 2006 $))

CITY	Due to Income Growth	Due to Population Growth	Due to Density	Due to State Wide Regulations.	Due to Courts	Due to Growth Manage't	To Approval Delay	Due to Constant	TOTAL: Population + Income	TOTAL Regulation	Regulation Contribution Rank
Abilene Texas	-$2,318	$339	$610	$11,354	$9,305	$4,505	$927	-$7,493	-$1,979	$26,091	243
Akron Ohio	-$5,408	-$1,435	$2,124	$12,994	$5,325	$2,578	$3,807	-$8,575	-$6,842	$24,704	246
Albany Georgia	-$7,191	-$70	$1,071	$22,400	$12,238	$2,963	$1,875	-$9,855	-$7,261	$39,475	197
Albuquerque NM	-$3,045	$5,783	$3,475	$24,826	$20,346	$4,926	$2,026	-$16,384	$2,738	$52,124	167
Alhambra California	-$5,033	-$332	$38,976	$106,448	$87,236	$42,239	$19,160	-$46,833	-$5,366	$255,082	17
Amarillo Texas	-$1,533	$2,376	$1,517	$14,089	$11,546	$11,181	$885	-$9,298	$843	$37,701	208
Anaheim California	-$33,085	$18,083	$27,183	$113,161	$92,738	$59,870	$23,684	-$49,786	-$15,001	$289,453	11
Anchorage Alaska	-$11,964	$6,661	$288	$17,117	$28,055	$6,792	$8,813	-$22,592	-$5,304	$60,777	144
Ann Arbor Michigan	-$8,584	$850	$7,780	$54,743	$29,909	$14,482	$14,665	-$24,085	-$7,735	$113,799	68
Appleton Wisconsin	-$7,366	$1,146	$3,231	$28,180	$23,094	$7,455	$6,212	-$12,398	-$6,220	$64,941	138
Appleton Wisconsin	-$7,366	$1,146	$3,231	$28,180	$23,094	$3,727	$4,010	-$12,398	-$6,220	$59,011	150
Arlington Texas	-$8,812	$7,136	$4,672	$24,443	$20,032	$4,850	$2,763	-$16,131	-$1,676	$52,088	168
Arlington Heights ILL	-$24,242	-$724	$11,891	$51,236	$41,989	$10,165	$17,050	-$33,813	-$24,966	$120,440	62
Arvada Colorado	-$364	$4,170	$4,901	$45,359	$24,782	$11,999	$10,253	-$19,956	$3,806	$92,393	93
Asheville NC	$327	$5,692	$2,122	$20,408	$16,725	$4,049	$1,025	-$13,468	$6,018	$42,208	195
Atlanta Georgia	$11,266	$2,894	$4,574	$39,826	$21,759	$5,268	$6,446	-$17,522	$14,161	$73,298	124
Aurora Colorado	-$10,062	$7,158	$2,771	$38,710	$21,149	$10,240	$6,157	-$17,031	-$2,903	$76,256	121
Aurora Illinois	-$554	$15,040	$6,366	$26,198	$21,470	$20,791	$10,966	-$17,289	$14,487	$79,424	113
Austin Texas	$9,363	$9,346	$3,359	$22,992	$18,842	$9,123	$7,218	-$15,173	$18,710	$58,176	152
Avondale Arizona	$29,506	$34,949	$2,052	$41,674	$34,152	$11,024	$12,908	-$18,335	$64,455	$99,759	85
Bakersfield California	-$1,761	$18,719	$4,906	$53,050	$43,476	$14,034	$4,885	-$23,340	$16,958	$115,444	65
Baldwin Park CA	-$24,635	$6,597	$31,640	$77,665	$63,648	$10,273	$7,152	-$34,169	-$18,037	$158,738	41
Baltimore Maryland	-$4,195	-$2,409	$6,800	$25,477	$13,919	$10,109	$1,706	-$11,209	-$6,604	$51,211	171
Baytown Texas	-$6,258	$1,803	$1,583	$13,725	$11,248	$2,723	$689	-$9,058	-$4,455	$28,386	231
Beaumont Texas	-$1,905	$308	$879	$12,426	$10,183	$2,465	$1,768	-$8,200	-$1,597	$26,843	240
Beaverton Oregon	-$3,034	$13,029	$8,456	$33,349	$27,330	$26,466	$12,982	-$22,008	$9,994	$100,126	84
Bend Oregon	$19,257	$39,138	$3,707	$32,698	$26,797	$25,949	$5,885	-$21,579	$58,396	$91,329	95
Bethlehem PA	-$12,304	$360	$4,862	$37,780	$10,320	$14,991	$10,753	-$16,622	-$11,944	$73,845	123
Billings Montana	-$1,135	$3,892	$3,085	$10,198	$16,714	$16,186	$1,537	-$13,459	$2,756	$44,634	187
Birmingham Alabama	-$2,393	-$2,285	$907	$6,110	$15,023	$4,849	$1,535	-$8,065	-$4,678	$27,517	237
Bloomington Illinois	$3,896	$5,110	$3,110	$19,998	$16,389	$7,935	$4,018	-$13,198	$9,006	$48,341	175
Boise Idaho	$3,559	$11,003	$3,953	$12,058	$29,644	$14,354	$3,482	-$15,915	$14,562	$59,538	149
Boston MA	$1,863	$79	$33,067	$81,491	$44,523	$21,557	$15,122	-$35,853	$1,942	$162,694	39
Boynton Beach FL	-$8,403	$8,480	$5,888	$28,835	$23,631	$22,884	$7,242	-$19,029	$77	$82,592	105
Brownsville Texas	$226	$5,708	$1,171	$10,375	$8,502	$6,175	$2,996	-$6,847	$5,934	$28,049	235
Bryan Texas	$194	$2,981	$1,360	$17,404	$14,263	$10,359	$2,113	-$11,486	$3,175	$44,138	191
Buffalo New York	-$2,608	-$2,524	$3,686	$11,333	$9,288	$4,497	$712	-$7,479	-$5,131	$25,829	245
Cambridge MA	-$10,337	-$4,789	$57,173	$119,803	$65,454	$31,692	$17,552	-$52,709	-$15,127	$234,502	21
Carrollton Texas	-$7,698	$11,601	$5,334	$31,047	$25,444	$12,320	$2,924	-$20,489	$3,903	$71,735	126
Carson California	-$31,600	$2,653	$15,088	$94,699	$77,608	$37,577	$14,402	-$41,664	-$28,947	$224,287	24
Charleston SC	$5,114	$6,167	$1,598	$30,255	$37,192	$6,003	$4,559	-$19,966	$11,281	$78,008	118
Charlotte NC	-$4,480	$10,965	$3,235	$23,588	$19,331	$14,040	$4,147	-$15,567	$6,485	$61,105	143
Chesapeake Virginia	$6,238	$10,683	$1,013	$30,532	$25,021	$30,288	$10,480	-$20,149	$16,921	$96,320	89
Chicago Illinois	$1,010	-$354	$18,961	$30,570	$25,053	$18,195	$5,246	-$20,174	$657	$79,064	116
Chico California	$17,459	$21,088	$5,078	$57,494	$47,118	$15,209	$14,680	-$25,295	$38,547	$134,502	54
Chino California	$7,736	$13,061	$11,495	$95,265	$78,072	$25,201	$16,216	-$41,913	$20,798	$214,754	25
Chino Hills California	$15,081	$78,871	$7,070	$119,347	$97,808	$31,572	$35,969	-$52,508	$93,952	$284,696	12
Cincinnati Ohio	-$5,035	-$3,037	$3,537	$17,783	$7,287	$7,056	$4,019	-$11,735	-$8,072	$36,145	212
Clearwater Florida	-$10,485	$3,952	$6,335	$27,067	$22,182	$5,370	$7,138	-$17,863	-$6,532	$61,757	142
Cleveland Ohio	-$3,309	-$2,505	$3,335	$12,423	$5,090	$7,394	$1,014	-$8,198	-$5,814	$25,921	244

Table 3 Continued
Estimated Contributions to Change in Housing Prices 1989-2006 (in 2006 $)

CITY	Due to Income Growth	Due to Population Growth	Due to Density	Due to State Wide Regulations.	Due to Courts	Due to Growth Manage't	To Approval Delay	Due to Constant	TOTAL: Population + Income	TOTAL Regulation	Regulation Contribution Rank
College Station Texas	$8,804	$7,309	$2,144	$22,827	$18,707	$9,058	$1,720	-$15,065	$16,113	$52,313	166
Colorado Springs CO	$6,409	$8,781	$2,935	$39,943	$21,823	$5,283	$2,508	-$17,573	$15,190	$69,557	132
Columbia SC	$4,125	$3,246	$1,000	$21,141	$25,989	$12,583	$4,380	-$13,952	$7,371	$64,094	140
Columbus Ohio	-$4,630	$2,313	$3,427	$19,572	$8,020	$3,883	$3,195	-$12,917	-$2,316	$34,671	218
Compton California	-$6,080	$3,271	$20,669	$62,289	$51,048	$16,478	$7,822	-$27,405	-$2,810	$137,637	52
Corona California	$3,883	$48,263	$15,877	$100,835	$82,637	$26,675	$14,351	-$44,363	$52,145	$224,497	23
Corpus Christi Texas	-$6,287	$1,366	$1,355	$14,334	$11,747	$5,688	$900	-$9,459	-$4,921	$32,668	221
Dallas Texas	-$8,926	$3,011	$3,398	$19,048	$15,610	$3,779	$1,196	-$12,571	-$5,915	$39,634	196
Davie Florida	-$6,340	$20,726	$4,928	$38,537	$31,582	$15,292	$15,486	-$25,432	$14,386	$100,895	83
Dayton Ohio	-$4,281	-$2,092	$1,691	$12,175	$4,989	$2,416	$1,376	-$8,035	-$6,373	$20,956	249
Decatur Illinois	-$5,886	-$813	$1,091	$11,393	$9,337	$2,260	$715	-$7,519	-$6,700	$23,706	247
Denton Texas	$10,076	$6,142	$1,495	$19,276	$15,797	$7,649	$2,663	-$12,721	$16,218	$45,384	183
Denver Colorado	$182	$5,067	$5,331	$42,209	$23,061	$5,583	$11,308	-$18,570	$5,248	$82,161	106
Des Moines Iowa	-$1,937	$270	$2,054	$7,716	$12,647	$9,186	$1,550	-$10,185	-$1,667	$31,100	225
Detroit Michigan	-$2,177	-$1,936	$3,090	$15,047	$8,221	$1,990	$2,834	-$6,620	-$4,113	$28,093	234
Durham NC	-$1,136	$8,744	$2,617	$24,021	$19,686	$9,532	$6,938	-$15,853	$7,608	$60,177	146
East Orange NJ	-$31,982	-$4,487	$29,326	$52,636	$14,379	$13,924	$5,582	-$23,158	-$36,469	$86,520	100
Edison CDP NJ	-$10,244	$6,598	$9,519	$83,330	$22,763	$22,044	$21,858	-$36,662	-$3,645	$149,995	45
El Cajon California	-$157	$339	$17,459	$83,412	$68,358	$22,065	$26,535	-$36,698	$183	$200,370	32
El Monte California	-$30,325	$3,470	$33,736	$83,038	$68,051	$21,966	$15,062	-$36,533	-$26,855	$188,117	36
El Paso Texas	-$7,617	$2,417	$2,180	$17,774	$14,566	$3,526	$2,009	-$11,730	-$5,200	$37,876	205
Elizabeth New Jersey	-$8,492	$7,370	$26,438	$73,126	$19,976	$9,672	$3,061	-$32,172	-$1,122	$105,835	76
Evansville Indiana	-$5,938	-$873	$1,870	$6,335	$15,574	$2,514	$2,705	-$8,361	-$6,811	$27,127	238
Everett Washington	-$2,896	$10,355	$5,059	$49,125	$26,839	$25,991	$8,842	-$21,613	$7,460	$110,797	71
Fargo North Dakota	-$1,612	$3,749	$2,490	$10,217	$16,746	$4,054	$3,336	-$13,485	$2,137	$34,353	220
Farmington Hills MI	-$31,038	$4,573	$5,286	$61,184	$33,428	$16,185	$9,476	-$26,918	-$26,465	$120,273	63
Fayetteville Arkansas	$11,694	$8,382	$1,610	$10,679	$8,752	$4,237	$4,068	-$14,095	$20,075	$27,736	236
Fayetteville NC	$1,586	$13,221	$2,571	$17,951	$14,711	$3,561	$1,578	-$11,846	$14,807	$37,801	206
Flower Mound Texas	$14,502	$44,943	$2,664	$31,580	$25,881	$12,531	$9,914	-$20,841	$59,445	$79,906	111
Folsom California	$36,562	$55,538	$11,269	$102,905	$84,333	$13,611	$11,199	-$45,274	$92,100	$212,048	28
Fort Wayne Indiana	-$2,450	$4,977	$2,304	$7,040	$17,307	$8,380	$2,623	-$9,291	$2,527	$35,350	216
Fort Worth Texas	$2,417	$5,489	$1,848	$16,555	$13,567	$3,285	$2,079	-$10,926	$7,906	$35,486	215
Fremont California	$15,478	$14,447	$11,958	$129,466	$106,100	$85,621	$33,599	-$56,960	$29,925	$354,785	4
Fresno California	-$445	$8,820	$7,386	$47,259	$38,730	$18,753	$4,220	-$20,792	$8,375	$108,962	73
Gainesville Florida	-$11,426	$4,300	$2,341	$20,823	$17,065	$4,131	$2,615	-$13,742	-$7,126	$44,634	188
Gilbert Arizona	$16,832	$71,261	$8,406	$61,638	$50,514	$16,305	$19,092	-$27,118	$88,092	$147,549	47
Glendale Arizona	-$5,455	$13,101	$6,469	$44,589	$36,542	$11,795	$12,007	-$19,617	$7,646	$104,934	79
Grand Rapids MI	-$12,071	-$415	$3,709	$26,286	$14,361	$10,430	$2,421	-$11,565	-$12,485	$53,499	165
Green Bay Wisconsin	-$4,707	$170	$1,960	$25,822	$21,162	$6,831	$2,414	-$11,361	-$4,537	$56,228	158
Greensboro NC	-$14,042	$4,399	$2,344	$20,821	$17,064	$4,131	$4,968	-$13,741	-$9,643	$46,984	179
Gulfport Mississippi	$1,690	$7,436	$943	$7,695	$12,612	$6,107	$1,997	-$10,156	$9,126	$28,411	230
Hampton Virginia	-$1,997	$1,744	$3,335	$23,237	$19,043	$4,610	$1,167	-$15,335	-$253	$48,058	176
Henderson Nevada	$1,422	$48,936	$5,927	$40,316	$33,039	$15,997	$2,531	-$26,606	$50,358	$91,884	94
Hesperia California	-$17,917	$21,609	$2,690	$58,571	$48,000	$23,241	$8,091	-$25,769	$3,692	$137,903	51
Hialeah Florida	-$19,457	$2,905	$15,770	$28,202	$23,112	$16,786	$12,041	-$18,612	-$16,552	$80,142	110
High Point NC	$761	$5,067	$1,829	$18,974	$15,550	$3,764	$5,004	-$12,522	$5,827	$43,292	193
Hollywood Florida	$909	$5,034	$8,619	$31,912	$26,153	$18,994	$9,417	-$21,060	$5,943	$86,476	101
Honolulu CDP Hawaii	-$25,088	-$159	$18,095	$41,510	$68,037	$49,414	$54,037	-$54,788	-$25,247	$212,999	27
Houston Texas	-$3,755	$3,819	$3,109	$16,941	$13,884	$10,083	$7,659	-$11,180	$63	$48,567	174

Table 3 Continued
Estimated Contributions to to Change in Housing Prices 1989-2006 (in 2006 $)

CITY	Due to Income Growth	Due to Population Growth	Due to Density	Due to State Wide Regulations.	Due to Courts	Due to Growth Manage't	To Approval Delay	Due to Constant	TOTAL: Population + Income	TOTAL Regulation	Regulation Contribution Rank
Huntington Beach CA	-$23,758	$2,867	$35,135	$144,839	$118,699	$38,315	$31,526	-$63,723	-$20,891	$333,378	7
Huntsville Alabama	-$7,668	$776	$971	$9,892	$24,321	$7,851	$2,484	-$13,057	-$6,892	$44,548	189
Independence MI	-$5,501	$878	$1,240	$7,956	$19,561	$3,157	$1,399	-$10,501	-$4,623	$32,073	223
Irvine California	-$24,027	$45,659	$19,442	$143,735	$117,794	$76,046	$36,099	-$63,237	$21,632	$373,674	3
Jackson Mississippi	-$9,647	-$1,792	$1,523	$8,847	$14,500	$3,510	$1,555	-$11,677	-$11,439	$28,413	229
Jersey New Jersey	-$11,233	$2,493	$36,797	$66,158	$18,073	$26,252	$4,708	-$29,107	-$8,740	$115,191	66
Kalamazoo Michigan	-$13,986	-$2,195	$2,081	$22,018	$12,030	$8,737	$1,935	-$9,687	-$16,181	$44,720	186
Kansas Missouri	-$3,160	-$89	$1,239	$8,761	$21,540	$3,476	$4,181	-$11,564	-$3,249	$37,958	203
Kenner Louisiana	-$4,955	-$2,896	$4,828	$11,359	$18,618	$4,507	$1,426	-$14,993	-$7,851	$35,911	213
Kent Washington	-$5,211	$29,627	$5,917	$53,658	$29,316	$21,292	$17,070	-$23,607	$24,416	$121,335	59
Killeen Texas	$6,809	$7,240	$2,600	$18,709	$15,332	$3,712	$940	-$12,347	$14,049	$38,693	200
Lake Charles LA	-$1,885	$218	$1,318	$7,199	$11,799	$2,856	$1,266	-$9,501	-$1,666	$23,119	248
Lakeland Florida	-$2,754	$6,163	$2,086	$18,569	$15,218	$14,737	$3,342	-$12,254	$3,409	$51,865	169
Lakewood California	-$2,967	$13,316	$35,668	$110,253	$90,355	$29,166	$19,844	-$48,507	$10,349	$249,618	19
Lancaster California	-$49,830	$14,267	$3,224	$63,778	$52,268	$25,308	$12,458	-$28,060	-$35,563	$153,812	44
Lansing Michigan	-$10,492	-$1,912	$2,443	$22,577	$12,335	$8,959	$2,268	-$9,933	-$12,404	$46,139	180
Las Vegas Nevada	$6,697	$25,968	$8,893	$34,511	$28,282	$13,694	$7,367	-$22,775	$32,665	$83,854	104
Lawrence Kansas	$6,928	$6,115	$3,517	$10,889	$26,771	$8,641	$5,561	-$14,372	$13,043	$51,861	170
League Texas	$2,462	$16,536	$1,456	$21,696	$17,781	$4,305	$1,362	-$14,318	$18,998	$45,144	185
Lewisville Texas	-$14,913	$12,611	$2,626	$22,384	$18,344	$4,441	$2,249	-$14,772	-$2,303	$47,418	177
Lincoln Nebraska	$469	$3,826	$3,096	$9,462	$23,263	$3,754	$6,178	-$12,488	$4,295	$42,657	194
Livonia Michigan	-$8,449	-$402	$3,994	$42,048	$22,973	$22,246	$8,448	-$18,499	-$8,851	$95,715	90
Long Beach California	-$27,409	$5,701	$34,857	$110,274	$90,372	$29,172	$27,080	-$48,516	-$21,708	$256,898	16
Longview Texas	-$3,945	$1,724	$1,144	$15,383	$12,606	$9,156	$1,159	-$10,152	-$2,221	$38,304	201
Los Angeles CA	-$29,619	$5,878	$32,723	$119,058	$97,571	$31,495	$33,888	-$52,381	-$23,741	$282,013	13
Lynchburg Virginia	-$3,577	$502	$1,214	$17,169	$14,070	$3,406	$1,617	-$11,330	-$3,075	$36,262	211
McAllen Texas	$1,838	$6,419	$2,245	$15,397	$12,618	$9,164	$2,127	-$10,161	$8,257	$39,306	198
McKinney Texas	$31,510	$36,699	$2,226	$22,886	$18,755	$4,541	$9,292	-$15,103	$68,209	$55,473	159
Medford Oregon	-$1,543	$12,671	$5,161	$29,495	$24,171	$23,407	$7,716	-$19,465	$11,129	$84,789	103
Melbourne Florida	-$10,714	$5,318	$2,970	$22,894	$18,762	$13,627	$4,504	-$15,109	-$5,396	$59,788	148
Merced California	-$26,064	$9,318	$6,993	$55,194	$45,233	$21,901	$9,241	-$24,283	-$16,746	$131,569	55
Mesa Arizona	-$2,530	$14,611	$5,822	$43,200	$35,403	$11,428	$6,630	-$19,006	$12,081	$96,662	88
Mesquite Texas	-$7,268	$4,490	$2,552	$15,709	$12,874	$6,234	$3,386	-$10,367	-$2,778	$38,204	202
Miami Beach Florida	$107,918	-$4,825	$36,805	$59,515	$48,774	$23,616	$33,507	-$39,276	$103,093	$165,412	37
Miami Florida	-$1,559	-$39	$16,919	$32,892	$26,956	$13,052	$8,674	-$21,707	-$1,598	$81,573	107
Milwaukee Wisconsin	-$6,514	-$1,781	$5,285	$26,395	$21,631	$6,982	$2,836	-$11,613	-$8,295	$57,844	154
Miramar Florida	$5,697	$34,150	$6,849	$35,242	$28,882	$13,984	$14,752	-$23,258	$39,847	$92,860	92
Mobile Alabama	$1,208	-$107	$1,309	$7,728	$19,001	$3,067	$1,359	-$10,201	$1,102	$31,155	224
Mount Vernon NY	-$17,795	$3,453	$53,204	$63,567	$52,095	$25,224	$17,162	-$41,950	-$14,343	$158,048	42
Murfreesboro TN	-$4,411	$15,701	$2,788	$23,013	$28,290	$4,566	$2,312	-$15,187	$11,290	$58,181	151
Nampa Idaho	$11,225	$14,175	$2,973	$8,284	$20,367	$6,574	$2,497	-$10,934	$25,401	$37,722	207
Nashua NH	-$6,763	$4,450	$5,993	$60,431	$49,525	$7,993	$2,530	-$26,587	-$2,313	$120,478	61
New Bedford MA	-$11,040	-$444	$8,855	$52,909	$28,907	$13,996	$5,315	-$23,278	-$11,484	$101,127	81
New Haven Connecticut	-$16,202	-$869	$13,102	$37,863	$31,029	$15,024	$5,072	-$24,987	-$17,071	$88,988	98
New Rochelle NY	-$52,787	$6,510	$32,191	$89,398	$73,264	$35,474	$16,465	-$58,997	-$46,278	$214,601	26
New York New York	-$8,063	$6,751	$87,431	$62,999	$51,629	$12,499	$19,382	-$41,576	-$1,312	$146,510	48
Newark New Jersey	-$2,137	-$1,058	$20,894	$54,565	$14,906	$28,869	$7,309	-$24,006	-$3,194	$105,648	77
Newport News VA	-$728	$1,093	$3,323	$24,843	$20,360	$19,716	$4,991	-$16,395	$365	$69,910	130
Norfolk Virginia	$3,588	-$2,919	$5,252	$24,036	$19,698	$9,538	$3,169	-$15,862	$669	$56,441	156
Norman Oklahoma	-$2,162	$3,427	$530	$9,413	$15,428	$14,940	$4,413	-$12,424	$1,265	$44,194	190

Table 3 Continued

Estimated to Change in Housing Prices 1989-2006 (in 2006 $)

CITY	Due to Income Growth	Due to Population Growth	Due to Density	Due to State Wide Regulations.	Due to Courts	Due to Growth Manage't	To Approval Delay	Due to Constant	TOTAL: Population + Income	TOTAL Regulation	Regulation Contribution Rank
O'Fallon Missouri	$11,616	$29,951	$3,725	$12,041	$29,603	$19,111	$2,117	-$15,892	$41,567	$62,871	141
Ogden Utah	-$2,258	$3,565	$2,513	$16,141	$19,842	$6,405	$3,344	-$10,652	$1,308	$45,733	182
Oklahoma City OK	-$3,374	$2,988	$731	$7,967	$13,059	$6,323	$2,401	-$10,516	-$386	$29,750	227
Olathe Kansas	$7,093	$14,494	$2,801	$12,854	$31,601	$10,201	$2,583	-$16,965	$21,588	$57,238	155
Omaha Nebraska	-$1,734	$2,067	$2,869	$8,462	$20,803	$13,430	$3,188	-$11,168	$333	$45,883	181
Orem Utah	-$9,169	$5,502	$5,824	$24,375	$29,964	$9,672	$4,387	-$16,086	-$3,666	$68,399	134
Orlando Florida	-$839	$7,497	$3,321	$27,511	$22,545	$10,916	$5,527	-$18,155	$6,658	$66,500	137
Oxnard California	-$9,392	$12,440	$25,076	$108,752	$89,125	$14,384	$34,597	-$47,847	$3,048	$246,858	20
Palatine Illinois	-$5,680	$22,371	$11,950	$46,060	$37,748	$18,277	$6,362	-$30,397	$16,690	$108,448	74
Palm Bay Florida	-$6,755	$8,964	$1,794	$23,845	$19,542	$18,924	$5,090	-$15,736	$2,209	$67,401	136
Palm Coast Florida	-$3,220	$43,496	$1,883	$31,789	$26,052	$6,307	$3,393	-$20,979	$40,276	$67,540	135
Palmdale California	-$24,276	$33,872	$3,408	$73,000	$59,825	$9,656	$7,334	-$32,117	$9,596	$149,814	46
Parma Ohio	-$7,678	-$636	$4,373	$20,058	$8,219	$3,980	$3,400	-$13,237	-$8,314	$35,657	214
Pasadena Texas	-$7,789	$2,816	$2,446	$14,307	$11,725	$5,677	$2,935	-$9,442	-$4,972	$34,645	219
Passaic New Jersey	-$62,862	-$1,151	$48,220	$77,523	$21,177	$20,508	$4,543	-$34,107	-$64,014	$123,751	58
Paterson New Jersey	-$43,917	$2,471	$40,930	$67,691	$18,492	$8,953	$7,084	-$29,781	-$41,446	$102,220	80
Pearland Texas	$6,399	$27,010	$1,906	$22,501	$18,440	$8,929	$4,050	-$14,849	$33,409	$53,920	163
Peoria Arizona	$16,625	$33,502	$1,788	$48,064	$39,390	$12,715	$16,095	-$21,146	$50,127	$116,264	64
Philadelphia PA	-$8,624	-$1,291	$8,456	$23,086	$6,306	$3,053	$4,832	-$10,157	-$9,914	$37,277	209
Phoenix Arizona	-$1,775	$9,967	$4,374	$42,530	$34,854	$16,876	$6,765	-$18,711	$8,191	$101,025	82
Pittsburgh PA	-$2,049	-$2,298	$3,109	$17,028	$4,652	$6,757	$1,069	-$7,492	-$4,347	$29,506	228
Plano Texas	-$11,894	$21,021	$5,808	$30,489	$24,987	$12,098	$4,594	-$20,121	$9,127	$72,169	125
Plantation Florida	-$9,339	$6,723	$8,290	$44,921	$36,814	$44,562	$9,590	-$29,645	-$2,617	$135,887	53
Plymouth Minnesota	-$1,773	$12,205	$4,596	$64,189	$35,069	$8,490	$6,448	-$28,240	$10,432	$114,197	67
Pomona California	-$15,235	$6,837	$16,773	$73,281	$60,056	$19,386	$11,656	-$32,241	-$8,398	$164,379	38
Pompano Beach FL	-$13,300	$12,164	$8,986	$34,019	$27,879	$20,248	$15,379	-$22,450	-$1,136	$97,525	87
Portland Oregon	$4,987	$5,186	$5,424	$26,332	$21,580	$26,122	$3,803	-$17,378	$10,173	$77,836	119
Portsmouth Virginia	$2,641	-$483	$3,308	$21,113	$17,303	$12,567	$2,519	-$13,933	$2,157	$53,501	164
Providence RI	-$9,998	$1,934	$16,757	$53,148	$29,037	$21,089	$1,780	-$23,383	-$8,064	$105,054	78
Quincy MA	-$4,392	$893	$13,269	$75,259	$41,118	$19,909	$6,930	-$33,111	-$3,499	$143,217	50
Racine Wisconsin	-$8,128	-$1,550	$4,176	$24,919	$20,421	$9,888	$1,043	-$10,963	-$9,677	$56,271	157
Raleigh NC	-$2,652	$13,385	$4,308	$27,814	$22,794	$11,037	$7,917	-$18,356	$10,733	$69,562	131
Redondo Beach CA	-$6,478	$5,804	$56,203	$162,224	$132,946	$21,457	$33,499	-$71,372	-$674	$350,127	5
Redwood California	$8,389	$17,071	$22,428	$163,683	$134,142	$64,950	$22,610	-$72,014	$25,459	$385,385	2
Reno Nevada	-$2,780	$16,380	$6,194	$40,683	$33,341	$16,143	$22,478	-$26,848	$13,600	$112,645	69
Richardson Texas	-$25,189	$7,444	$5,304	$30,422	$24,932	$6,036	$2,865	-$20,077	-$17,745	$64,255	139
Riverside California	-$12,675	$14,910	$10,191	$74,773	$61,278	$39,560	$13,771	-$32,897	$2,234	$189,383	35
Roanoke Virginia	-$1,638	-$781	$1,787	$16,334	$13,386	$6,481	$1,743	-$10,779	-$2,419	$37,945	204
Rochester New York	-$12,852	-$1,604	$4,151	$14,162	$11,606	$2,810	$1,245	-$9,346	-$14,456	$29,823	226
Rochester Hills MI	-$15,192	$7,207	$4,678	$60,072	$32,820	$15,891	$18,607	-$26,429	-$7,984	$127,390	57
Round Rock Texas	$17,282	$19,686	$3,396	$21,406	$17,543	$16,988	$3,898	-$14,127	$36,968	$59,835	147
Salem Oregon	$2,109	$6,488	$3,601	$21,671	$17,760	$12,899	$2,857	-$14,302	$8,597	$55,187	161
Salt Lake Utah	$9,276	$2,771	$2,100	$24,800	$30,486	$9,841	$4,983	-$16,366	$12,047	$70,108	129
San Antonio Texas	$2,507	$4,061	$2,252	$14,067	$11,528	$2,791	$4,181	-$9,283	$6,568	$32,566	222
SanBuenaventura CA	-$13,536	$7,461	$19,676	$118,425	$97,052	$46,992	$87,409	-$52,102	-$6,076	$349,878	6
San Diego California	$14,874	$8,115	$13,625	$102,563	$84,053	$27,132	$38,209	-$45,124	$22,989	$251,956	18
San Francisco CA	$57,582	$2,562	$82,204	$151,013	$123,759	$59,923	$63,211	-$66,440	$60,144	$397,906	1
San Jose California	-$4,626	$12,774	$23,236	$129,813	$106,385	$17,170	$20,648	-$57,112	$8,148	$274,016	14
San Leandro CA	$10,842	$18,782	$25,254	$107,530	$88,124	$42,669	$22,505	-$47,309	$29,624	$260,828	15
Santa Ana California	-$11,378	$11,306	$44,515	$100,508	$82,369	$13,294	$14,725	-$44,219	-$72	$210,896	29

Table 3 Continued Estimated Contributions to Change in Housing Prices 1989-2006 (in 2006 $)

CITY	Due to Income Growth	Due to Population Growth	Due to Density	Due to State Wide Regulations.	Due to Courts	Due to Growth Manage't	To Approval Delay	Due to Constant	TOTAL: Population + Income	TOTAL Regulation	Regulation Contribution Rank
Santa Clara California	$25,797	$14,748	$27,366	$131,412	$107,695	$34,763	$22,186	-$57,816	$40,545	$296,057	9
Santa Fe New Mexico	-$4,978	$3,804	$3,037	$35,188	$28,837	$6,981	$8,396	-$23,222	-$1,174	$79,402	114
Santa Maria California	-$18,102	$16,032	$11,767	$78,307	$64,174	$31,072	$16,170	-$34,452	-$2,071	$189,724	34
Savannah Georgia	-$9,622	-$1,101	$1,521	$25,906	$14,154	$3,427	$1,735	-$11,397	-$10,723	$45,221	184
Schaumburg Illinois	-$18,708	$4,167	$7,984	$38,431	$31,495	$22,874	$6,032	-$25,362	-$14,541	$98,833	86
Scranton PA	-$4,372	-$1,709	$2,198	$22,445	$6,131	$5,937	$1,973	-$9,875	-$6,080	$36,486	210
Seattle Washington	$31,451	$4,066	$17,619	$76,953	$42,043	$50,892	$29,312	-$33,856	$35,517	$199,199	33
Simi Valley California	-$6,512	$16,033	$12,809	$117,855	$96,585	$31,177	$54,265	-$51,851	$9,521	$299,881	8
Sioux Falls SD	$4,668	$5,785	$2,355	$9,174	$22,554	$10,921	$1,382	-$12,108	$10,454	$44,031	192
Skokie Illinois	-$9,182	$10,222	$18,900	$50,101	$41,059	$9,940	$9,227	-$33,064	$1,039	$110,328	72
Somerville MA	$11,669	-$8,348	$47,167	$86,929	$47,494	$11,498	$14,555	-$38,245	$3,321	$160,475	40
South Bend Indiana	-$3,502	-$550	$1,591	$5,979	$14,699	$4,745	$1,201	-$7,891	-$4,052	$26,624	241
Southfield Michigan	-$20,576	-$1,622	$3,601	$39,051	$21,335	$5,165	$9,535	-$17,181	-$22,198	$75,086	122
Sparks Nevada	$5,783	$16,049	$6,690	$36,862	$30,209	$14,627	$7,561	-$24,327	$21,831	$89,259	97
Springfield MA	-$23,805	-$1,058	$6,426	$40,140	$21,931	$26,546	$6,049	-$17,660	-$24,864	$94,666	91
St. George Utah	$2,875	$26,466	$1,716	$30,400	$37,370	$6,031	$3,054	-$20,062	$29,341	$76,856	120
St. Joseph Missouri	$3,337	$365	$1,123	$6,486	$15,947	$5,148	$652	-$8,561	$3,702	$28,232	233
St. Louis Missouri	-$1,059	-$1,933	$4,502	$7,836	$19,265	$6,218	$1,968	-$10,342	-$2,992	$35,287	217
St. Petersburg Florida	$5,778	$1,916	$5,134	$22,881	$18,752	$13,619	$2,873	-$15,100	$7,694	$58,126	153
Stamford Connecticut	-$33,464	$6,962	$13,565	$84,652	$69,374	$33,590	$16,299	-$55,865	-$26,502	$203,915	30
Sterling Heights MI	-$17,652	$3,351	$5,232	$41,880	$22,881	$5,539	$9,466	-$18,425	-$14,302	$79,766	112
Syracuse New York	-$12,252	-$2,310	$4,338	$15,266	$12,511	$9,087	$1,917	-$10,075	-$14,561	$38,781	199
Tacoma Washington	$5,594	$2,906	$5,203	$38,198	$20,869	$20,210	$2,238	-$16,806	$8,501	$81,515	108
Tampa Florida	$4,701	$3,012	$3,374	$22,885	$18,755	$18,162	$10,346	-$15,103	$7,713	$70,147	128
Tempe Arizona	-$19,739	$3,572	$6,587	$48,353	$39,626	$19,187	$4,385	-$21,273	-$16,167	$111,550	70
Thornton Colorado	$3,545	$17,445	$5,542	$39,148	$21,388	$15,534	$13,601	-$17,223	$20,989	$89,671	96
Toledo Ohio	-$7,676	-$1,684	$2,619	$14,081	$5,770	$5,588	$1,061	-$9,293	-$9,360	$26,500	242
Topeka Kansas	-$7,624	-$379	$1,429	$6,713	$16,504	$2,664	$1,012	-$8,860	-$8,002	$26,892	239
Trenton New Jersey	-$14,416	-$1,047	$10,672	$28,619	$7,818	$7,571	$3,274	-$12,591	-$15,464	$47,283	178
Troy Michigan	$155	$3,511	$4,870	$59,675	$32,603	$15,786	$20,233	-$26,255	$3,666	$128,298	56
Tucson Arizona	$1,407	$5,042	$3,032	$33,474	$27,433	$17,710	$7,847	-$14,727	$6,449	$86,464	102
Tustin California	$50,217	$15,113	$22,730	$122,820	$100,654	$48,736	$21,592	-$54,036	$65,330	$293,802	10
Tyler Texas	-$644	$3,401	$1,634	$16,773	$13,746	$16,639	$2,001	-$11,069	$2,756	$49,159	173
Union New Jersey	-$8,808	$7,217	$138,784	$76,152	$20,803	$40,290	$8,075	-$33,504	-$1,591	$145,319	49
Vancouver WA	$20,534	$29,366	$4,705	$37,268	$20,361	$9,859	$3,744	-$16,396	$49,900	$71,231	127
Virginia Beach VI	$3,912	$3,126	$2,933	$32,628	$26,739	$12,947	$6,965	-$21,532	$7,038	$79,278	115
Visalia California	$7,853	$12,702	$6,659	$48,506	$39,752	$25,663	$7,309	-$21,341	$20,555	$121,231	60
Vista California	-$10,050	$16,253	$16,149	$92,831	$76,077	$12,279	$19,429	-$40,842	$6,203	$200,614	31
Warren Michigan	-$18,205	-$1,813	$4,117	$31,324	$17,114	$8,286	$3,628	-$13,781	-$20,019	$60,352	145
Warwick RI	-$1,619	-$1,246	$4,106	$51,917	$28,365	$13,734	$12,604	-$22,842	-$2,865	$106,621	75
Waterford CDP MI	-$9,586	$522	$2,698	$36,264	$19,813	$19,187	$13,156	-$15,955	-$9,064	$88,420	99
West Jordan Utah	$10,710	$18,078	$3,769	$24,032	$29,543	$9,536	$5,583	-$15,860	$28,787	$68,694	133
Westminster Colorado	-$2,579	$9,003	$4,889	$43,353	$23,686	$5,734	$8,711	-$19,074	$6,424	$81,484	109
Whittier California	-$11,085	$17,352	$25,390	$108,305	$88,758	$14,325	$22,667	-$47,650	$6,267	$234,056	22
Wichita Falls Texas	-$4,750	$119	$882	$12,514	$10,255	$4,966	$629	-$8,258	-$4,631	$28,363	232
Wilmington NC	-$2,816	$12,253	$2,857	$23,926	$19,608	$4,747	$7,111	-$15,790	$9,437	$55,392	160
Winston-Salem NC	-$6,538	$5,802	$1,822	$19,707	$16,150	$11,730	$1,980	-$13,005	-$735	$49,567	172
Wyoming Michigan	-$7,499	$2,766	$2,744	$25,857	$14,127	$6,840	$8,298	-$11,376	-$4,733	$55,122	162
Yonkers New York	-$27,146	$3,412	$37,048	$65,717	$53,856	$13,038	$21,456	-$43,369	-$23,734	$154,067	43
Yuma Arizona	-$5,576	$11,235	$981	$31,875	$26,122	$16,864	$3,291	-$14,024	$5,659	$78,153	117
Sample Average	-3632	8007	9744	41892	32489	14895	9024		4374	98300	

Table 4a
Comparing Housing Price Increases in San Francisco and Major US Cities

	1989	2006	Percent Increase
Average Real US Housing Price (major cities)[1]	$167,640	$258,524	54%
Real Price of Housing in San Francisco[1]	$479,237	$806,700	68%

Table 4b
Sources of the Increase In Housing Prices in San Francisco and Major US Cities

	San Francisco	Major US Cities (avg)
Total Change in Real Housing Prices 1989-2006	$327,463	$90,884
Real Increase In Housing Prices Due to:		
I) Autonomous Change in Housing Prices[6]	-$66,440	-$24,556
II) Increase in Income and Population	$60,144	$3,840
III) Density (Population per Square Mile)	$82,204	$8,624
IV) Land Use Restrictions and Regulations	$397,906	$101,977
IVa) State Wide Land Use Restrictions Imposed by Executive & Legislature[2]	$150,013	$43,024
IVb) Municipal Land Use Restrictions Upheld by Courts[3]	$123,759	$34,306
IVc) State Wide Growth Management and Residential Building Restrictions[4]	$59,923	$16,177
IVd) Approval Delay[5]	$63,211	$8,470

NOTES
1) Source: 1990 Census and 2006 PUMS Census.
http://factfinder.census.gov/home/saff/main.html?_lang=en. Median Owner Occupied House adjusting price for the general level of inflation, expressing all data in 2006 dollars using the consumer price index. http://www.bls.gov/cpi/
2) The level of activity in the Executive and Legislative branches over the past ten years that is directed toward enacting greater statewide land use restrictions. Source: Foster and Summers (2005)
3) The tendency of appellate courts to uphold or restrain municipal land use regulation. Source: Foster and Summers (2005)
4) Involvement of state legislature in affecting residential building activities and/or growth management procedures Source: Gyourko *et al.* (2007).
5) Approval delay is the average time lag (in months) for a) relatively small, single-family projects involving fewer than 50 units; b) larger single-family developments with more than 50 units, and c) multifamily projects of indeterminate size. Lag times are due to the average duration of the review process, the time between application for rezoning and issuance of a building permit and the time between application for subdivision approval and the issuance of a building permit conditional on proper zoning being in place. Source: Gyourko *et al.* (2007).
6) Changes in housing prices when if there had been no changes in regulations or income or population. This effect is likely capturing the falling mortgage rates, relaxed lending practices and changes in the cost of construction.