Regulation and the High Cost of Housing in California

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The rise in housing costs in California has far exceeded the national inflation rate. During the past three years, housing prices in five coastal counties increased by more than 60 percent. For the highest quintile of cities, prices increased by an average of more than 30 percent *per year.* Evidently California housing markets differ qualitatively from those in the rest of the country.

One striking difference is the degree of regulation governing land use and residential construction. California represents the most extreme example of autarky in land-use regulations of any U.S. state. Cities are free to set their rules independently, with little oversight.[1] Moreover, state tax policy creates incentives that are likely to decrease production and increase housing costs. Property taxes are constitutionally limited to 1 percent of acquisition costs while cities are permitted a share of local sales tax receipts. This creates regulatory incentives to favor retail development over housing construction, to favor development of expensive housing over moderately priced housing, and to discourage the construction of housing.

In this paper, we explore the linkages between land-use regulations, growth in the housing stock, and housing prices in California cities. First, we assess whether housing is more expensive in more regulated cities. Next, we assess whether growth in the housing stock over the period of a decade depends on the degree of land-use regulation at the start of the decade. Finally, we estimate the price elasticity of housing supply in regulated and relatively unregulated cities. Our results suggest that current regulations have powerful effects on housing outcomes.

I. Data and Methodology

We develop a city-level index of regulatory stringency for California cities, and we relate this index of regulation to local housing prices in 1990 and 2000. We explore a series of simple hypotheses about the ways in which regulation affects the costs of housing and about the sensitivity of the housing stock to changes in price.

A. *Estimating Geographic and Intertemporal Variation in Housing Costs*

Hedonic methods are commonly used to measure the extent to which prices of otherwise identical housing units differ by location or differ over time in the same geographical location. Stephen Malpezzi et al. (1998) have demonstrated the viability of producing housing price indexes with data from the Census Public Use Microdata Samples (PUMS). In this paper, we use the 1990 and 2000 PUMS to estimate a series of constant-quality housing price indexes for California cities.

For reasons of confidentiality, household data from the census identify the Public Use Microdata Area (PUMA), not the political jurisdiction, within which a sampled household resides. However, it is possible to apportion probabilistically sampled households and dwelling units to political jurisdictions, by relying upon the

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[1] Cities are required to submit plans for development (called housing "elements"), but there are few sanctions if sufficient land is not reserved for regional housing needs and no sanctions at all if cities subsequently deny developers permission to build on any land so reserved. There is no "as of right" allowing developers to proceed with construction when projects comply with existing regulations.

proportion of the population of each PUMA that lies within each census place.[2]

The models relate the logarithm of house value or rent to indicators of all of the housing characteristics measured in the PUMS, including the number of rooms, the number of bedrooms, the age of the unit, the number of units in the structure, whether the unit is a condominium, and whether the unit has complete kitchen and plumbing facilities. These models are estimated separately for owner- and renter-occupied dwellings for 407 California cities. The regression results are then used to estimate the market price of constant-quality dwellings for each city for 1990 and for 2000. We analyze the link between regulation and these measures of price.

B. *Measuring Housing-Market Regulation*

Explicit growth controls, such as urban service boundaries or growth moratoria, reduce the quantity of developable land and thus the ability of housing supply to adjust to changes in demand. Minimum quality standards, large lot zoning (intended to reduce density), and "fiscal zoning" (designed to minimize the fiscal impact of land use), are likely to restrict further the supply of housing.

These regulations are prevalent in California cities. We rely on a survey of California land-use officials (Madelyn Glickfeld and Ned Levine, 1992) to measure their incidence. The survey gathered detailed information on the growth-control measures adopted by each city.

For each of 407 cities, we observe 15 growth-control measures that have been widely adopted throughout California. Roughly half regulate residential development directly, a third regulate commercial development, and the remainder regulate both.[3] Roughly half of all cities have provisions requiring "adequate" preexisting service levels for residential and commercial development. Nearly half recently reduced permissible density and the permissible height of commercial and industrial buildings. Among the more extreme growth-control measures are those requiring supermajority city council votes for increasing densities ("up-zoning") or requiring voter approval. Roughly one-fifth of cities had not adopted any of these measures at the time of the survey, while another 40 percent had adopted three or more of these provisions.

We measure the regulatory stringency of a given city by the number of these growth-control measures adopted by each city at the time of the survey.

C. *Exploratory Relationships*

We explore several simple hypotheses to assess the impact of regulation on housing costs in California cities. First, we measure the extent to which housing costs are higher in cities with more stringent regulation, following Malpezzi (1996), Malpezzi and Richard K. Green (1996), and Henry O. Pollakowski and Susan M. Wachter (1990). We test cross-sectional relationships at two points in time: 1990 and 2000. We also test whether the change in housing costs over the decade is larger in more regulated cities.

Next, we investigate the link between regulatory stringency at the beginning of the 1990s and the growth of the housing stock over the subsequent decade. Using data on residential building permits issued by each city between 1990 and 2000, we assess whether the growth in the housing stock is affected by the regulatory stringency of the city (see Christopher C. Mayer and C. Tsuriel Somerville [2000] for a comparable analysis using an alternative data source). We test for the effect of additional regulatory provisions upon the decennial growth in the housing stock.

[2] This relies upon the "geographic correlation engine" developed at the University of Missouri, ⟨http://mcdc2.missouri.edu/websas/geocorr2k.html⟩. Details of these calculations are reported in the longer version of our paper.

[3] Residential restrictions may limit building permits, or population growth, require "adequate" service levels for new residential development, rezone land from residential usage, reduce permitted density, or require voter approval or supermajority council votes for up-zoning. Commercial restrictions may require "adequate" service levels for nonresidential development, restrict the amount of nonresidential building, rezone commercial land to other uses, or impose height restrictions. Growth management elements and urban limit lines, may restrict all development.

TABLE 1—REGRESSION ESTIMATES OF THE EFFECT OF THE NUMBER OF GROWTH RESTRICTIONS ON RENTAL AND OWNER-OCCUPIED HOUSING PRICES

Variable	1990	2000	Δ(2000–1990)
A. *Dependent Variable = Price Index for Owner-Occupied Housing* (in logarithms):			
Number of controls	0.031	0.045	0.011
	(0.007)	(0.008)	(0.003)
County fixed effects	0.010	0.011	0.001
	(0.004)	(0.005)	(0.002)
B. *Dependent Variable = Price Index for Rental Housing* (in logarithms):			
Number of controls	0.015	0.023	0.008
	(0.004)	(0.004)	(0.002)
County fixed effects	0.006	0.008	0.002
	(0.002)	(0.003)	(0.002)

Notes: Standard errors are in parentheses. Figures in the table provide the coefficient on the number of growth-restricting measures that each city had in place at the time of the survey.

Finally, we test for variations in housing-supply elasticities among relatively regulated and relatively unregulated cities. We assess whether a consistent pattern holds for California cities by distinguishing cities that are more intensely regulated from those less intensely regulated; we test for differences in the relationship between changes in the housing stock and changes in housing prices.

II. Empirical Results

A. *Housing Costs and the Degree of Regulatory Stringency*

Table 1 reports regressions relating the housing price indexes measured at the city level to the number of regulatory provisions adopted by the city. The table presents the coefficient on the growth-control regulation index on three dependent variables: the 1990 log housing price index, the 2000 log housing price index, and the within-city changes in the log housing price index over the decade. The table reports results for a simple bivariate regression of housing prices on the regulation measure and a specification including fixed effects for California's 58 counties.

The bivariate regression indicates that each additional regulatory measures is associated with a statistically significant 3-percent (1990) and 4.5-percent (2000) increase in the prices of owner-occupied housing, and a significant 1-percent (1990) and 2.3-percent (2000) increase in the price of rental housing. Moreover, housing prices grew at a significantly faster rate in more regulated cities. Adjusting for county-level fixed effects reduces the point estimates considerably. Nonetheless, the cross-sectional effects are highly significant, indicating that the more regulated cities within the same counties have higher housing prices. Adjusting for fixed effects eliminates the positive correlation between the change in housing prices over the decade and the degree of regulation at the beginning of the decade.

Thus, housing prices and rents are indeed higher in cities with more stringent regulation of development and land use.

B. *Growth in the Housing Stock via New Construction and the Degree of Regulatory Stringency*

Local land-use regulations restricting urban growth are likely to inhibit increases in the supply of housing available at a given point in time and to dampen the responsiveness of the housing stock to increases in demand over time. We explore whether the sensitivity of housing supply depends on the stringency of land-use regulation. First, we estimate the growth in the housing stock during the 1990s that is attributable to new construction. We add residential building permits issued by each city for new single-family and multi-family units over the decade to the number of dwellings at the beginning of the decade and compute log growth in the housing stock attributable to new construction. We then assess whether growth in the housing stock via new construction is related to the extent of regulation observed initially.

Table 2 presents regression estimates of the effect of growth restrictions on new housing construction between 1990 and 2000. The dependent variables in Table 2 are logarithmic changes in all housing units, in single-family

TABLE 2—REGRESSION ESTIMATES OF THE EFFECTS OF GROWTH RESTRICTION ON THE LOG CHANGE IN THE HOUSING STOCK CAUSED BY NEW PERMITTED UNITS, 1990–2000

	Regression	
Variable	(i)	(ii)
A. *Dependent Variable = Log Change in All Units:*[a]		
Number of restrictions	−0.002	−0.0031
	(0.002)	(0.0017)
Change in price index[d]		0.106
		(0.003)
B. *Dependent Variable = Log Change in Single-Family Units:*[b]		
Number of restrictions	−0.004	−0.005
	(0.002)	(0.002)
Change in price index[d]		0.055
		(0.034)
C. *Dependent Variable = Log Change in Multi-Family Units:*[c]		
Number of restrictions	0.001	0.000
	(0.001)	(0.001)
Change in price index[d]		0.195
		(0.030)

Notes: Standard errors are in parentheses. The sample of cities used in each regression is restricted to observations where the change in the housing stock over the decade does not exceed 100 percent.

[a] Measured by the log of the sum of owner-occupied units in 1990, rental units in 1990, and all residential building permits issued over the decade minus the log of the sum of 1990 owner-occupied and rental units.

[b] Measured by the log of the sum of owner-occupied units in 1990 and new single-family residential permits issued over the decade minus the log of owner-occupied units in 1990.

[c] Measured by the log of the sum of the rental units in 1990 and multi-family building permits issued over the decade minus the log of 1990 rental units.

[d] For the first two regressions, the change in the price index is a weighted average of the change in the rental and owner-occupied index, where the weights are given by the proportion of housing in 1990 that is owner-occupied and rental. For the second two regressions, the change in the price index refers to the change in the owner-occupied price index. In the final two regressions, the change in the price index refers to the change in the rental units price index.

units, and in multi-family housing dwellings. The table relates growth in housing units to the number of restrictions. It also presents regressions which include the change in the relevant housing price index over the decade,[4] where the change in the price indexes proxies for variation in housing demand across cities.

The number of restrictions is negatively correlated with growth in the aggregate housing stock. The effects are statistically important for single-family units: restrictions exert a negative effect on housing supply in both specifications, with the results increasing slightly when the change in the relevant price index is added to the specification. There is no evidence of a relationship between growth in the multi-family unit housing stock and the number of growth restrictions.

C. *The Price Elasticity of Housing Supply and the Degree of Regulation*

In the results presented in Table 2, the change in the price index is positively correlated with the change in housing units. Since both variables are expressed in logarithms, the coefficient on the price index can be interpreted as an estimate of the price elasticity of housing supply. While the ordinary least-squares estimates presented in Table 2 suffer from a clear identification problem, the basic results suggest an appropriate test for an effect of growth restrictions on housing supply: namely, does the elasticity of housing supply differ between more regulated and less regulated cities? Here, we estimate housing-supply elasticities for more and less regulated cities.

We define less regulated cities as those with either one or zero growth restrictions and more regulated cities as those with two (the median) or more growth restrictions. To account for the endogeneity of the change in the price index, we construct an instrumental variable that forecasts employment growth in each city using state-level employment trends. Specifically, we calculate the distribution of employment by three-digit SIC codes for each city at the beginning of the decade and use the initial employment distribution coupled with decennial employment

[4] For the overall growth model, we calculate the weighted average of the changes in the owner-occupied and rental price indexes, using the proportion of housing units in each city in 1990 that were owner-occupied and renter-occupied as weights.

TABLE 3—IV ESTIMATES OF THE HOUSING SUPPLY ELASTICITY FOR RELATIVELY REGULATED AND RELATIVELY UNREGULATED CITIES USING REGRESSIONS OF THE LOG CHANGE IN THE HOUSING STOCK AGAINST THE CHANGE IN THE RELEVANT PRICE INDEX

	Unregulated cities		Regulated cities	
Variable or statistic	Reduced form	IV	Reduced form	IV
A. *Overall Change in the Housing Stock Against the Average Increase in Prices:*				
Change in average price index		0.171 (0.091)		−0.231 (0.137)
Predicted change in employment	0.436 (0.228)		−0.505 (0.261)	
F statistic[a] (*P* value)		70.842 (0.0001)		31.352 (0.0001)
B. *Change in the Single-Family Housing Stock Against the Increase in Owner-Occupied Housing Prices:*				
Change in owner-occupied price index		0.074 (0.095)		−0.203 (0.132)
Predicted change in employment	0.237 (0.308)		−0.582 (0.351)	
F statistic[a] (*P* value)		65.271 (0.0001)		33.635 (0.0001)
C. *Change in the Multi-Family Housing Stock Against the Increase in Rental Housing Prices:*				
Change in rental price index		0.358 (0.115)		−0.036 (0.140)
Predicted change in employment	0.646 (0.198)		−0.045 (0.166)	
F statistic[a] (*P* value)		60.613 (0.0001)		15.399 (0.0001)

Notes: Standard errors are in parentheses. All regressions include a constant term.

[a] This statistic is the *F* statistic on the predicted employment change variable in the first-stage regression of housing price indexes on the predicted employment change.

growth rates at the state level to forecast the growth in employment for each city. This variable predicts shifts in the demand for housing in the locality. This measure is independent of supply conditions, since variation in this variable is determined by the overall growth rate of the state and the predetermined industrial employment of each city. (In the longer version of this paper, we present evidence of a very strong first-stage relationship between our forecasted employment growth measure and the changes in our housing price indexes.)

Table 3 presents the principal results. Panel A presents results where the dependent variable is the log change in the housing stock and the key explanatory variable is the weighted average change in the price indices. Panel B presents results for owner-occupied units, while panel C presents results for rental units. For unregulated cities and regulated cities, we estimate two models: a reduced-form regression of the quantity change on the predicted change in employment; and an instrumental-variables (IV) estimate of the coefficient on the log price change (the supply elasticity) when the predicted change in employment is used as an instrument.

For the growth in the overall housing stock, we find a significant (at the 8-percent level) and positive supply elasticity for unregulated cities and a negative and significant (at the 7-percent level) negative effect for regulated cities. The results are somewhat weaker for the owner-occupied housing units (no measurable elasticity in unregulated cities and a marginally significant negative effect of a log price change in regulated cities). The strongest contrast occurs in the rental market. For unregulated cities, the IV estimate of the price elasticity of supply is approximately 0.36. For regulated cities, the estimate is zero.

III. Conclusion

Our analysis documents the proposition that land-use regulation increases housing costs in California cities. First, we find a positive relationship between the degree of regulatory stringency and housing prices for both owner-occupied units and rental units. This relationship is evident in both the 1990 and 2000 cross sections, as well as in the changes in housing prices and rents over the decade.

We also find evidence that new housing construction is lower in more regulated cities relative to less regulated cities. Holding constant the change in the price indexes over the decade, we find that changes in the housing stock arising from new construction are smaller in more regulated cities. While this relationship may arise from unobserved differences in the changes in housing demand over the decade, this is unlikely. As the initial results suggest, housing price appreciation in more regulated cities exceeded the comparable price changes in less regulated cities. Thus, those cities with the greatest increases in housing demand experienced the lowest increases in new housing supply.

The strongest evidence of the impact of regulation on housing costs comes from the estimates of the supply elasticity of housing for regulated and unregulated jurisdictions. Using an exogenous predictor of changes in housing demand, we find that the responsiveness of the housing stock via new construction is weaker in more regulated cities, relative to less regulated cities. Moreover, the difference in responsiveness is greatest for the supply of multi-family housing units, the source of supply that is most frequently the target of regulation.

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