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WHY HAVE HOUSING PRICES GONE UP?

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ABSTRACT

Since 1950, housing prices have risen regularly by almost two percent per year. Between 1950 and 1970, this increase reflects rising housing quality and construction costs. Since 1970, this increase reflects the increasing difficulty of obtaining regulatory approval for building new homes. In this paper, we present a simple model of regulatory approval that suggests a number of explanations for this change including changing judicial tastes, decreasing ability to bribe regulators, rising incomes and greater tastes for amenities, and improvements in the ability of homeowners to organize and influence local decisions. Our preliminary evidence suggests that there was a significant increase in the ability of local residents to block new projects and a change of cities from urban growth machines to homeowners' cooperatives.

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I. The Rise in Housing Prices

The mean and variance of housing prices have risen across the United States since 1950. The top panel of Table 1 shows that the average price across the 316 metropolitan areas of the continental United States has increased 1.7 percent annually from $59,575 in 1950 (in 2000 dollars) to $138,601 in 2000. More notable is the widening variance. Since 1970, the standard deviation of real prices across metropolitan areas increased by 247 percent compared with a 72 percent increase in average prices.

As Figure 1 shows, this rising variance reflects an explosion of housing values at the top end of the price distribution. The top line in the figure plots the real average price for the metropolitan area at the 90th percentile of the house value distribution. The second line depicts price in the median metropolitan area, and the third line shows the mean house value for the area at the 10th percentile of the distribution. In 1970, the average house price in the metropolitan area at the 90th percentile was 35 percent more expensive than that of the median metropolitan area. In 1990, the 90th percentile area's price was more than twice as expensive as for the median metropolitan area. There has been little change in the gap between the median metropolitan area and low-cost areas.

Too often, analysts attempt to understand housing prices only by attending to demand-side factors such as interest rates or per capita income, while ignoring the supply-side of the market. Rising prices require not only rising demand, but also limits on supply. The supply of housing includes three elements: land, a physical structure, and government approval to put the structure on the land. Thus, rising prices must reflect rising physical costs of construction, increasing land prices or regulatory barriers to new construction.

The bottom panel of Table 1 reports the real value of construction costs per square foot for a modest-quality, single-family home in a sample of 177 markets tracked by the R.S. Means Company, a data provider to the home building industry. Average house prices and construction costs rose together between 1950 and 1970, but since 1970, the cost of putting up the physical structure has declined slightly while housing prices have continued to rise. Even in booming markets, construction cost increases have been modest. Between 1970 and 2000, real construction costs in San Francisco and Boston rose by 4.6 percent and 6.6 percent, respectively. Over the same 30 years, real mean house prices rose by 270 percent in the San Francisco primary metropolitan statistical area (PMSA) and 127 percent in the Boston metropolitan area.

Rising structure costs still could explain the post-1970 growth in housing prices if structural size and quality were increasing rapidly. To assess the importance of housing quality, we can compare the overall rise in housing prices with the rise in prices measured by repeat-sales indices that hold housing structure constant. In the United States as a whole, the real median value of owner-occupied housing rose by 1.20 percent per year from 1980 to 2000. Over this same period, real appreciation of the repeat-sales index published by the Office of Federal Enterprise Housing Oversight (OFHEO) was 0.93 percent per year, which suggests that changes in the quality of housing account for no more than one quarter of the average increase in housing values. The same methodology in high-price areas shows that quality growth is even less important in those places.[1]

[1] For example, real median prices rose by 3.14 percent per year between 1980-2000 in the San Francisco metropolitan area according to U.S. Census data, while OFHEO reports a 3.45 percent real appreciation rate for its constant quality series of repeat sales. The analogous numbers for the New York metropolitan area are 3.64 percent and 3.71 percent, respectively. Because changes in structure quality clearly do not account for higher prices in the most expensive coastal markets, we use Census data because it is available over a much longer time period.

A summary measure of the importance of physical structure is the ratio of the average house price (P) to the estimated physical construction cost (CC) for 102 metropolitan areas in each Census year from 1950-2000.[2, 3] If the housing supply market is competitive, then the difference between the value of this P/CC ratio and one tells us how much of the value of housing cannot be accounted for by the physical cost of supplying the unit.[4] This remainder reflects either the cost of land or the costs of obtaining regulatory approval. The top two rows of Table 2 report the sample means and standard deviations of the distribution of P/CC in each of the last six Census years, while the bottom two rows report the implied share of land and regulatory approval (i.e., 1 – CC/P). Even in the most expensive metropolitan areas, structure appears to have represented almost all of the cost of housing in 1970 and earlier years.[5] As the bottom two rows of Table 2 indicate, the physical cost of constructing the house represented about 90 percent of the value of the home in the metropolitan area in the 90th percentile of the P/CC distribution in 1970. In the San Francisco PMSA, which had the lowest share

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[2] Because construction costs are reported per square foot, housing values are divided by an estimate of the median size of single-family homes in each metropolitan area. Specifically, the *American Housing Survey* (*AHS*) is used to calculate median unit size for single-family homes in 1999. We then assume that unit size grew by 2.75% per decade between 1960 and 2000, which roughly corresponds to national changes in unit sizes in the *AHS* and information on the size of new single-family homes. In other work using data dating back only to 1980, we make additional adjustments to the numerator and denominator of the P/CC ratio to help control for potential bias in self-reporting of house values and for aging of the housing stock (see Glaeser and Gyourko (2005)). Given the longer time span examined here, we are unable to make those same adjustments. Our previous research shows that not controlling for the depreciation on existing homes is more important empirically than not controlling for the upward bias in self-reported house values. Hence, the P/CC ratios used here are likely to be biased downward. Experimentation confined to data from more recent decades finds that the cross sectional distribution of P/CC ratios across cities is not sensitive to these adjustments (or lack thereof).

[3] These 102 areas include the PMSA components of CMSAs. Grouping the relevant PMSAs together, there are 68 distinct MSAs, CMSAs and NECMAs.

[4] Glaeser, Gyourko and Saks (2005) present extensive evidence suggesting the highly competitive nature of the housing market.

[5] There are several explanations for why we observe so many metropolitan areas with average housing price below construction costs. As mentioned above, these estimates are not adjusted for the depreciation of existing homes. Another factor that would bias our estimates downward is if housing units were smaller in the past than we assume. In general, we have chosen assumptions to err on the side of yielding a conservative (lower) P/CC ratio.

of total house value accounted for by physical construction costs, only 24 percent was not due to structure value.

It is only since 1980, and only in a relatively few metropolitan areas, that there has been a widening gap between price and construction cost. Almost all of the markets in which housing prices became substantially higher than physical production costs during the 1970s were part of the three big coastal metropolises in California—the Los Angeles-centered CMSA, the San Francisco-centered CMSA, and the San Diego MSA.

A decade later, gaps between prices and construction costs on the West Coast had grown and had spread to interior markets in California. For example, structure represented only 53 percent of average house value in Sacramento in 1990. High prices relative to construction costs had also spread to other West Coast markets such as Seattle. The non-structure component of house value also exceeded 40 percent across a swath of the east coast roughly approximated by Amtrak's Northeast Corridor.

By the year 2000, there were 27 metropolitan areas in which structure could account for no more than 60 percent of total house value. These locations include virtually all of the coastal areas already discussed. Moreover, the 1990s witnessed the spread of high housing prices relative to physical production costs to interior markets such as Ann Arbor, MI, Austin-San Marcos, TX, Denver, CO, Nashville, TN, and Raleigh-Durham-Chapel Hill, NC. In the highest priced housing markets in the nation (the PMSAs within the San Francisco CMSA), structure is estimated to represent no more than 30 percent of house value. Figure 2 plots the P/CC ratios in 2000 versus 1970 for all 102 metropolitan areas, and starkly illustrates the dramatic rise in the gap between price and construction cost in the highest price markets over the past three decades.

The key to understanding the rise in housing prices relative to construction costs is that new construction has declined sharply in high price locations. Figure 3 documents the drop in new construction intensity in three increasingly expensive metropolitan areas: New York, San Francisco and Los Angeles. New construction is measured at decadal frequencies as the share of housing units built since the last Census divided by the number of units in the area in the preceding Census. The values reported for 1960 indicate that Los Angeles increased its stock by nearly 60 percent during the 1950s, while the number of housing units in San Francisco expanded by more than 30 percent. Even New York increased the size of its housing stock by more than 20 percent that decade. By the 1990s, the housing stock in all three metropolitan areas increased by well under 10 percent over the decade.

Although these three large, high housing price areas are outliers, Table 3 shows that there has been a significant reduction in the rate of new construction nationally. In the 1950s, the median rate of new construction was 40 percent in our sample of 102 metropolitan areas. Four decades later it had fallen to 14 percent, which was still double the rates seen in San Francisco, New York, and Los Angeles.

As late as the 1970s, there was a robust relationship between new construction and the ratio of price to construction costs. Figure 4 shows that in places where prices were high relative to construction costs in 1970, there was more new construction over the ensuing decade (with the notable exception of the San Francisco PMSA). Figure 5 repeats the exercise for the 1990s, documenting that this basic relationship has been reversed. It is no longer the case that high prices relative to construction costs generally lead to a surge in new construction.

Table 4 shows the declines in residential construction more rigorously. For our panel of 102 metropolitan areas, we begin by regressing the ratio of new construction to the initial housing stock on year dummy variables. These coefficients, which are reported in the first column, document the significant decline in the intensity of new construction between 1960 and today. The second regression includes controls for density, income and the ratio of price-to-construction cost at the beginning of the decade. The controls for price and density are both statistically significant, but they explain little of the change over time. These three controls together reduce the coefficient on the year 2000 by .05, or about 14 percent. While such a regression is only suggestive, the results indicate that rising density levels can only explain a small amount of the decline in new construction over time. The third regression adds interactions of the P/CC variable with the year dummies. Just as the figures suggested, there was a powerful relationship between price and new construction during the earlier time periods that vanished by the 1990s (e.g., the total effect of P/CC in 1990, which is the sum of coefficient on the level of P/CC and its interaction with 1990, is very close to zero).

These results strongly suggest that restrictions on new supply have become increasingly important in preventing suppliers from responding to high prices by building additional units. But are these limits on new construction the result of a dwindling supply of land or other barriers to new construction? Table 4 already suggested that this change cannot be explained by density alone. Further evidence that rising density is not strong enough to explain large declines in construction can be found by examining individual permit-issuing places within the San Francisco metropolitan area. Figure 6 depicts a robust negative relationship between initial period density and new construction in the

1990s. However, it also shows many low-density, high cost areas with very little new construction.[6]

A final check on the density hypothesis is to return to the share of housing prices that is not related to physical construction costs. Beyond physical structure, the cost of supplying a house includes both the cost of the land and the cost of the right to build. If the costs associated with the right to build were small, then the non-structure value of the property would include only the cost of the land. A completely free market for land would lead land to be worth the same amount on both the intensive and extensive margins. Stated differently, a quarter acre would be valued the same if it sits under one house or if it extends the lot of another house. Using this insight, Glaeser and Gyourko (2003) and Glaeser, Gyourko and Saks (2005) use hedonic price estimation to estimate the price of land when it extends the lot of an existing house. We find that such land is not all that valuable; generally a quarter acre is worth about ten times more if it sits under a house than if it extends the lot of another house. The fact that land is worth much more when it is bundled together with the right to build provides further evidence that the right to build is worth a great deal.[7]

In sum, the evidence points toward a man-made scarcity of housing in the sense that the housing supply has been constrained by government regulation as opposed to

[6] A very similar relationship holds if one looks at the same relationship at the census tract level. That is, more dense tracts have lower permitting intensity, but there are plenty of less dense tracts in the San Francisco area with equally low permitting activity. That graph is available upon request. More generally, Glaeser and Gyourko (2003) show that there is little relationship between density and high housing costs across U.S. metropolitan areas.

[7] Additional evidence on the role of zoning is given by the relationship across metropolitan areas between zoning and reduced construction levels and higher price increases. Saks (2004) uses an index of subjective assessments of zoning regulations and finds a positive relationship with housing prices and a negative relationship with residential construction.

fundamental geographic limitations.[8] The growing dispersion of housing prices relative to construction costs suggests that these regulations have spread into a larger number of local markets over time. Moreover, they appear to have become particularly severe in the past 2-3 decades. To explore the source of these changes, the next section develops a model of the incentives faced by local governments to impose restrictions on residential development.

II. The Economics of Zoning and Permitting

Our model is one of a local zoning authority that decides whether to approve or reject residential development. There are two locations: the zoning authority's town and a reservation locale. There are N total consumers, of which D live in the town. The remainder of the population lives in the reservation locale, and there are no constraints preventing people from moving there. Total utility in this outlying area is a decreasing function of the number of people living there, $\underline{U}(N-D)$.

In the town, the flow of utility equals U(D)+*a*-housing costs, where U(D) is decreasing in the amount of development in the city, and *a* is an individual-specific desire to live in the locale. The distribution of *a* is described by a cumulative density F(*a*) and density f(*a*). The cost of construction in the town equals K, which can be thought of as capturing both physical costs of construction and the opportunity cost of land taken away from agricultural uses. We normalize the cost of construction in the reservation locale to be equal to zero, so that K reflects the additional cost of building a housing unit in town. Denoting the interest rate as *r*, the annual cost of housing construction is *r*K.

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[8] Even in areas like Manhattan where water restricts the ability to build outward, the option to build upward remains. The choice to limit building heights constrains the number of new housing units just as other zoning regulations may limit the number of single-family houses.

As in any spatial equilibrium, there will be a marginal consumer with a taste for the town equal to $\hat{a}$ who is indifferent between living in the town or the reservation locale. Every consumer with a value of *a* greater than $\hat{a}$ will live in the town and the remaining consumers will live in the reservation locale. The marginal consumer must satisfy $D = N(1 - F(\hat{a}))$; we use the notation $\hat{a}(D) = F^{-1}(1 - D/N)$.

The initial population of the town is split into homeowners and renters. We assume that a fraction *h* of these units are allocated to homeowners and the remainder to renters. All individuals are assumed to live in the community for exactly L time periods. After that time, individuals are replaced by identical consumers so that the total size of the population remains unchanged. Individuals maximize $\int_{t=0}^{V} e^{-rt} u(t)dt + e^{-rV} \bullet Asset_V$ where u(t) is the flow of utility at time t, r is the interest rate and $Asset_V$ is the value of any asset as of time V. Renters pay the market clearing rent, which is equal to the same annual cost as the interest payments on a house. Both rents and housing values will decline with new development. If the town starts with $\underline{D}$ housing units, then houses in town will be worth $\frac{U(\underline{D}) - \underline{U}(N - \underline{D}) + \hat{a}(\underline{D})}{r}$.

Given these assumptions, there is a unique amount of development that will maximize the average discounted lifetime utility of all current residents of the town. In order to achieve this social optimum, it is necessary to allow for the possibility of side-payments between developers (who gain from additional residential construction) and homeowners (who lose from additional development through lower future housing values). It is straightforward to show that a higher fraction of homeowners will lead to less development. Moreover, because a shorter lifespan makes the resale value of homes more salient to homeowners, shorter life spans also curtail the optimal amount of development.

There are two reasons why the level of development that maximizes the welfare of current residents will not be socially optimal. First, higher population density has a negative impact on the utility of future residents of the town and of the reservation locale that current residents will not internalize. Second, current homeowners have an incentive to increase the value of their homes, and do not internalize the impact that higher housing prices have on non-homeowners who would like to live in the town.

We now consider the decision faced by the town's zoning authority who decides whether a new development project of size Δ will proceed. We simplify the analysis by assuming that utility in the reservation locale is fixed at $\underline{U}$. Furthermore, we will ignore the incentive of renters to lobby for more housing to be built. Essentially, this assumption implies that renters are not organized enough to support the construction of new housing.

The zoning authority will receive net benefits of $\alpha + g_C(C_R - C_D) + g_T(T_R - T_D) + \varepsilon$ from rejecting the project. The parameter α captures the innate distaste of the authority for development. C_D and C_R reflect the cash spent by developers and town residents to influence the authority's decision, and g_C is a concave function reflecting the influence that cash will have on the decision-making of the authority. Similarly, T_D and T_R reflect the time spent by the developer and residents, respectively, on influencing the authority, with a concave function g_T representing the influence of time on the authority. We assume that both g(.) functions are symmetric around zero. Finally, ε is a uniformly distributed mean-zero idiosyncratic term with density 1. We will assume that parameter values are such that there is always some positive probability that the project will be both accepted and rejected.

Under these assumptions, the probability that the authority will authorize the project equals $.5 + g_C(C_D - C_R) + g_T(T_D - T_R) - \alpha$. We denote the cost of time to the developer as W_D and the cost to residents as W_R. The developer therefore chooses the amount of time and cash spent to influence the zoning board to maximize:

$$\left(.5 + g_C(C_D - C_R) + g_T(T_D - T_R) - \alpha\right)\Delta\left(\frac{U(\underline{D}+\Delta) - \underline{U} + \hat{a}(\underline{D}+\Delta)}{r} - K\right) - W_D T_D - C_D .$$

From the perspective of each current homeowner, the development project will create a net loss equal to $\frac{U(\underline{D}+\Delta) - U(\underline{D}) + e^{-rL}\left(\hat{a}(\underline{D}+\Delta) - \hat{a}(\underline{D})\right)}{r}$. This expression reflects both the negative externality associated with increased population density in town and the decline in housing values. Individuals face costs of influencing the authority equal to $W_R T_R + C_R$. Because a continuous distribution of residents implies that each individual person has a negligible impact on the zoning decision, we assume the existence of a community organization that organizes town residents. This organization includes a proportion λ of homeowners and maximizes the aggregate utility of its members. We assume that $W_D > W_R$ so that the opportunity cost of time is higher to the developer than to the homeowners. Although this assumption seems plausible, it implies that landlords cannot employ renters to lobby the zoning board at the same time cost faced by homeowners.[9]

[9] Historically, it has been rare to see renters fight zoning restrictions. Perhaps this is due to some agency problem that prevents developers from following this strategy. Stronger homeowner participation might be because homeowners simply enjoy the social activity of protesting new developments.

Taken together, this model implies the following two propositions (proofs are in the appendix):

Proposition 1: If both the landlord and the homeowners association undertake some lobbying effort, then the landlord will use only cash and the homeowners will use only time.

Such specialization of effort seems consistent with much anecdotal evidence on local battles between developers and community groups (Warner and Molotch (2000)). This result implies:

Proposition 2: If both actors engage in a positive amount of lobbying then:

(1) the probability that the project will be approved declines with α,

(2) the probability that the project will be approved is decreasing with *h* and λ,

(3) if $g_C(x) = \gamma_C \bullet \tilde{g}_C(x)$ and $g_T(x) = \gamma_T \bullet \tilde{g}_T(x)$ then the probability the project will be approved declines with γ_T and rises with γ_C, and

(4) if $U(\underline{D} + \Delta) = U(\underline{D}) - u\Delta$, then the probability the project will be approved falls with u.

Proposition 2 sets forth a number of comparative statics that can potentially explain the change in the zoning environment in the United States. The first, and perhaps most popular explanation to date, is that an increase in zoning reflects changes in the preferences of judges and other political decision-makers. While there is evidence from legal and economics scholarship that judges and local government officials have become increasingly sympathetic to community and environmental concerns (see the discussion below), it is unsatisfying to explain a large-scale shift of this nature simply by appealing to changing preferences.

The second comparative static suggests that the explanation lies in the rise of homeownership and the success of community organization. Increases in both the share of homeowners and the political organization of homeowners' groups should lead to less development. In the past 40 years, the fraction of homeownership has risen from about 59 to 68% (Federal Reserve Board, 1964 and Aizcorbe et. al., 2003). Moreover, political participation of homeowners groups has been rising (Nelson, 2004, Freund, 1974). Not only should this trend restrict residential development, but Altshuler and Luberoff (2002) suggest that these groups have been increasingly able to restrict large-scale nonresidential development projects as well.

The third part of Proposition 2 points to the changes in the relative effectiveness of using cash versus time to influence political decision-makers. γ_C can be interpreted as the efficacy of bribes, and it is quite plausible that this parameter has declined over time. In contrast, it is likely that the efficacy of spending time to influence decision-makers has increased. Rising education levels and learning from other political battles (e.g., the civil rights movement) may have made community members more savvy about using courts and the press.

The final comparative static concerns the taste for density. If rising incomes have caused people to place a higher value on living in a low density community, then we should expect to see less development. Other factors, such as crime and improvements in transportation, may also have increased the desirability of low-density living.

III. Evaluating the Explanations for a More Restrictive Zoning Environment

In this section, we review the possible reasons why it has become more difficult to build new homes since 1970.

Judicial Tastes

In 1977, Robert Ellickson noted that "suburban governments are becoming ever more adventuresome in their efforts to control housing development." (p. 388). Ellickson does not explain this change, but points to judicial decisions such as Nectow v. City of Cambridge which have made it difficult for landowners to stop municipalities from restricting new construction on their land. Fischel (2004) points to the ideology of judges: "Courts, whose judges share the same environmental attitudes as middle class homeowners (just as 1920s judges shared the ideology of hearth and home), were more sympathetic to claims that the local decision had failed to account for environmental impacts than they had been to seemingly selfish claims that neighbors' home values were at risk." (pp. 332-333) Other cases such as Mt. Laurel that demanded low income housing have simultaneously allowed growth controls: "once a community has satisfied its fair share obligation [a fraction of the region's low-income housing], the *Mount Laurel* Doctrine will not restrict other measures, including large-lot and open area zoning, that would maintain its beauty and communal character"(*Mount Laurel II,* 456 A.2d at 421 cited in Fischel (2004), p. 331).

There can be little doubt that court decisions have become friendlier to anti-development sentiment. While courts clearly are important, ultimately it is unsatisfying to attribute the change in the zoning environment to changing attitudes of judicial decision-makers. These attitudes are not exogenous, but reflect other trends in American society. If changes in the tastes of judges and policy makers reflect societal trends like the environmental movement, then these changes should be viewed as an improved effectiveness of certain groups in shaping policy. In the language of the model, this should be viewed as an increase in T_R or γ_T, not an exogenous change in α. Empirically, we cannot reject the hypothesis that judicial tastes changed, but on theoretical grounds this explanation is so unsatisfying that we will turn elsewhere.

The Impact of Residents' Groups

While the influence of developers may or may not have declined, many observers have noted a sizable increase in the organization and political impact of local residents. Altshuler and Luberoff (2002) examine the history of large scale government projects ("Mega Projects") and describe changes that began in the 1960s, when citizens became better able to challenge large scale projects that would impact their neighborhood. One early and striking example was Jane Jacobs' leadership of the Greenwich Village movement that stopped Robert Moses' West Side highway project in New York. Through increasingly sophisticated use of the media, local groups learned how turn mega-projects into public relations disasters.

There is abundant evidence of the impact of homeowners' and neighborhood groups, but there is less understanding of where this impact comes from. One hypothesis is that homeowners have become better organized (an increase in λ). Some analysts have suggested that the organization skills of environmental groups were learned from the organizational successes of the civil rights movement and the anti-war protests. Either through imitation of these earlier groups or because of rising education and media savvy, local residents appear to have become better at using the media and the courts. Thus, the typical residential activist of 2004 seems more skilled than its counterpart from 1955.

The Ability to Use Cash to Influence Local Decision-Makers

A third possible hypothesis is that developers' ability to use cash to influence local decision-makers has fallen over time. This influence historically has come both from legal payments, in the form of campaign donations or legal cash transfers (i.e. a developer employing a politician for legal work), or illegal cash payments or bribes. Zoning environments may have become more restrictive if developers in the 1960s were more easily able to bribe local politicians than they can today. In other words, the urban growth machine described by Molotch (1976) has weakened as it has become harder for developers to transfer cash to politicians.

There is some evidence suggesting a decline in corruption over time within the United States. Glaeser and Goldin (2004) use newspaper records to show a decline in the share of articles alleging corruption between the late 19^{th} century and the mid-20^{th} century. However, their coverage does not show a significant change between 1960s and the 1990s—the period of the permitting slowdown. Anecdotes about corruption in development abound, and it may be true that such anecdotes were more common in the 1960s than today. While this hypothesis remains plausible, there is precious little evidence either supporting or refuting it.

Even if it were possible to show such a change, it would be desirable to go further and try to understand why this change occurred. One plausible explanation is that improvements in the news media have caused more attention to be paid to corrupt deals. A second explanation is that the political influence of local party machines has declined. These machines facilitated the flow of funds from developers (or anyone else) and ensured that legal repercussions from local justice would be modest. The decline of local machines might also have played a role in reducing the influence that developers were able to have on local governments.

The Value of Amenities

Another natural explanation for the rise in restrictions on new construction is that rising income levels have increased the willingness to pay for high amenity neighborhoods, and in particular, for low density neighborhoods (assuming low density is a normal good, of course). This hypothesis corresponds to an increase in the parameter u, which the model predicts should lead to a decrease in permitting as the incentive of homeowners to spend time to block new construction rises.

To evaluate the importance of rising incomes in explaining the decline in permitting, we regress the share of new housing units in 1960 on the ratio of housing prices to construction costs, density, and the logarithm of income in 1950. The coefficient on income is -.14 (with a standard error of .23), indicating that richer communities were less likely to build new housing units.

However, the magnitude of this coefficient is not large enough to explain the general decline in permitting over time. Our data suggest that permitting has declined by 37 percentage points between 1960 and today. In those same areas, real median incomes have risen by .77 log points. Using the estimated coefficient on income, together these values suggest that rising incomes can explain only about 29 percent of the fall in residential construction. Rising American incomes are important, but they are only a small part of the change in the permitting environment.

Another way to think about the effect of income is to consider the zoning environment of very rich places in 1960. If the income hypothesis is correct, then permitting in these places should have been as restrictive in 1960 as the entire metropolitan areas of Boston or New York in more recent years. However, places like New Rochelle, NY, San Mateo, CA and West Orange, NJ, each allowed at least 10 times as much development in the 1950s as metropolitan areas with comparable incomes today. Again, this analysis suggests that the complete story goes well beyond the explanation that homeowners became richer.

Changes in the Housing Market

A final hypothesis is that the impact of new construction on housing prices has changed over time. In the 1950s, housing costs were low, lower incomes made people less concerned about environmental amenities, and an absence of construction in previous decades may have meant that the quality of new housing was significantly higher than older units. For these reasons, new construction may not have led to major reductions in housing prices for existing units and as such, homeowners had much weaker incentives to fight new construction. In 2004, however, homeowners appear to believe that new construction will significantly reduce housing prices. Certainly, the evidence in this paper linking rising housing prices to reductions in construction suggests that they are right. As in the case of the previous theories, we have little evidence on the relevance of this theory and we look to further research to examine this hypothesis more thoroughly.

IV. Conclusion

Housing is one of the most important elements in household portfolios and budgets. Over the past 30 years, the dispersion in prices across American markets has increased substantially. In much of the country, new housing units still are abundant and housing prices remain low. In contrast, new construction has plummeted and housing prices have soared in a small, but increasing number of places. These changes do not appear to be the result of a declining availability of land, but rather are the result of a changing regulatory regime that has made large-scale development increasingly difficult in expensive regions of the country.

Changes in housing supply regulations may be the most important transformation that has happened in the American housing market since the development of the automobile, but they are both under-studied and under-debated. The positive research agenda going forward should be to understand why these changes have occurred and what relationship exists with other major trends in the American society. The normative policy agenda should be to better understand the costs and benefits of limits on new construction. The costs appear to include higher prices and a misallocation of labor, while the benefits include internalization of construction-related externalities. Given the implications of this regulatory shift, the economics profession could make a major contribution by analyzing the welfare effects of regulation on the rise in housing prices.

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Appendix: Proofs of Propositions

Proof of Proposition 1:

We use the notation that $\Phi_R = \frac{U(\underline{D}) - U(\underline{D}+\Delta) + e^{-rL}\left(\hat{a}(\underline{D}) - \hat{a}(\underline{D}+\Delta)\right)}{r}$ and

$\Phi_D = \Delta\left(\frac{U(\underline{D}+\Delta) - \underline{U} + \hat{a}(\underline{D}+\Delta)}{r} - K\right)$ for the losses and gains from development for the homeowners and the developer respectively. For the developer, the marginal product of spending an additional dollar is $g_C'(C_D - C_R)\Phi_D - 1$ and the marginal product of spending more time equals $g_T'(T_D - T_R)\Phi_D - W_D$. The second derivative of the developer's utility with respect to spending is $g_C''(C_D - C_R)\Phi_D$ and the second derivative of the developer's utility with respect to time is $g_T''(T_D - T_R)\Phi_D$. For the homeowners, the marginal impact of more spending is $\lambda h \Phi_R \underline{D} g_C'(C_D - C_R) - 1$ and the marginal impact of more time is $\lambda h \Phi_R \underline{D} g_T'(T_D - T_R) - W_D$. The second derivative with respect to spending is $-\lambda h \Phi_R \underline{D} g_C''(C_D - C_R)$ and the second derivative with respect to time is $-\lambda h \Phi_R \underline{D} g_T''(T_D - T_R)$. Obviously, if the second order conditions hold for the homeowners they cannot hold for the developer and vice-versa. Because the problem is inevitably concave for one of the actors and convex for the other, it cannot be an optimum in which for both actors use both technologies.

We have assumed that each actor uses at least one technology, so it remains to be shown which technology will be used by each actor. For the homeowners to use cash, it must be the case that $\lambda h \Phi_R \underline{D} g_T'(-T_R) - W_R < 0 = \lambda h \Phi_R \underline{D} g_C'(C_D) - 1$ which would imply that $g_T'(-T_R)/g_C'(C_D) < W_R$. For the developers to use time,

$g'_C(C_D)\Phi_D - 1 < 0 = g'_T(-T_R)\Phi_D - W_D$, but this would imply that $g'_T(-T_R)/g'_C(C_D) > W_D$ which is a contradiction. On the other hand, if the homeowners use time and the developers use cash, this must imply that

$\lambda h \Phi_R \underline{D} g'_T(-T_R) - W_R = 0 > \lambda h \Phi_R \underline{D} g'_C(C_D) - 1$ and

$g'_C(C_D)\Phi_D - 1 = 0 > g'_T(-T_R)\Phi_D - W_D$.

Proof of Proposition 2: Given the assumptions that have been made, the probability that the project is authorized $.5 + g_C(C_D) + g_T(-T_R) - \alpha$, where $\lambda h \Phi_R \underline{D} g'_T(-T_R) = W_R$ and $g'_C(C_D)\Phi_D = 1$.

(1) Given that the value of α does not impact the type of lobbying employed by either interest group, the probability of the project being approved will decline with α.

(2) Differentiation of $\lambda h \Phi_R \underline{D} g'_T(-T_R) = W_R$ and second order conditions implies that T_R is rising with both λ and h. As T_R rises, the probability that the project will be approved falls.

(3) If $g_C(x) = \gamma_C \bullet \tilde{g}_C(x)$ then the probability of approval equals $.5 + \gamma_C \tilde{g}_C(C_D) + g_T(-T_R) - \alpha$ and the derivative of this with respect to γ_C is

$\tilde{g}_C(C_D) + \gamma_C \tilde{g}'_C(C_D)\dfrac{\partial C_D}{\partial \gamma_C}$, where using the implicit function theorem,

$\dfrac{\partial C_D}{\partial \gamma_C} = \dfrac{\tilde{g}'_C(C_D)}{-\gamma_C \tilde{g}''_C(C_D)}$ which is positive since second order conditions have been assumed to hold, so the overall impact of γ_C is positive. If $g_T(x) = \gamma_T \bullet \tilde{g}_T(x)$ then the derivative of the probability of approval with respect to γ_T equals $\tilde{g}_T(-T_R) - \gamma_C \tilde{g}'_C(-T_R)\dfrac{\partial T_R}{\partial \gamma_T}$, where $\tilde{g}_T(-T_R) < 0$ and $\frac{\partial T_R}{\partial \gamma_T} = \frac{\tilde{g}'_T(-T_R)}{\gamma_T \tilde{g}''_T(-T_R)}$ which is positive since second order condition have been assumed, so the overall impact is negative.

(4) If $U(\underline{D}+\Delta) = U(\underline{D}) - u\Delta$, then the parameter u only enters through the terms

$\Phi_R = \frac{U(\underline{D}) - U(\underline{D}+\Delta) + e^{-rL}\left(\hat{a}(\underline{D}) - \hat{a}(\underline{D}+\Delta)\right)}{r}$ and

$\Phi_D = \Delta\left(\frac{U(\underline{D}+\Delta) - \underline{U} + \hat{a}(\underline{D}+\Delta)}{r} - K\right)$. Differentiation then yields the result that

$\frac{\partial T_R}{\partial u} = \frac{\Delta g'_T(-T_R)}{r\Phi_R g''_T(-T_R)} > 0$ and $\frac{\partial C_D}{\partial u} = \frac{-\Delta^2 g'_C(C_D)}{-\Phi_D g''_C(C_D)} < 0$, so lobbying by homeowners increases and lobbying by developers decreases. Thus, the probability of approval must fall.

Table 1: Real House Prices Over Time 316 Metropolitan Areas; $2000						
	1950	1960	1970	1980	1990	2000
Mean	$59,575	$73,741	$80,556	$109,570	$120,929	$138,601
% Change in Mean Over Decade	--	23.8%	9.2%	36.0%	10.4%	14.6%
Real Single-Family Construction Costs Over Time One-Story, Modest Quality Home $2000/ft²						
	1950	1960	1970	1980	1990	2000
Mean	$49.70	$58.50	$63.60	$65.40	$63.30	$61.60
% Change in Mean Over Decade	--	17.7%	8.7%	2.8%	-3.2%	-2.7%

Notes:
1. The source for the house price data is Gyourko, Mayer, and Sinai (2004). Prices are for single-family homes, with metropolitan area values being aggregated across their county components based on 1999 definitions from the Office of Management and Budget. Prices are reported for individual primary metropolitan statistical area (PMSA) components of consolidated metropolitan statistical areas (CMSAs).

2. Construction costs are from the R.S. Means Company, a consultant and data provider to the home building industry. The underlying data include material costs, labor costs, and equipment costs for a lower-quality, one story house without a basement that still meets building code requirements in each market. See the following two publications by the R. S. Means Company for greater detail on the underlying cost data: *Residential Cost Data*, 19th annual edition, (2000) and *Square Foot Costs*, 21st annual edition (2000), both published by the R.S. Means Company.

Table 2: Price-to-Construction Cost Ratios (P/CC) Over Time 102 Metropolitan Areas						
	1950	1960	1970	1980	1990	2000
Mean	0.83	0.90	0.88	1.15	1.35	1.46
Standard Deviation	0.16	0.16	0.16	0.30	0.59	0.55
90th Percentile	1.04	1.10	1.12	1.49	2.17	1.85
Maximum	1.19	1.30	1.31	2.17	3.49	4.06
	Implied Land Share (~1 – CC/P)					
90th Percentile	0.04	0.09	0.11	0.33	0.54	0.46
Maximum	0.16	0.23	0.24	0.54	0.71	0.75

Notes: Mean house prices are constructed for each metropolitan area using county-level data from the relevant decennial census. Construction cost data are from the R.S. Means Company as described above. Various adjustments to the price and cost data as described in the text.

Table 3: New Housing Units as a Fraction of Initial Housing Stock			
	25th percentile	Median	75th percentile
1960	.33	.40	.59
1970	.24	.35	.45
1980	.23	.36	.53
1990	.11	.18	.26
2000	.09	.14	.19

Note. New units in 1960, 1970 and 1980 are the number of housing units built since the previous census. New units in 1990 and 2000 are the total number of building permits. Sample is limited to a balanced panel of 102 metropolitan areas for which it is possible to calculate housing prices relative to construction costs.

Table 4:
Declines in Residential Construction Controlling for Density

Constant (1960)	.52 (.04)	.46 (.06)	.58 (.07)
Year			
1970	-.14 (.02)	-.09 (.05)	-.17 (.05)
1980	-.12 (.03)	-.03 (.09)	-.11 (.07)
1990	-.32 (.03)	-.24 (.08)	-.35 (.07)
2000	-.37 (.03)	-.29 (.09)	-.37 (.08)
Year* P/CC_{t-10}			
1970			-.36 (.20)
1980			-.51 (.21)
1990			-.70 (.28)
2000			-.83 (.28)
Log $density_{t-10}$		-.10 (.02)	-.12 (.02)
P/CC_{t-10}		.15 (.05)	.89 (.30)
Log $income_{t-10}$		-.06 (.15)	-.08 (.14)
Adjusted R^2	0.27	0.42	0.48

Note. Dependent variable is the number of new units in each decade relative to the initial housing stock. New units in 1960, 1970 and 1980 are the number of housing units built since the previous census. New units in 1990 and 2000 are the total number of building permits. Sample is limited to a balanced panel of 102 metropolitan areas for which it is possible to calculate housing prices relative to construction costs. Density is the number of housing units per square mile. Income is a weighted average of median family income by county, where the weights are the fraction of families in the metropolitan area. Each right-hand side variable is expressed relative to its sample average. Standard errors are clustered by metropolitan area.

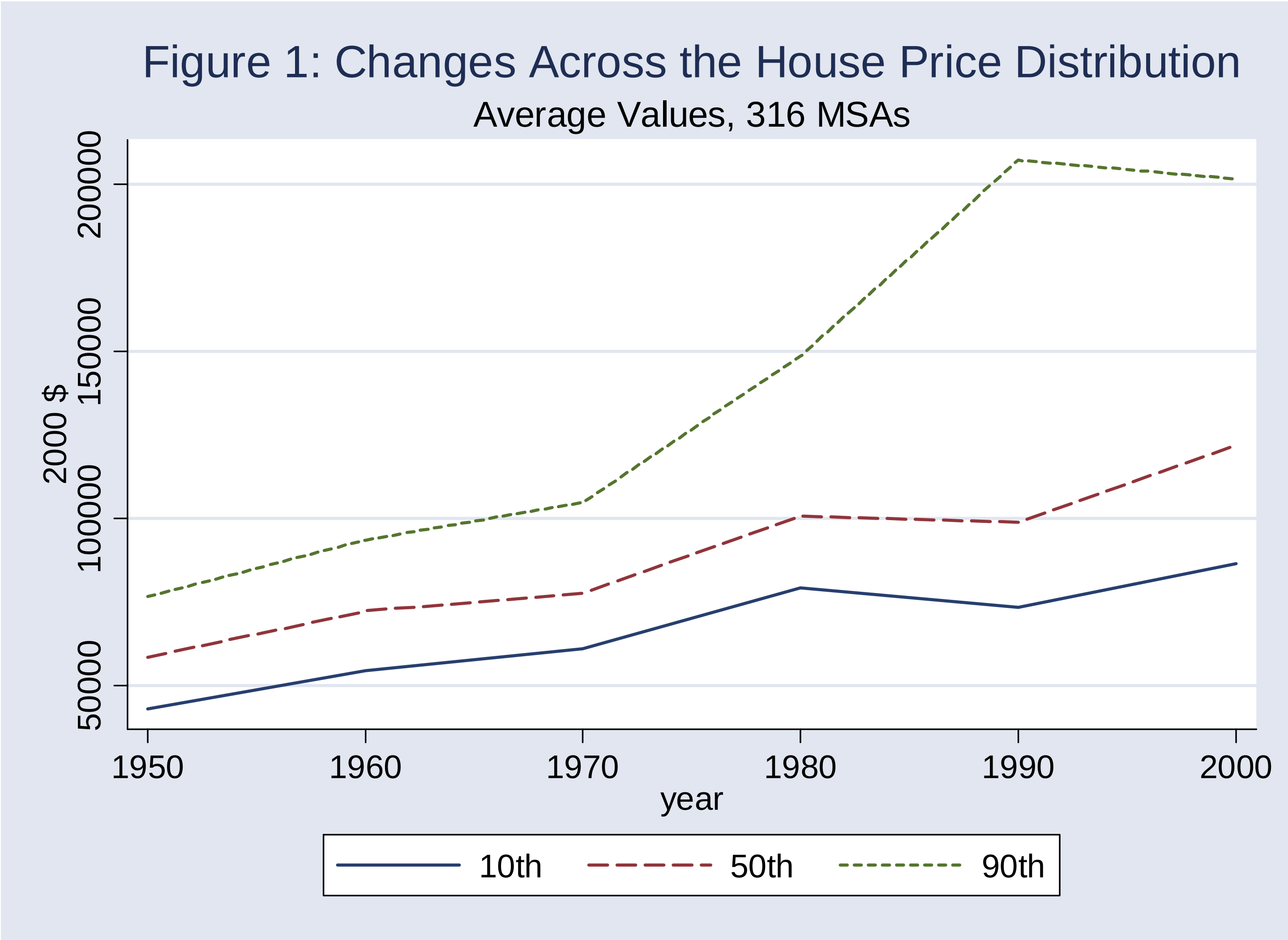
Figure 1: Changes Across the House Price Distribution
Average Values, 316 MSAs
2000 $
50000
100000
150000
200000
1950
1960
1970
1980
1990
2000
year
10th
50th
90th

Figure 2: House Prices Relative to Construction Costs in 1970 and 2000

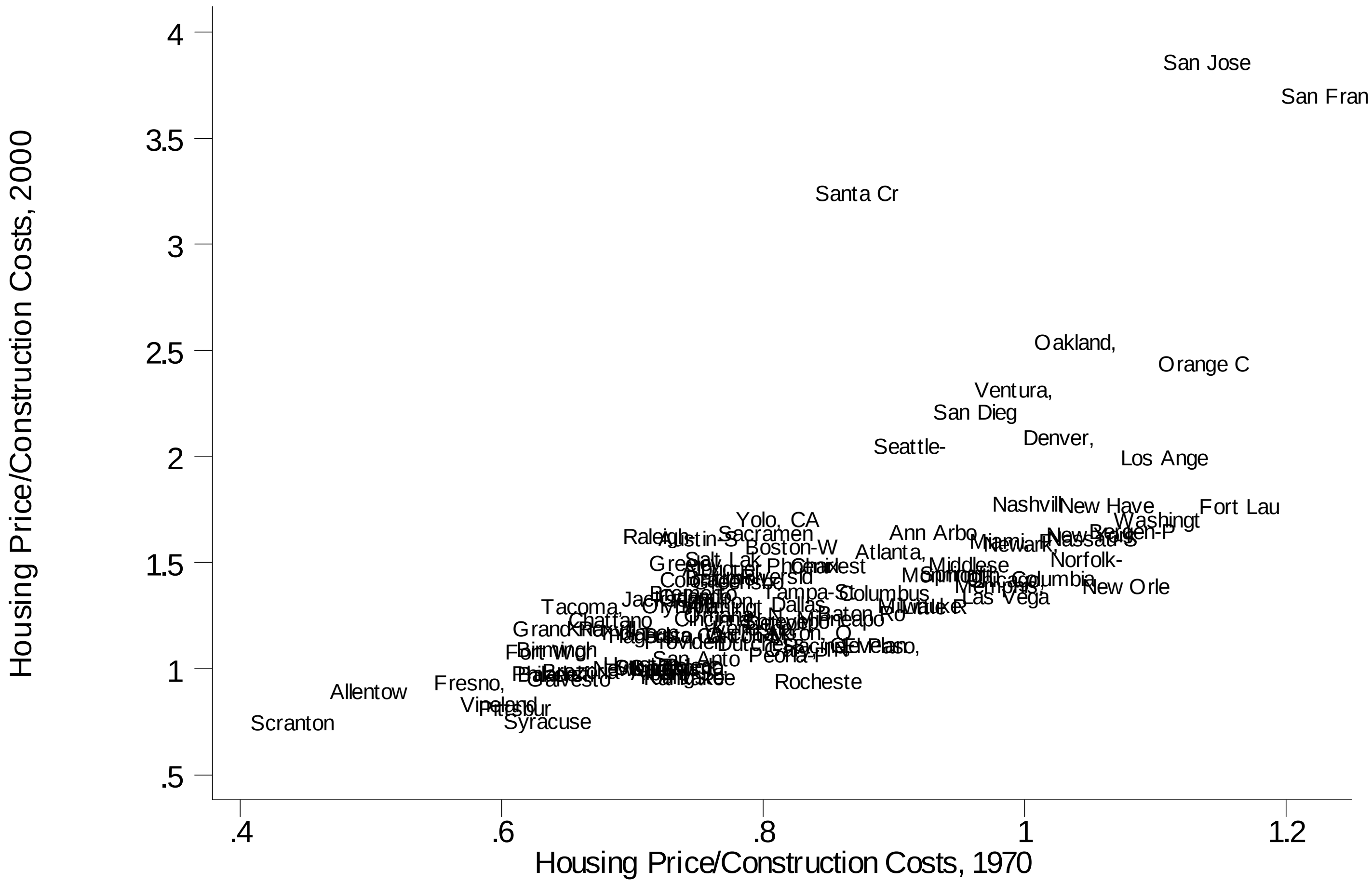

Figure 3: Declining Construction Intensity in Select High House Value Markets San Francisco, Los Angeles, and New York PMSAs, 1960-2000

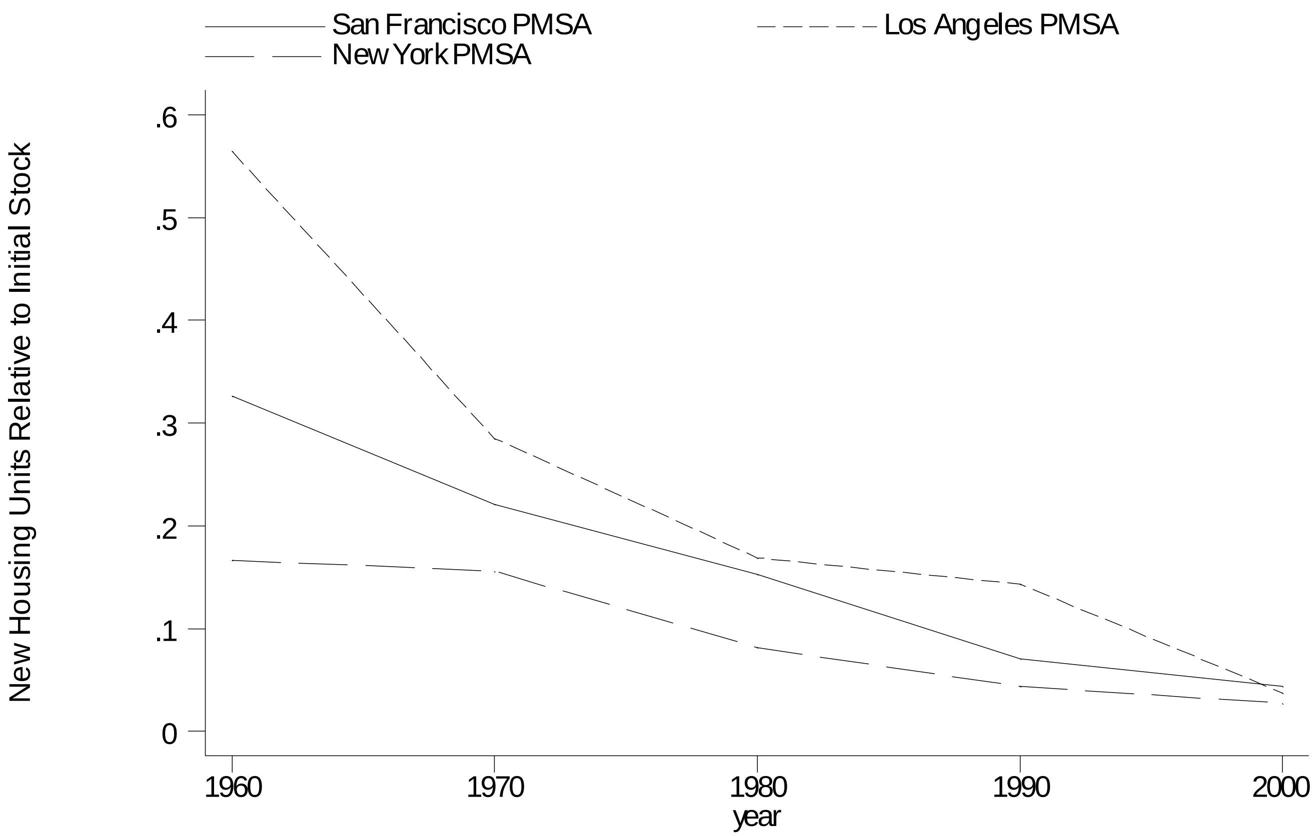

Figure 4: Residential Construction and P/CC in the 1970s
Metropolitan Areas with P/CC > 1 in 1970

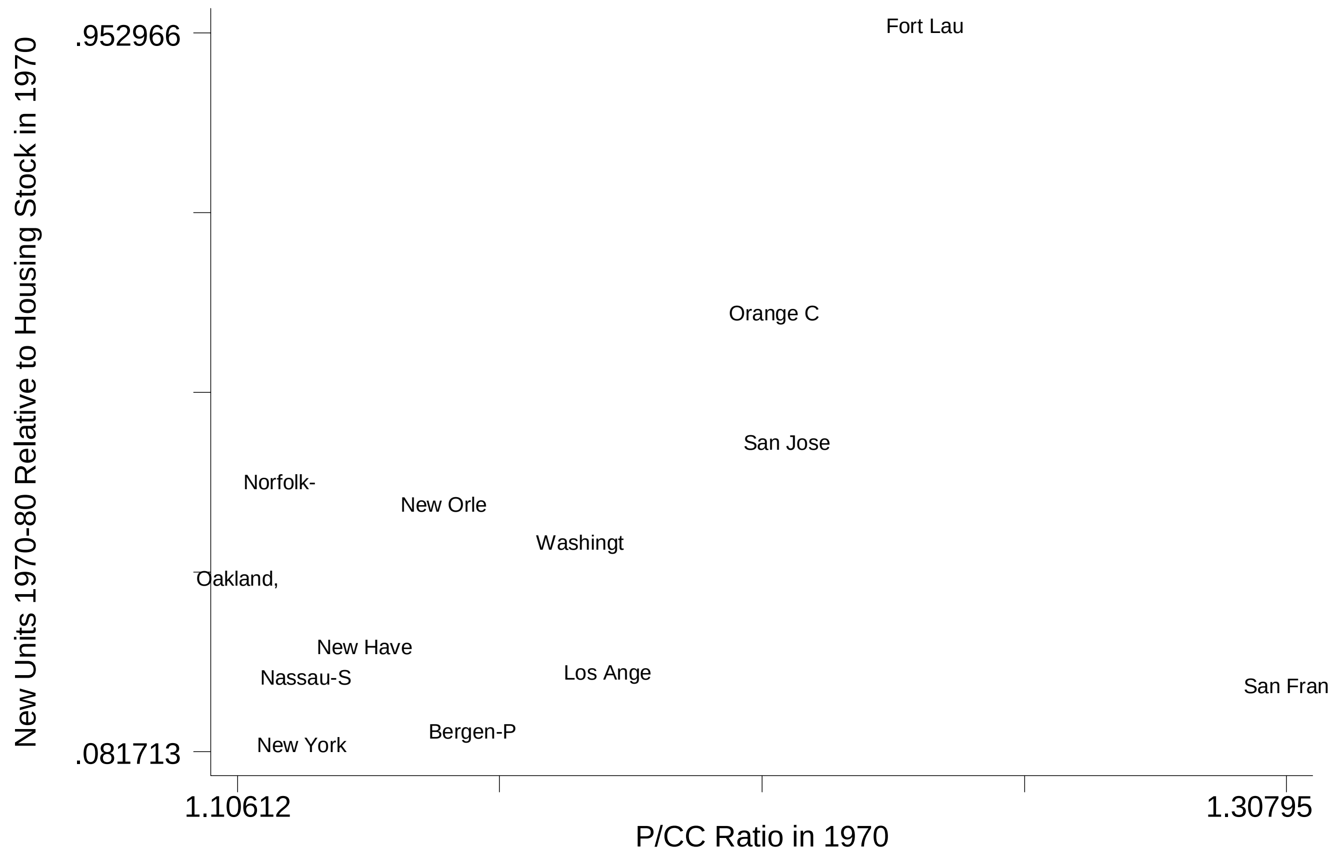

Figure 5: Residential Construction and P/CC in the 1990s
Metropolitan Areas with P/CC > 1 in 1990

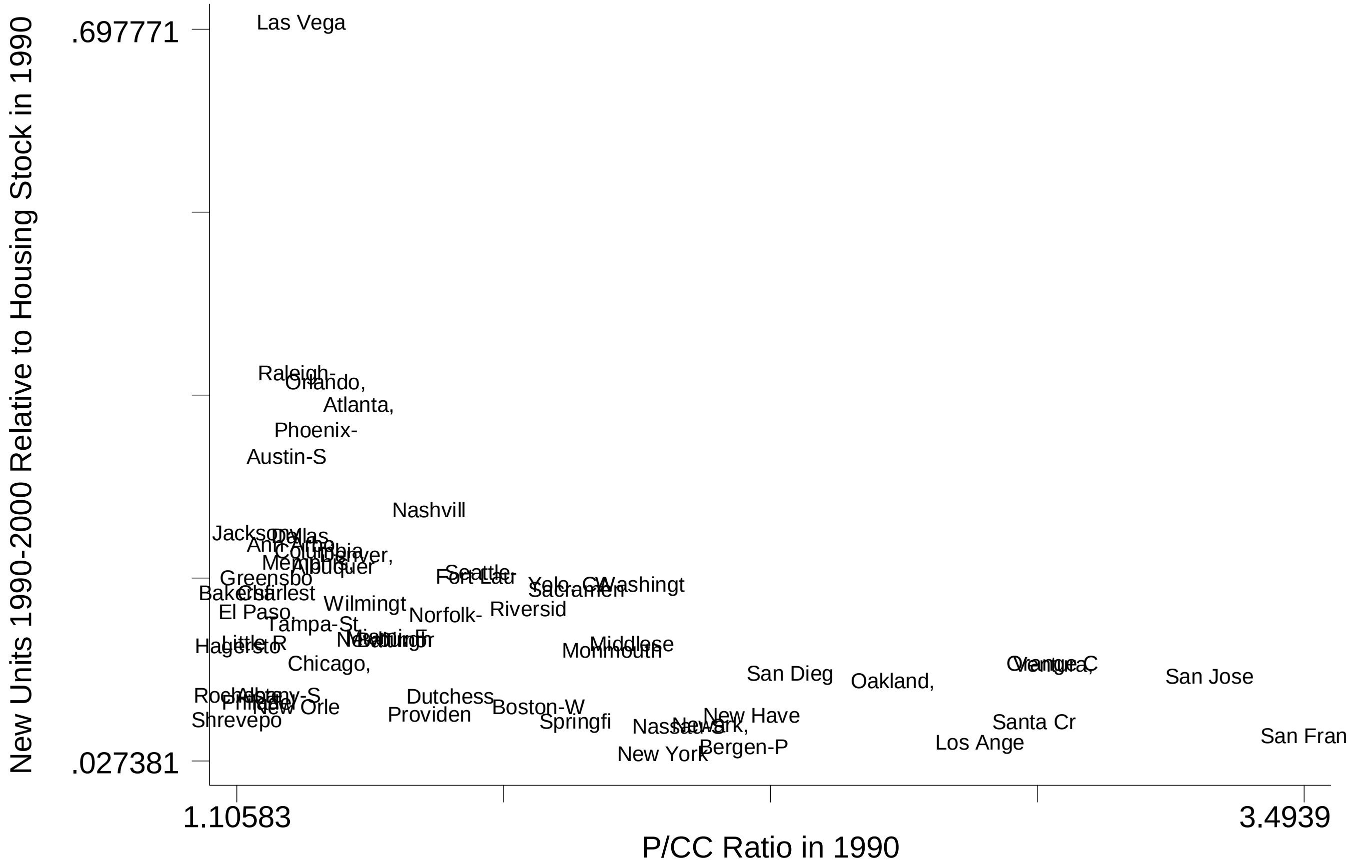

Figure 6: The Intensity of New Single Family Construction and Density in the San Francisco PMSA (Permit-Issuing Places, 1980-2002)