Land Use Politics, Housing Costs, and Segregation in California Cities

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Abstract

California cities have some of the highest housing prices in the United States, but most of the state's urbanized land is set aside for the least efficient uses. Using data from a new survey of land use planners in approximately 270 California jurisdictions (the Terner Center California Residential Land Use Survey), I find that the share of land zoned for single-family housing and more restrictive minimum lot size requirements predict higher housing costs compared to other jurisdictions in the same metropolitan area. Likewise, the degree of political opposition to housing development predicts higher prices, longer delays for lawful projects, and a lower likelihood of zoning reform. This opposition to development is greater in areas with a higher proportion of non-Hispanic White and highly educated residents. Finally, I find that both the intensity of land use and degree of opposition to development predict a lower share of Black, Hispanic, and blue-collar workers living in the area, compared to jurisdictions in the same metropolitan area.

Introduction

With the exception of Hawaii and the District of Columbia, California has the nation's highest housing prices in the country, including the four most expensive metropolitan areas led by San Jose and San Francisco.[1] Not surprisingly, housing affordability is mentioned by Californians as one the most important issues facing the state (Baldassare, Bonner, and Dykman, 2018).

Many struggle to afford housing in California's large metropolitan areas, and state policy experts largely agree that lack of housing supply growth is a major part of the problem.[2] Meanwhile, the state legislature had been debating a bill that would force changes to zoning laws to allow moderately dense apartment buildings near rail lines and job centers, but the legislation has since stalled.[3]

A large academic literature finds that restrictive zoning laws result in higher housing prices by suppressing the supply of housing (Fischel, 2015; Glaeser, 2011; Glaeser and Gyourko, 2018). Among the many summary measures of zoning regulations, Rothwell (2009) finds that regulations on density (e.g., those pertaining to lot size regulations and the number of units allowed per acre) are the most predictive of housing prices.

Likewise, by segmenting land use by type of housing (e.g., single-family detached, single-family attached, and multifamily), zoning laws create classes of neighborhoods and jurisdictions that segregate people by income, class, and race, as a number of studies have found (Pendall, 2000; Rothwell and Massey, 2010; Rothwell, 2012). In a new book, Trounstine (2018) argues that political support for segregation was a key factor motivating zoning laws. Recent census data analyzed by Frey (2017) finds that Black-White segregation remains high, despite modest reductions in many large metropolitan areas. In California, Los Angeles and San Francisco are among the large areas that continue to exhibit high levels of racial segregation.

Thus far, zoning research has been limited by a lack of data. Neither the federal government nor individual states collect and publish data on land use regulations. Existing studies typically utilize one-time surveys conducted by academics. Three surveys have received the bulk of attention from scholars. A national survey of zoning in approximately 2000 jurisdictions was conducted by scholars at the Wharton School (Gyourko, Saiz, and Summer, 2008). Shortly before, Pendall, Puentes, and Martin (2006) conducted a survey of a similar number of jurisdictions within the 50 largest metropolitan areas, allowing for metropolitan level summary statistics. In 2004, a survey of zoning regulations in Massachusetts was conducted by the Pioneer Institute and Rappaport Institute for 187 local governments within 50 miles of Boston (Glaeser and Ward, 2009).[4] No large database allows scholars to calculate the percentage of land available for multifamily housing or the average number of units permitted per acre. Likewise, with one limited exception noted in Rothwell (2012), there are no databases of changes in zoning laws over time.

The present study draws on the recent Terner California Residential Land Use Survey (TCRLUS) (Mawhorter and Reid, 2018a). The TCRLUS collected detailed zoning information from city planners in 252 incorporated cities and 19

1 My analysis of median gross rent from the 2017 American Community Survey 1-year estimates via American Fact Finder.

2 Dillon, L. (2018). "Experts say California needs to build a lot more housing. But the public disagrees." Los Angeles Times. Retrieved from: https://www.latimes.com/politics/la-pol-ca-residents-housing-polling-20181021-story.html.

3 Dillon, L. (2019). "High-profile California housing bill clears hurdle after tense debate over local control." Los Angeles Times. Retrieved from: https://www.latimes.com/politics/la-pol-ca-senate-bill-50-changes-20190424-story.html.

4 Pioneer Institute for Public Policy Research and Rappaport Institute for Greater Boston. (2005). Massachusetts Housing Regulation Database. Prepared by Amy Dain and Jenny Schuetz.

county unincorporated areas. The TCRLUS was conducted between August 2017 and October 2018 (Mawhorter and Reid, 2018b).

The database offers in-depth measures of zoning at the place level and planners' perspectives on the political economy of support or opposition to housing development. I take advantage of these data to merge in data from the U.S. Census Bureau and other sources to study how zoning policies correspond to housing prices, racial, and class-based segregation. The theoretical foundation is that anti-density regulations limit the intensity of land use and drive up housing prices. Within the context of a metropolitan area, aggressive anti-density regulation will deter lower-income households from living in that place but push up their share of population in surrounding places within commuting distance. If zoning laws and political opposition to development are endogenous to demand for housing from lower-income residents, then laws may become more restrictive in response to potential market participation from lower-income households. This dynamic is consistent with various theoretical perspectives on zoning (Rothwell and Massey, 2010; Rothwell, 2012; Trounstine, 2018; Einstein, Palmer, and Glick, 2019).

The paper starts by assessing the relationship between the intensity of land use and local housing prices. It then examines the political context of land use laws and how opposition to development may create costs to developers that go beyond zoning statues. I then turn to how the intensity of land use and the local political environment predict segregation by race and class.

Methods

This study focuses on how zoning affects the density of residential land use. I construct two principal measures of anti-density zoning used throughout the analysis and a measure of political opposition to development. I also create a variable intended to capture the net support of local citizens and public officials for housing development, irrespective of zoning laws. These measures are derived from the TCRLUS. Then, I describe my main measures of racial and class-segregation, which draw on U.S. Census Bureau data.

Share of developable land allocated to single-family housing

This measures what percentage of "developed or developable" land is zoned for one of three categories: single-family detached units, multifamily units, or non-residential uses. The TCRLUS does not ask about single-family attached units (e.g., townhomes). I use the percent of land designated as single-family as a measure of constraints on more affordable higher-density housing. This measures what economists call

Table 1: Regulations on the intensity of residential land use

Item	Median response: single-family	Median response: multifamily
Minimum lot size: _____ square feet	6,000	6,000
Minimum lot width or street frontage: _____ feet	60	60
Maximum floor area ratio: _____ FAR	0.5	0.65
Maximum density: _____ units per acre	7	24
Maximum lot coverage: _____ % of lot	0.4	0.55
Height limit: _____ feet	30	35
Front yard setback: _____ feet	20	20
Side yard setback: _____ feet	5	5
Back yard setback: _____ feet	15	15

Source: Terner California Residential Land Use Survey. Items read: Please enter the typical zoning standards in your jurisdiction for single-family detached housing (or multifamily housing), in the most common type of zoning where single-family (or multifamily housing) can be built. If your single-family detached (or multifamily) zoning does not specify a certain standard, leave that standard blank.

the extensive margin of land use—whether something can be used for dense housing or not.

When asked how much land is allowed for each use category, the TCRLUS allowed planners to answer almost none (0-5 percent), little (5-25 percent), some (26-50 percent), a lot (51-75 percent), most (76-95 percent), or almost all (96-100 percent). To convert these valuables into a continuous variable, I imputed the mid-point percentage of land within each band. To further reduce imprecision, I added the imputed values together to get a re-estimated total amount of land, and then recalculated the percentages, accordingly. Using this method, if a planner responded with "a lot (51-75 percent)" for each of the three categories, I would force the percentages to be 33 percent for each category rather than the mid-point between the two values (63 percent). In this way, the final value indicates the extent to which jurisdictions prioritize single-family zoning.

Minimum lot size regulations

This measures the intensity of residential land use within the designations of single-family or multifamily zoning. Even within the broad classification of single-family and multifamily housing, jurisdictions vary in the number of dwelling units allowed per acre of land, the amount of land that can be covered by the structure (e.g., yard space), height limits, and related features. The TCRLUS collects data on a number of these features, which are summarized in Table 1.

I considered all of the above variables but ended up using minimum lot size because it has been identified as important to local housing markets in previous studies, and does a better job of explaining the variation in outcomes, as I explain below.

To operationalize the minimum lot size item, I multiply the minimum lot size requirement for single-family housing by the share of developable land devoted to single-family housing and add this to the product of the minimum lot size for multifamily housing and the share of land devoted to multifamily housing. This yields a land-use weighted measure of minimum lot size requirements, which relates to the intensity of permitted use. A higher value indicates that land is used less efficiently.

In the analysis that follows, this single measure of the jurisdiction's minimum lot size requirement outperforms a summary measure that combines all of the indicators above—after first standardizing each item and changing the sign on those that indicate lower restrictions. It also outperforms each item individually. These results are not published, but they are available upon request. I do find evidence that some of these other measures matter, but when included in the same model as average minimum lot size, the latter is significant where the others are not.[5]

My preferred measure would be one that combines the intensity of land use (by permitted density per acre) with the extensive margin (percent of land zoned in each category) to calculate permitted units per acre of land in the jurisdiction, but I believe the categorical responses are not precise enough to estimate this.[6]

The political context of housing development

Previous zoning studies that have created summary measures, like the Wharton Index (Glaeser and Gyourko, 2018), have incorporated what could be deemed process regulations, which include things like what governing agency or authority holds final power of zoning decisions (e.g., a land use planning agency or elected officials), political context, and bureaucratic efficiency. I therefore also examine several items related to these concepts from the TCRLUS.

One question asks: "Who is typically authorized to grant preliminary plat/plan approval for the following types of development applications?" I test whether zoning officials answered by choosing the option "City council or other elected legislative body" instead of "Jurisdiction staff or

5 In models predicting occupational segregation, only minimum lot size and land area designations (e.g., the share of land for single-family housing) are significant when both measures are included. In models predicting racial segregation, front and side setbacks and height limits are also significant, in addition to land area designations. In models predicting rents, side single-family setbacks are also significant but no other variables except by-right development, which becomes insignificant if the percentage of land for single-family use is also included.

6 Such a measure could be constructed in the TCRLUS by multiplying the maximum allowable density for single-family units by the share of land zoned for single-family units and adding this to the maximum allowable density for multifamily units times the share of land zoned for multifamily. However, given the nature of the survey collection, the data appear too imprecise to support such a measure. The maximum allowable number of units varies considerably within the categories of single-family or multifamily housing, but the TCRLUS does not have data on what percentage of land is allocated to these specific categories or how maximum allowable density varies within them. The TCRLUS, for example, does not collect information on the amount of land for single-family attached housing or the number of units permitted in those designations. Thus, not surprisingly, my measure of units per acre is not correlated with outcomes in most models that control for the share of land zoned for single-family use and the minimum lot size requirement, so I discard it in favor of those two.

zoning administrators" or "Planning board or commission." The idea is that elected officials might be swayed more easily by local voters—especially homeowners—who are more likely to oppose zoning and participate in local government meetings (Einstein, Palmer, and Glick, 2019; Trounstine, 2018).

Along those lines, I also include an item that captures political support and opposition for zoning. Summary data (Appendix Table 1) shows that the planners who answered the TCRLUS indicated that citizens were much more likely to oppose housing developments than officials. The TCRLUS asks two questions about opposition and support, worded as follows: "In your experience, how often do local citizens and city officials actively oppose [support] residential development projects?" Answers are on a 1-6 scale from "Almost never" to "Almost always". I calculated net support by subtracting the opposition response from the support response. Appendix Table 1 shows that net support from citizens is slightly negative, meaning that the average planner views his or her fellow citizens as more likely to oppose than support development. The opposite was the case for officials, who were rated as much more likely to support development. In preliminary regression models, both responses were significant, so I used a combined measure for net support that is the mean net support from both groups.

To further study political constraints on development that go beyond the legal code, I include a measure of by-right development, in the form of "yes" answers to the question: "Does your jurisdiction allow by-right development without discretionary review for some types of projects, or in some areas of your jurisdiction?" I also looked at delays in approvals for single- and multifamily projects with five or more units. Planners were asked how long it typically takes to win approval for completed projects that align with the zoning laws. Areas with longer delays impose higher costs on developers beyond the statutory zoning laws. Planners were also asked to list factors that contribute to delayed development, and I consider whether they mention public opposition and public meetings.[7] Finally, I considered whether zoning has become more or less restrictive according to planners over the last five years.

To examine whether these political variables are confounded by national political preferences or party ideology, I obtained data on the number and percentage of votes that went to each presidential candidate in the 2016 U.S. general election from the California Secretary of State. These data were made available at the jurisdiction level and readily matched to the city names from the Terner database.

Measuring jurisdiction-based segregation

This study looks at how zoning laws relate to three outcomes of interest: housing costs, racial segregation, and occupational segregation.

To measure these concepts, I downloaded data from the 2013-2017 American Community Survey (ACS), which provides 5-year estimates (U.S. Census Bureau 2017) used in this study at the level of place, county, and metropolitan area.

To measure housing costs, I use the log of median gross rent and median home values. To capture non-price related features of housing that affect costs, I also included the median number of rooms, which speaks to the intensity of a structure's use. A housing unit with more rooms implies a larger space with a less intensive use of land per unit of housing.

Segregation is typically measured at the neighborhood level, but the zoning data is at the place level. To measure segregation, I calculate unevenness in the populations of interest by dividing their share of the metropolitan area's population for the relevant group to the share of total metropolitan population living in the place. Formally, the formula is represented in equation one, where S is segregation for group "i" living in place "p," which is nested in metropolitan area "MSA."

$$1.\ S_{i,place} = \frac{\frac{P_{i,place}}{P_{i,MSA}}}{\frac{P_{t,place}}{P_{t,MSA}}}$$

I calculate this for all major racial groups but focus on measures that combine Hispanic and Black residents, since California has a relatively large Hispanic population but varies greatly by region in its Black population.

To measure occupational segregation, I group workers into professional and blue-collar occupations and consider a few other designations as robustness checks. Professional occupations consist of workers in the following categories: management, business, and financial occupations; computer engineering, and science occupations; education, legal, community service, arts, and media occupations; healthcare practitioner and technical occupations. Blue-collar occupations are all non-professional occupations. Blue-collar non-service occupations are those in natural resources,

7 One important caveat is that planners might systematically understate (or overstate) the difficulty of getting approval. Some evidence for this was found in recent work on the Terner data (O'Neill, Gualco-Nelson, and Biber 2019).

construction, and maintenance occupations; production, transportation, and material moving occupations. Service occupations consist of workers in the following categories: healthcare support occupations; protective service occupations; food preparation and serving related occupations; building and grounds cleaning and maintenance occupations; personal care and service occupations.

To control for regional housing demand, I calculated the number of jobs in the county for every housing unit in the place. There is no expectation that every worker needs his or her own home, but this, nonetheless, indicates the intensity of housing demand. Since Census measures where people live but not (directly) where they work, I used data from the Bureau of Economic Analysis (2017) to measure jobs. In essence, this measures available demand for housing in the county relative to the number of units presently in the jurisdiction. Other control variables include the percentage of workers with long commute times (above 30 minutes), which is from the ACS and whether or not the jurisdiction is the principal city of a metropolitan area.

Appendix Table 1 summarizes the key variables used in the analysis. The general approach will be to regress the outcome of interest on the zoning variables, controlling for metropolitan fixed effects and the control variables mentioned above. This should be taken as descriptive evidence as this method can not identify the causal effect of zoning and omitted variables may be correlated with both zoning and the outcome of interest. Nonetheless, this exercise answers a basic question: Are California jurisdictions with more restrictive anti-density zoning more expensive and more segregated? From a methodological perspective, this analysis also helps better understand the strengths and weaknesses of survey-based approaches to collecting zoning data.

Findings

Single-family zoning and larger minimum lot requirements restrict the intensity of land use and predict higher housing prices in more restrictive jurisdictions.

Less than one-quarter of land in California municipalities is zoned to allow multifamily housing. By contrast, just over half (56 percent) of land is zoned to allow for single-family detached housing. This pattern plays out across California's largest metropolitan areas, including San Jose, San Francisco, and Los Angeles.

At a time when the unaffordability of housing is a highly salient issue for the public and its political representatives in California, it is striking that land is used so inefficiently. Almost no jurisdictions in the entire state permit most developable land to be used for multifamily units, which would include apartments and condos (Table 2). Meanwhile, the least efficient use of land—single-family detached—dominates the majority of space in the state that planners consider developable land. Single-family attached includes townhomes and other higher density forms of housing that would be more efficient than single-family detached.

As expected, suburban governments are less efficient than central city governments in their land use. Central cities

Table 2: Share of land in California zoned for single-detached and multifamily uses by local government

	Single-Family	Multifamily
Missing	0.2%	0.3%
Almost none (0-5%)	0.0%	5.8%
Little (6-25%)	9.0%	66.9%
Some (26-50%)	27.4%	23.2%
A lot (51-75%)	47.0%	2.7%
Most (76-95%)	15.3%	1.1%
Almost all (96-100%)	1.0%	0.0%

Source: Terner California Residential Land Use Survey. 251 jurisdictions included.

Table 3: Land use and intensity by type of California jurisdiction

	Single-family detached	Multifamily	Non-residential	Average minimum lot size per unit in acres	Net support of citizens for development
Suburban government in metropolitan area	54%	18%	28%	0.22	-4%
Central city of metropolitan area	42%	18%	40%	0.14	-29%
Outside of metropolitan area	51%	26%	23%	0.18	47%
All jurisdictions	47%	18%	34%	0.18	-17%

Source: Terner California Residential Land Use Survey. 251 jurisdictions included. Net support of citizens is calculated by subtracting the percentage of responses expressing that citizens usually support development (4-6 on the 1-6 scale) from the percentage of responses indicating that citizens usually oppose development.

are home to business districts with high-demand for nearby housing, and land tends to be more expensive for that reason. This is reflected in smaller minimum lot size requirements, but strikingly, central city governments in California do not devote any more land to multifamily uses than their suburban counterparts. Jurisdictions outside of metropolitan areas allow the most multifamily housing, though the longer distances to job centers make this of marginal value to the state's residents (Table 3).

Somewhat surprisingly, planners view residents of central cities as more opposed to development than residents of suburban governments. Still, across all jurisdictions planners are 17 percentage points more likely to say their citizens frequently oppose development than frequently support it.

Among the largest metropolitan areas in the state, this pattern of favoring single-family land use is striking. In none of the six largest metropolitan areas is multifamily permitted on par with single-family uses. In Riverside and San Jose metropolitan areas, multifamily housing is only permitted on less than one-quarter of land. Riverside's municipalities also stand out for having excessive minimum lot size requirements that suggest roughly three units per acre is the typical standard (Table 4). Moreover, from the perspective of planners, opposition to development from citizens is very strong in these areas, with the exception of Sacramento (where citizens are viewed as favorably disposed to development) and Riverside where opposition is only slightly stronger than support. In San Diego, San Francisco, Los Angeles, and especially San Jose metropolitan areas, however, planners are much more likely to state the citizens frequently oppose residential development.

Jurisdictions with more anti-multifamily zoning are more expensive. A jurisdiction's average minimum lot size requirement is very strongly and robustly correlated with local rental prices, housing values, and the size of housing units, measured by the number of rooms.

To illustrate the relationship between housing costs and minimum lot size standards, I categorized each jurisdiction by quartile with the highest being those jurisdictions with the highest (and most restrictive) minimum lot size standards. For each of the large metropolitan areas, I then calculated the ratio of median rents and home values in jurisdictions in the top quartile of lot size requirements to those in the bottom quartile. In every case except rents in the San Jose area, the more restrictive areas were substantially higher (Table 5). In Los Angeles, rents are 32 percent higher and home values 38 percent higher in jurisdiction with stringent lot size requirements compared to jurisdictions that are relatively lenient. In San Francisco, the price gaps are 36 percent and 54 percent for rents and home values. In San Jose, rents are roughly the same across zoning regimes, but home values are 78 percent higher in jurisdictions with high minimum lot sizes.

To investigate the relationship between prices and zoning more systematically, I regressed median rents, home values, and rooms on the share of land zoned for single-family uses and the minimum lot size requirements. To adjust for non-zoning characteristics that affect housing markets, I use metropolitan fixed effects. This can be interpreted as comparing the outcome of interest (e.g., rent) in each jurisdiction against the average for the metropolitan area. I also include control variables for the number of jobs in the county per unit of local housing. This picks up regional demand for housing relative to the local housing stock. Before controlling

Table 4: Share of land zoned for single- and multifamily housing in California's largest metropolitan areas, minimum lot sizes in acres, and political support for development

	Share of land zoned for single-family use (%)	Share of land zoned for multi-family use, (%)	Average minimum lot size per unit in acres	Average net support for development from citizens (%)	Jurisdictions included in survey
Los Angeles-Long Beach-Anaheim, CA	59.0	20.8	0.16	-44.7	66
San Francisco-Oakland-Berkeley, CA	53.0	21.9	0.14	-19.6	46
Riverside-San Bernardino-Ontario, CA	63.1	18.2	0.31	-3.9	27
San Diego-Chula Vista-Carlsbad, CA	34.9	22.2	0.15	-9.8	13
San Jose-Sunnyvale-Santa Clara, CA	47.2	17.0	0.16	-75.1	11
Sacramento-Roseville-Folsom, CA	56.9	31.4	0.13	19.8	10

Source: Terner California Residential Land Use Survey. "SF" means single-family detached; "MF" means multifamily. Net support of citizens is calculated by subtracting the percentage of responses expressing that citizens usually support development (4-6 on the 1-6 scale) from the percentage of responses indicating that citizens usually oppose development.

for zoning, this variable is highly significant and positive in predicting rent, home values, and rooms. I also include a measure to capture the convenience of the jurisdiction's location relative to the region's job centers. This is expressed in terms of the share of workers with long commutes. It does not predict rental prices, but it is strongly associated with lower home values but larger homes. Finally, I include a variable for whether the city is the metropolitan area's principal city (the largest in the area) or not. This variable predicts smaller homes but not prices.

The results of this analysis show that minimum lot size requirements consistently and robustly predict higher housing costs and larger homes. A one standard deviation increase in minimum lot size requirements predicts an 8 percent increase in rents and home values. Meanwhile, the share of land zoned for single-family detached use predicts higher housing home values and larger homes in models with parsimonious controls for zoning but is marginally insignificant when predicting rental prices. These regression results are summarized in Appendix Table 2.

I also examined whether other zoning-related variables explained variation in these outcomes. Whether or not the jurisdiction allows zoning permitted by-right did not matter; nor did it matter whether or not multifamily housing projects were authorized by professional zoning commissions or elected officials. However, planners who said they received more applications for large multifamily development projects did have lower rental prices, presumably because developers expected that their projects will be approved in more pro-development jurisdictions. This suggests that relaxing supply constraints would lower prices.

Table 5: Relative rents and home values in jurisdictions with high vs. low minimum lot sizes

	Median rent in highly regulated areas/Median rent in less regulated areas	Home values in highly regulated areas/Home values in less regulated areas
Los Angeles-Long Beach-Anaheim, CA	1.32	1.38
Sacramento-Roseville-Folsom, CA	1.22	1.18
San Diego-Chula Vista-Carlsbad, CA	1.48	1.90
San Francisco-Oakland-Berkeley, CA	1.36	1.54
San Jose-Sunnyvale-Santa Clara, CA	0.97	1.78

Source: Terner California Residential Land Use Survey. Values divide median rent and median home values in jurisdictions in the top quartile of minimum lot size standards compared to those in the bottom quartile. Values above 1 indicate that prices are higher in more regulated areas.

Table 6: Citizen and local official support and opposition to housing development projects in California jurisdictions (% by response)

	Citizen support	Citizens opposition	Official support	Official opposition
Almost never (0-5%)	10.3	11.7	5.4	33.6
Seldom (6-25%)	29.7	23.8	10.3	38.9
Sometimes (26-50%)	30.0	31.3	20.3	20.2
Often (51-75%)	12.6	19.3	18.4	5.7
Usually (76-95%)	12.2	9.4	26.1	1.2
Almost always (96-100%)	5.3	4.5	19.5	0.4

Source: Terner California Residential Land Use Survey

Net political support for development from citizens and officials was very strongly and robustly predictive of lower rents, lower housing values, and smaller-sized units (though only marginally in the latter case). A standard deviation increase in political support predicts 6 percent lower rents and 12 percent lower home values. Delays for rule-compliant projects were associated with higher rents and home values, but only significant in the latter case.

Finally, I also looked at how citizen support for residential development varies within these metropolitan areas. Citizen opposition does not always align with tighter regulations. In fact, across all jurisdictions, citizen opposition to development is weakly correlated with the share of land for single-family housing but not at all correlated with minimum lot size regulations, suggesting that citizen opposition can have effects on land use that go beyond the codified laws, as I explore in the next section. In Los Angeles, net citizen support is strongly negative in the areas with the lowest minimum lot size regulations and only mildly negative in the most restricted areas. The same pattern is true in Sacramento, where the most regulated areas are actually favorably disposed toward development, according to these response from planners. Yet, in San Francisco and San Diego, planners in more regulated areas rate their citizens as far more hostile to development. The next section explores how political opposition to development may manifest itself through other barriers.

Table 7: Support for development by faction, White population share, presidential vote shares, and educational attainment by quartile of political support for development in California jurisdictions

	Net support for development from public officials	Net support for development from citizens	Percent White	Percent who voted for Trump	Bachelor's or higher attainment rate
Least supportive quartile of citizens and officials	0.1	-1.7	49%	33%	43%
Second quartile	1.9	-0.5	46%	32%	37%
Third quartile	3.1	0.4	38%	33%	28%
Most supportive quartile of citizens and officials	4.3	2.8	34%	32%	22%

Source: Terner California Residential Land Use Survey, 2017 5 Year American Community Survey, and California Secretary of State, available https://www.sos.ca.gov/elections/prior-elections/statewide-election-results/general-election-november-8-2016/statement-vote/

Citizen opposition to housing development is greater in more educated jurisdictions and predicts delayed approval for projects that meet the area's legal standards.

In one third (33 percent) of California jurisdictions, planners report that citizens oppose development projects often, usually, or almost always. This is slightly higher than the percentage of planners reporting that citizens often, usually, or almost always support development (30 percent), suggesting that citizens are regarded as a constraint on development. The opposite is the case for local officials, who are regarded as often supporting development in 64 percent of jurisdictions and often opposing it in just 7 percent (Table 6).

To better understand the demographic and regulatory characteristics of areas that support and oppose development, I classified a support indicator that combines citizen and official support into quartiles. In the jurisdictions with the most support for housing, the non-Hispanic White share of the population is 34 percent and the bachelor's degree or higher attainment rate for the population aged 25 and older is just 22 percent. By contrast, in the least supportive areas, White residents comprise nearly half of the population and the bachelor's degree attainment rate is roughly double (43 percent). Despite the strong relationships with race and education, national political affiliation does not appear to be related to attitudes toward development. There is no statistically significant relationship between support for development and the share of votes from area residents that went to Donald Trump or Hillary Clinton in the 2016 general election (Table 7).

As mentioned in the previous section, political support (or opposition) to development is not meaningfully correlated with the intensity of land use, measured by the share of land devoted to single-family land use or the minimum lot size requirements. Still, this does not imply that political opposition has no effect on the housing market. Civic opposition to development predicts significantly more delays for both single- and multifamily projects with at least five units. Moreover, planners are much more likely to report that public opposition or public meetings result in development delays in areas with greater opposition to development (Table 8).

I also found that areas with greater political opposition to housing were less likely than other jurisdictions to reform their zoning laws by making them less restrictive over the last five years, according to planners. The difference between the least and most supportive areas was 10 percentage points (42 percent to 52 percent, respectively).

In summary, the evidence suggests that political opposition to development works primarily through extra-statutory mechanisms like causing delays but could also affect the future intensity of statutory land-use by blocking reforms. Opposition to housing development is more likely in areas with highly educated and non-Hispanic White residents, with no relationship to national political preferences. This implies consequences for segregation that are discussed next.

Table 8: Relationship between political support for development and regulatory delays, reasons for delays, and intensity of land use

	Six-month delays or longer for multifamily projects	Six-month delays or longer for single-family projects	Percent mentioning public opposition as reason for delay	Percent mentioning public meetings as reason for delay	Percent of land zoned for single-family use
Least supportive quartile of citizens and officials	44%	37%	50%	27%	53%
Second quartile	30%	23%	37%	24%	50%
Third quartile	30%	25%	41%	12%	50%
Most supportive quartile of citizens and officials	23%	18%	8%	7%	49%

Source: Terner California Residential Land Use Survey

Table 9: The 10 cities with most under- and over-represented Black and Hispanic populations in sample of large California jurisdictions by zoning measure

City	Metropolitan area	Over-representation of Black and Hispanic residents	Share of developable land zoned single-family detached	Average minimum lot size (in acres)
10 most under-represented				
Cupertino	San Jose-Sunnyvale-Santa Clara, CA	0.15	53%	0.11
Irvine	Los Angeles-Long Beach-Anaheim, CA	0.23	33%	0.30
Arcadia	Los Angeles-Long Beach-Anaheim, CA	0.25	54%	0.19
Palo Alto	San Jose-Sunnyvale-Santa Clara, CA	0.29	45%	0.16
Fountain Valley	Los Angeles-Long Beach-Anaheim, CA	0.33	78%	0.17
Yorba Linda	Los Angeles-Long Beach-Anaheim, CA	0.34	83%	0.34
Mission Viejo	Los Angeles-Long Beach-Anaheim, CA	0.36	42%	0.11
Walnut Creek	San Francisco-Oakland-Hayward, CA	0.36	42%	0.20
San Ramon	San Francisco-Oakland-Hayward, CA	0.36	54%	0.20
Laguna Niguel	Los Angeles-Long Beach-Anaheim, CA	0.36	67%	0.07
Mean of 10 most under-represented		0.30	55%	0.19

Source: Terner California Residential Land Use Survey. Limits analysis to jurisdictions with at least 50,000 residents and located within a metropolitan area (241). The over-representation index divides local population shares by metropolitan population shares. It equals one when the place share of group population equals the metropolitan share. Values less than one indicate under-representation. Values above one indicate over-representation.

Jurisdictions with anti-multifamily zoning are more racially segregated.

Jurisdictions where land is predominantly allocated to the least efficient use (single-family detached housing) are home to significantly fewer Black and Hispanic residents as a share of the metropolitan area's Black and Hispanic community.

To analyze segregation at the place level, I compared the jurisdiction's share of the metropolitan area's Black and Hispanic population to the jurisdiction's share of total population. If Black and Hispanic residents lived evenly across all places within a metropolitan area, then this value would equal one. Values under one show under-representation of a population, and values over one show over-representation—meaning the area has a higher share of the region's Black and Hispanic population than it does of the total population.

Among cities in metropolitan areas with at least 50,000 residents, Cupertino was the most under-represented with respect to its share of the San Jose metropolitan areas' Black and Hispanic population. It is home to 0.5 percent of the metro area's population of Black and Hispanic residents, but 3.1 percent of the metro area's total population. Just 4 percent of Cupertino residents are Black or Hispanic. According to my constructed measure of zoned land, most of Cupertino's land (54 percent) is zoned for single-family detached housing, while 24 percent is available for multifamily housing.

Palo Alto, home to Stanford University, is also heavily under-represented in its Hispanic and Black population, as shown in the table. The number of Black and Hispanic residents would need to triple to reflect the city's share of total metropolitan area population. My zoning intensity measure calculated from the TCRLUS data suggests that 45 percent of its land is

Table 9 (Cont.) : The 10 cities with most under- and over-represented Black and Hispanic populations in sample of large California jurisdictions by zoning measure

City	Metropolitan area	Over-representation of Black and Hispanic residents	Share of developable land zoned single-family detached	Average minimum lot size (in acres)
10 most over-represented				
Watsonville	Santa Cruz-Watsonville, CA	2.41	33%	0.13
Richmond	San Francisco-Oakland-Hayward, CA	2.14	22%	0.10
Gilroy	San Jose-Sunnyvale-Santa Clara, CA	2.11	37%	0.15
Pittsburg	San Francisco-Oakland-Hayward, CA	1.97	42%	0.11
South Gate	Los Angeles-Long Beach-Anaheim, CA	1.86	45%	0.11
Antioch	San Francisco-Oakland-Hayward, CA	1.82	62%	0.15
National City	San Diego-Carlsbad, CA	1.81	53%	0.11
Inglewood	Los Angeles-Long Beach-Anaheim, CA	1.80	33%	0.20
Woodland	Sacramento--Roseville--Arden-Arcade, CA	1.77	45%	0.12
Paramount	Los Angeles-Long Beach-Anaheim, CA	1.75	45%	0.16
Mean of 10 most over-represented		1.94	42%	0.13

zoned for single-family use and 27 percent for multifamily. Even this may overstate the intensity of land use. Palo Alto's official planning documents show that it devotes 21 percent of land to single-family uses and only 6 percent of land for multifamily (even including multi-use) (City of Palo Alto, 2014). Thus, city documents suggest single-family land use is 3.5 times as prevalent as multifamily land use, whereas the survey data suggest it is only 2 times as prevalent. I suspect the discrepancy in absolute numbers (21 percent vs 45 percent) with the TCRLUS arises from the interpretation of "developable" land, since much of Palo Alto's land (44 percent) is allocated to parks, preserves, and open-spaces. Moreover, using the extreme ranges from the actual TCRLUS responses (instead of mid-point imputations) would allow for as much as 75 percent of land to be single-family detached and as little as 26 percent for multifamily. This would be closer to the 3.5 ratio of single-family land to multifamily land. In any case, the TCRLUS data suggest a somewhat greater role for multifamily land use than the city's actual documentation, but both sources convey the dominance of single-family land use over multifamily.

On the other extreme, certain jurisdictions in California's metropolitan areas are home to a disproportionate share of Black and Hispanic residents, and these areas tend to have more relaxed zoning standards that are far less oriented toward single-family only detached housing. In the ten most over-represented cities for Black and Hispanic residents, 42 percent of land is zoned for single-family compared to 55 percent in the ten most under-represented cities. Gilroy, in the San Jose metropolitan area, has twice its expected share of Black and Hispanic residents relative to its share of total population. Just 37 percent of its land is zoned for single-family detached housing (Table 9).

The patterns here suggest that citizen opposition to housing may be an important additional factor. In the ten most exclusionary places—meaning those with the most under-represented Black and Hispanic populations—70 percent of

Table 10: The 10 cities with most under- and over-represented blue-collar workers in sample of large California jurisdictions by zoning measure

City	Metropolitan area	Over-representation of Black and Hispanic residents	Share of developable land zoned single-family detached	Average minimum lot size (in acres)
10 most under-represented				
Los Altos	San Jose-Sunnyvale-Santa Clara, CA	0.42	73%	0.23
Los Altos Hills	San Jose-Sunnyvale-Santa Clara, CA	0.43	95%	1.00
La Canada Flintridge	Los Angeles-Long Beach-Anaheim, CA	0.46	73%	0.42
Cupertino	San Jose-Sunnyvale-Santa Clara, CA	0.47	53%	0.11
Palo Alto	San Jose-Sunnyvale-Santa Clara, CA	0.49	45%	0.16
Manhattan Beach	Los Angeles-Long Beach-Anaheim, CA	0.50	53%	0.11
Rolling Hills Estates	Los Angeles-Long Beach-Anaheim, CA	0.51	73%	1.92
Ross	San Francisco-Oakland-Hayward, CA	0.52	95%	
Bradbury	Los Angeles-Long Beach-Anaheim, CA	0.53	95%	2.00
Emeryville	San Francisco-Oakland-Hayward, CA	0.56	17%	0.06
Mean of 10 most under-represented		0.49	67%	0.67

Source: Terner California Residential Land Use Survey. Limits analysis to jurisdictions with at least 50,000 residents and located within a metropolitan area (241). The over-representation index divides local population shares by metropolitan population shares. It equals one when the place share of group population equals the metropolitan share. Values less than one indicate under-representation. Values above one indicate over-representation.

planners report that citizens often oppose development, and only 20 percent report that they often support it. In the most over-represented jurisdictions, the opposite pattern holds: 60 percent of planners say citizens often support development, with just 20 percent indicating that citizens often oppose it.

As with the housing analysis, I also developed regression models to study these connections more formally. As before, this controls for metropolitan area fixed effects, central city status, and the share of workers with long commute times. In addition to the combined Black and Hispanic population, I analyzed Black, White, Hispanic, and Asian residents separately. I find that the share of land zoned for single-family detached housing robustly predicts a lower share of Black and Hispanic residents and a higher share of White residents. Minimum lot size requirements predict significantly lower Hispanic population shares, but they were not significant in predicting Black population shares (Appendix Table 3).

As expected, based on the above, political support (or lack thereof) for housing was also strongly related to the Black and Hispanic population shares. A one standard deviation increase in political support for development predicted a 0.18 increase in Black-Hispanic representativeness—almost a 20 percent relative gain in the Black-Hispanic population share. This effect size is higher than that found for single-family zoning (0.10 for a standard deviation change).

The link between zoning and racial exclusion seems to run through home prices. When I control for median home values, the zoning variables are no longer significant in predicting Black-Hispanic representation, but areas with very high home values have very few Black and Hispanic residents.

Table 10 (Cont.) : The 10 cities with most under- and over-represented blue-collar workers in sample of large California jurisdictions by zoning measure

City	Metropolitan area	Over-representation of Black and Hispanic residents	Share of developable land zoned single-family detached	Average minimum lot size (in acres)
10 most over-represented				
Colma	San Francisco-Oakland-Hayward, CA	1.39	12%	0.08
Antioch	San Francisco-Oakland-Hayward, CA	1.39	62%	0.15
Oakley	San Francisco-Oakland-Hayward, CA	1.39	67%	0.16
National City	San Diego-Carlsbad, CA	1.40	53%	0.11
Pittsburg	San Francisco-Oakland-Hayward, CA	1.40	42%	0.11
Bell	Los Angeles-Long Beach-Anaheim, CA	1.40	38%	0.14
Watsonville	Santa Cruz-Watsonville, CA	1.41	33%	0.13
Gilroy	San Jose-Sunnyvale-Santa Clara, CA	1.42	37%	0.15
Isleton	Sacramento--Roseville--Arden-Arcade, CA	1.47	54%	
San Pablo	San Francisco-Oakland-Hayward, CA	1.56	53%	0.15
Mean of 10 most over-represented		1.42	45%	0.13

Jurisdictions that enforce low-density zoning exclude blue-collar workers.

Both the share of land set aside for single-family housing and the stringency of minimum lot size requirements predict that a jurisdiction will be home to a significantly smaller share of workers in blue-collar occupations relative to the surrounding jurisdictions in their metropolitan area.

A metropolitan area is a labor market for workers performing a wide variety of services, including construction, repair, domestic services, building services, and food preparation, and retail sales. California's export-oriented tech companies and other advanced industries employ high shares of professional workers and spur demand for other high-paying occupations, such as those in legal and medical professions, as well as low-paying occupations.

Yet, high housing costs near job centers creates problems for workers in lower-paid occupations who want to be close to their job, forcing them to live further away in jurisdictions with more relaxed zoning laws.

Thus, Cupertino and Palo Alto not only have low shares of Black and Hispanic residents, but they have low shares of workers in blue-collar occupations. The share of workers in blue-collar jobs who live in these areas would have to double to represent these jurisdictions' share of total population. The same issue is found in Los Altos Hills, Ross, and Bradbury, which allocate virtually all of their land to single-family detached housing, thus, in effect, prohibiting most blue-collar workers from participating in the housing market. In the ten cities with the least representation of blue-collar workers, two-thirds of land is reserved for the least efficient use (single-family detached). Meanwhile, cities like Gilroy, Watsonville, and Bell are heavily oriented toward blue-collar workers and reserve relatively low-shares of land for single-family detached housing (Table 10).

I performed the same regression analysis with the occupational segregation measures as I did with the racial segregation measures. I again found strong evidence that both the share of land zoned for single-family use and minimum lot size restrictions predict significantly lower shares of blue-collar workers (Appendix Table 4). Minimum lot size requirements are also strongly correlated with lower shares of workers in service occupations (a subset of blue-collar) and higher share of professional workers and computer workers (a subset of professional workers).

Political support for development also strongly predicts greater representation for blue-collar workers in the local population. A one standard deviation increase in net support predicts roughly a 0.10 increase in the index.

Conclusion

The purpose of this study was to identify whether or not land use regulations at the jurisdiction level measured through a survey of planners could yield data that explains variation in housing costs and segregation across California's jurisdictions. I find clear evidence that these data do explain some of the patterns in housing costs, as well as racial, ethnic, and occupational residency. Anti-density zoning and local opposition to development predicts more exclusive jurisdictions with fewer Black and Hispanic residents and fewer blue-collar workers, relative to the areas in the surrounding metropolitan area.

I also find that citizen opposition to housing development is widespread, at least according to planners, and seems to be highest in predominately White, educated, affluent areas that are likely to be the most desirable places to build new housing. The patterns in the data suggest that citizen opposition manifests itself in terms of delayed approvals (even for projects that meet legal standards) and the prevention of zoning reform.

The data are limited in several important ways: the TCRLUS responses to these technical questions may be more or less inaccurate; data are only collected for very broad zoning categories (e.g., single-family detached and multifamily); precise estimates of land use allocations are not provided; and there are no historic measures of how stringent these regulations were decades ago. These limitations could be remedied by systematically collecting and coding historical and contemporary planning documents and ordinances.

The analysis itself is also limited in that these broad correlations cannot definitively identify causal relationships. Jurisdictions are not randomly assigned zoning. One interpretation of zoning's history postulates that it was developed in the 1920s in the United States in response to political demands to deal with negative externalities, to reduce political competition for elites, and limit their economic and social interaction with immigrants and Black migrants (Trounsine, 2018; Rothwell, forthcoming). If so, the incorporation of new cities in California and the setting up of zoning standards may have followed from the same motivations. In short, it is likely that prosperous places are the most likely to set up restrictive zoning laws so as to preserve elite status. In this sense, prosperity may precede zoning, but even if so, there is good reason to believe that zoning affects and preserves distinctive jurisdictional status. There is nothing fundamental about land that makes it well- or ill-suited for residents of a particular class or race. There is no inherent reason why economic and racial diversity could not prevail in every jurisdiction, even with distinctions across and within neighborhoods as to the size and quality of housing and the desirability of the location. While proving causality is always difficult in social science, it is easy to imagine that the construction of more multifamily housing and the more efficient use of land in high-cost areas would create more affordable housing units and allow more blue-collar workers to move in. The theoretical and empirical literature on zoning is quite clear about these predictions. The reasons why this integration has not happened are political, not economic.

Despite the limitations in measurement and analysis, the results of this analysis confirm the findings form a large literature across multiple zoning datasets. The share of land allocated to single-family detached as opposed to other uses is consistently associated with price and population outcomes, as are minimum lot size requirements, and planner assessments of political support for development. These results can be regarded as additional evidence that high housing costs and segregation residency patters are not an inevitable outgrowth of housing markets but emerge from the political economy of housing regulations. •

Appendix Tables

Appendix Table 1: Summary Statistics of Key Variables

	Obs	Mean	Standard Deviation	Min	Max
Share of developable land zoned single-family detached	268	0.51	0.17	0.02	0.95
Average minimum lot size (in acres)	258	0.18	0.20	0.05	2.00
Number of applications for large multi-family projects	263	0.00	0.84	-1.33	3.73
Zoning permitted by right	270	0.72	0.45	0.00	1.00
Multifamily housing requires approval from elected officials	264	0.22	0.41	0.00	1.00
Delays for projects that meet zoning rules	254	2.22	0.73	1.00	4.00
Mean net support of citizens and officials for development	265	1.00	1.83	-4.00	5.00
Net support of officials to development	260	2.05	1.94	-4.00	5.00
Net support of citizens to development	263	-0.02	2.15	-5.00	5.00
Blue-collar worker Over-representation	245	0.98	0.23	0.42	1.56
Black-Hispanic Over-representation	245	0.94	0.50	0.08	2.51
Black Over-representation	245	0.80	0.83	0.00	6.39
Hispanic Over-representation	245	0.97	0.53	0.07	2.78
Median rent (2013-2017)	252	$1,491	$481	$693	$3,500
Median number of rooms (2013-2017)	252	5.25	0.81	3.10	9.00
Median home value (2013-2017)	252	$562,104	$403,351	$120,900	$2,000,000
Jobs in county/Housing unit (2017)	245	199	926	1	13801
Central city	252	0.27	0.44	0.00	1.00
Percent of workers who commute at least 30 minutes to work	252	39.4	13.5	1.7	64.9

The over-representation index divides local population shares by metropolitan population shares. It equals one when the place share of group population equals the metropolitan share. Values less than one indicate under-representation. Values above one indicate over-representation.

Appendix Table 2: Regression of housing costs on zoning laws in California jurisdictions using metropolitan area fixed effects

	Ln of median rent (2017)	Ln of median home value (2017)	Median number of rooms (2017)	Ln of median rent (2017)	Ln of median home value (2017)	Median number of rooms (2017)
	1	2	3	4	5	6
Share of developable land zoned single-family detached	0.156*	0.489***	1.733***	0.0179	0.276	1.121***
	(0.0824)	(0.168)	(0.284)	(0.0839)	(0.172)	(0.281)
Average minimum lot size (in acres)	0.429***	0.560***	1.653***	0.421***	0.398**	1.045***
	(0.0767)	(0.157)	(0.264)	(0.0824)	(0.169)	(0.275)
Central city	0.0331	0.0732	-0.124	0.0742**	0.123**	0.0205
	(0.0291)	(0.0594)	(0.100)	(0.0295)	(0.0605)	(0.0987)
Jobs in county/Housing unit (2017)	-7.01e-06	-6.01e-07	-9.64e-05*	-3.65e-05	0.000112	-6.82e-05
	(1.63e-05)	(3.34e-05)	(5.63e-05)	(4.89e-05)	(0.000100)	(0.000163)
Percent of workers who commute at least 30 minutes to work	0.000920	-0.00856***	0.0174***	0.00177	-0.00642**	0.0249***
	(0.00139)	(0.00283)	(0.00477)	(0.00136)	(0.00280)	(0.00456)
Number of applications for large multi-family projects				-0.0457***	-0.0154	-0.229***
				(0.0164)	(0.0336)	(0.0547)
Zoning permitted by right				-0.0459*	-0.0416	-0.130
				(0.0276)	(0.0567)	(0.0924)
Multifamily housing requires approval from elected officials				-0.00600	-0.0370	0.000797
				(0.0295)	(0.0604)	(0.0985)
Delays in approval for projects that meet rules				0.0307*	0.110***	-0.0373
				(0.0176)	(0.0361)	(0.0589)
Mean net support from citizens and officials for development				-0.0285***	-0.0629***	-0.0406*
				(0.00667)	(0.0137)	(0.0223)
Constant	7.055***	13.01***	3.407***	7.075***	12.86***	3.704***
	(0.0723)	(0.148)	(0.249)	(0.0808)	(0.166)	(0.270)
Observations	233	233	233	212	212	212
Adjusted R-squared	0.666	0.657	0.422	0.706	0.692	0.371
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. All models are estimated using metropolitan area fixed effects.						

Appendix Table 3: Regression of segregation based on race-ethnicity in California jurisdictions using metropolitan area fixed effects on zoning measures and political context

	Black-Hispanic over-representation	Hispanic over-representation	Black over-representation	White over-representation	Asian over-representation	Black-Hispanic over-representation
	1	2	3	4	5	6
Share of developable land zoned single-family detached	-0.750***	-0.689***	-1.155***	0.824***	-0.0337	-0.563**
	(0.217)	(0.238)	(0.381)	(0.264)	(0.374)	(0.228)
Average minimum lot size (in acres)	-0.315*	-0.350**	-0.0486	0.174	0.585**	-0.360*
	(0.161)	(0.176)	(0.282)	(0.195)	(0.277)	(0.212)
Central city	-0.0449	-0.0758	0.128	-0.0992	0.341**	-0.0973
	(0.0767)	(0.0842)	(0.135)	(0.0931)	(0.132)	(0.0799)
Percent of workers who commute at least 30 minutes to work	0.0114***	0.0100**	0.0131**	-0.0176***	0.0115*	0.0111***
	(0.00365)	(0.00401)	(0.00641)	(0.00443)	(0.00629)	(0.00362)
Number of applications for large multifamily projects						0.00188
						(0.0438)
Zoning permitted by-right						0.0575
						(0.0751)
Multifamily housing requires approval from elected officials						-0.00136
						(0.0808)
Delays in approval for projects that meet rules						-0.0747
						(0.0481)
Mean net support from citizens and officials for development						0.0991***
						(0.0182)
Constant	0.947***	1.013***	0.850**	1.339***	0.415	0.923***
	(0.191)	(0.209)	(0.335)	(0.231)	(0.328)	(0.218)
Observations	233	233	233	233	233	212
Adjusted R-squared	0.112	0.077	0.057	0.068	0.049	0.215
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. All models are estimated using metropolitan area fixed effects.						

The over-representation index divides local population shares by metropolitan population shares. It equals one when the place share of group population equals the metropolitan share. Values less than one indicate under-representation. Values above one indicate over-representation.

Appendix Table 4: Regression of segregation based on occupation in California jurisdictions using metropolitan area fixed effects on zoning measures and political context

	Blue-collar workers over-representation	Blue-collar non-service workers over-representation	Service workers over-representation	Professional workers over-representation	Computer and mathematical workers over-representation	Blue-collar workers over-representation
	1	2	3	4	5	6
Share of developable land zoned single-family detached	-0.198**	-0.467**	-0.184	0.225	-0.292	-0.0457
	(0.0987)	(0.193)	(0.135)	(0.152)	(0.266)	(0.0979)
Average minimum lot size (in acres)	-0.279***	-0.393***	-0.352***	0.424***	0.441**	-0.296***
	(0.0731)	(0.143)	(0.0999)	(0.113)	(0.197)	(0.0909)
Central city	-0.0525	-0.106	-0.0409	0.0699	0.227**	-0.0779**
	(0.0349)	(0.0680)	(0.0476)	(0.0537)	(0.0937)	(0.0343)
Percent of workers who commute at least 30 minutes to work	0.00444***	0.0127***	-0.00320	-0.00708***	-0.00673	0.00384**
	(0.00166)	(0.00324)	(0.00227)	(0.00256)	(0.00447)	(0.00155)
Number of applications for large multifamily projects						0.0196
						(0.0188)
Zoning permitted by-right						0.0316
						(0.0322)
Multifamily housing requires approval from elected officials						0.0540
						(0.0347)
Delays in approval for projects that meet rules						-0.0491**
						(0.0206)
Mean net support from citizens and officials for development						0.0480***
						(0.00780)
Constant	0.978***	0.799***	1.273***	1.081***	1.238***	0.966***
	(0.0867)	(0.169)	(0.118)	(0.134)	(0.233)	(0.0935)
Observations	233	233	233	233	233	212
Adjusted R-squared	0.097	0.133	0.075	0.100	0.151	0.246
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. All models are estimated using metropolitan area fixed effects.						

The over-representation index divides local population shares by metropolitan population shares. It equals one when the place share of group population equals the metropolitan share. Values less than one indicate under-representation. Values above one indicate over-representation.

References

Baldassare, M., Bonner, D., & Dykman, A. (2018). "Californians and Their Government." Public Policy Institute of California. Retrieved from: https://www.ppic.org/wp-content/uploads/s-518mbs.pdf.

City of Palo Alto. 2014. "2015-2023 Housing Element," Table 4-2 Distribution of Existing Land Uses in Palo Alto." Retrieved from: https://www.cityofpaloalto.org/civicax/filebank/documents/37935.

Einstein, K. L., Palmer, M., & Glick, D.M. (2019). "Who participates in local government? Evidence from meeting minutes." Perspectives on Politics 17 (1): 28-46.

Environmental Science Associates (ESA). (2014). "City of Mountain View 2015-2023 Housing Element." Retrieved from:https://www.mountainview.gov/civicax/filebank/blobdload.aspx?BlobID=15284.

Fischel, W. A. (2015). Zoning rules!: The economics of land use regulation. Cambridge, MA: Lincoln Institute of Land Policy.

Frey, W. H. (2017). "Black-white segregation edges downward since 2000, census shows." Brookings Institution. Retrieved from: https://www.brookings.edu/blog/the-avenue/2018/12/17/black-white-segregation-edges-downward-since-2000-census-sho.

Glaeser, E. (2011). Triumph of the city: How urban spaces make us human. Pan Macmillan, 2011.

Glaeser, E. L. & Ward, B. A. (2009). "The causes and consequences of land use regulation: Evidence from Greater Boston." Journal of Urban Economics 65 (3): 265-278.

Glaeser, E. and – Gyourko, J. (2018). "The economic implications of housing supply." Journal of Economic Perspectives 32 (1): 3-30.

Gyourko, J., Saiz, A., & Summers, A. (2008). "A new measure of the local regulatory environment for housing markets: The Wharton Residential Land Use Regulatory Index." Urban Studies 45, no. 3: 693-729.

Mawhorter, S. & Reid, C. (2018a). Terner California Residential Land Use Survey. Berkeley, CA: University of California, Berkeley.

Mawhorter, S. & Reid, C. (2018b). "Local Housing Policies Across California." The Terner Center, University of California, Berkeley (Berkeley, California). Retrieved from: http://californialanduse.org/download/Terner_California_Residential_Land_Use_Survey_Report.pdf.

O'Neill, M., Gualco-Nelson, G., Biber, E. (2019). "Comparing Perceptions and Practice Why Better Land Use Data Is Critical to Ground Truth Legal Reform" The Terner Center, University of California, Berkeley (Berkeley, California). Retrieved from: http://californialanduse.org/download/O'Neill_Comparing_Perceptions.pdf.

Pendall, R. (2000). "Local Land Use Regulation and the Chain of Exclusion" Journal of the American Planning Association 66 (2):125-142.

Pendall, R., Puentes, R., & Martin, J. (2006). "From Traditional to Reformed: A Review of the Land Use Regulations in the Nation's 50 Largest Metropolitan Areas." Metropolitan Policy Program, the Brookings Institution.

Rothwell, J.(2009). "The Effects of Density Regulation on Metropolitan Housing Markets." Available at SRN: https://ssrn.com/abstract=1154146 or http://dx.doi.org/10.2139/ssrn.1154146

Rothwell, J. (2012). Housing costs, zoning, and access to high-scoring schools. Brookings Institution. Retrieved from: https://www.brookings.edu/wp-content/uploads/2016/06/0419_school_inequality_rothwell.pdf.

Rothwell, J. T. & Massey, D. S. (2010). "Density zoning and class segregation in US metropolitan areas." Social Science Quarterly 91 (5): 1123-1143.

Rothwell, J. (Forthcoming 2019). A Republic of Equals: A Manifesto for a Just Society (Princeton, NJ: Princeton University Press)

Trounstine, J. (2018). Segregation by Design: Local Politics and Inequality in American Cities. (Cambridge, England: Cambridge University Press).

U.S. Bureau of Economic Analysis. (2017). Local Area Personal Income accounts CAEMP25N: Total Full-time and Part-time Employment by Industry; <https://apps.bea.gov/regional/downloadzip.cfm>; (June 13, 2019)

U.S. Census Bureau; Census 2017, 2013-2017.American Community Survey; generated by Jonathan Rothwell; using American FactFinder; <http://factfinder.census.gov>; (13 June 2019).

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