Measuring Exclusionary Zoning in the Suburbs

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Abstract

When state law permits, cities and suburbs tend to adopt exclusionary zoning policies designed to keep out the less affluent. Urban scholars have long lamented the dearth of metrics for measuring the exclusionary tendencies of the policies of specific localities. The Wharton Residential Land Use Regulatory Index, published in 2008, is currently the most cited. It has many virtues, but it is hardly above criticism. The questionnaire that the authors of the Wharton Index circulated to local governments drew a 38-percent response rate.

This article offers five metrics for measuring the exclusionary tendencies of a suburb's zoning policies, as well as an aggregate metric that combines the five. Each metric assumes that the contents of the local government's published zoning map and ordinance sincerely express its policy intentions. The article applies the metrics to 37 suburbs and, in some instances, to four additional localities in three particular U.S. metropolitan areas. The three are Silicon Valley, the region with the most astronomic housing prices in the United States; Greater New Haven, Connecticut, the Frostbelt representative; and the northwestern sector of Greater Austin, Texas, one of the fastest growing metropolitan areas in the United States. Austin suburbs are found to have, as most would predict, less large-lot zoning, more small-lot zoning, and fewer restrictions on the construction of multifamily housing. The various metrics promise to help reveal differences in land-use policies across space and time.

Introduction

Thomas Hobbes and George Orwell both envisioned, in different fashions, that a powerful government would govern a large territory. Leviathan, however, can go local. Despite their low visibility, municipal zoning controls now constitute arguably the most consequential regulatory program in the United States. A century ago, local governments did too little to regulate land use. Today, as this article demonstrates, many of them severely overregulate, creating barriers to the development of less costly forms of housing. In numerous regions, most notably the West Coast and Northeast, these barriers have sent housing prices skyward.

Zoning is a principal form of government land-use regulation in many nations, including Australia, France, Germany, and Japan, but not, for example, England. The regulating entity, commonly a municipality, officially approves a map that identifies the boundaries of its various zones and promulgates an ordinance that indicates the uses permitted and forbidden in each. In 1891, Frankfurt-on-Main, Germany, pioneered the practice of zoning (Logan, 1976: 379). During the 1910s, Los Angeles and New York City were the first U.S. cities to embrace the practice (Talen, 2012: 22–36). Currently, over 90 percent of cities and suburbs in the United States, with the notable exception of Houston, Texas, engage in zoning (Pendall, Puentes, and Martin, 2006: 11). The zoning maps and ordinances of most U.S. suburbs set aside a large majority of land solely for detached houses and tend to limit the creation of mixed-use neighborhoods (Ellickson, 2021a: 1624; Hirt, 2014: 7, 49–59).

U.S. zoning practices have drawn increasing criticism, and not only for their effect on urban form. Numerous urban economists contend that, in many parts of the country, zoning restrictions have boosted housing prices (Glaeser, Gyourko, and Saks, 2005; Glaeser and Ward, 2009; Herkenhoff, Ohanian, and Prescott, 2018), distorted the allocation of the U.S. labor force (Ganong and Shoag, 2017), and reduced the national rate of productivity growth (Hsieh and Moretti, 2019). Some critics especially decry the exclusionary thrust of zoning policies. Large-lot requirements and restrictions on the building of multifamily housing can limit the residential options of households of modest income and thus the life chances of those kept out, particularly children (Chetty, Hendren, and Katz, 2016).

There have been numerous valuable empirical studies of zoning practices. In California, recent ones include Mawhorter and Reid (2018) and Furth and Gonzalez (2019). Scholars nevertheless have bemoaned the lack of metrics to quantify the stringency of zoning restrictions (Gyourko and Molloy, 2015: 1294, 1298; Herkenhoff, Ohanian, and Prescott, 2018: 90, 92).

Currently, the most respected and most-cited set of metrics is "The Wharton Residential Land Use Regulatory Index."[1] In 2008, Joseph Gyourko, Albert Saiz, and Anita Summers published the first Wharton Index (Gyourko, Saiz, and Summers, 2008). Gyourko has since worked with another set of co-authors to update the findings (Gyourko, Hartley, and Krimmel, 2019). Among the many strengths of the Wharton Index are its national scope, the breadth of its inquiry into barriers to housing production, and its sophistication. The Wharton endeavors, however, also have shortcomings. The first questionnaire that the Wharton team used to identify local practices generated a 38-percent response rate (Gyourko, Saiz, and Summers, 2008: 696). The authors also did not check the accuracy of the reports of the localities that did bother to reply. Similar problems may limit the usefulness of the second Wharton Index.

To measure the exclusionary tendency of a locality's land use controls, this article proposes, as an alternative, five separate individual metrics. The article concludes by combining the five into a single overarching metric. It applies all six to the zoning policies to 37 suburbs in three specific U.S. metropolitan areas: Silicon Valley, California; Greater New Haven, Connecticut; and the northwestern portion of Greater Austin, Texas.

[1] See, for example, Wassmer and Williams (2021).

These three metropolitan areas have markedly different housing markets. Silicon Valley, part of the peninsula that extends south from San Francisco, has become a destination of choice for national and international specialists in information technology. Silicon Valley is the priciest housing market in the United States, with tract houses built in the 1950s commonly selling, in 2020, for $2 million or more (Ellickson, 2021a: 1614). By contrast, demand for housing is soft in Greater New Haven, as in much of the U.S. Frostbelt. The median house in Greater New Haven sells for about one-tenth of what a Silicon Valley counterpart would command. For many decades, Greater Austin has been near the top of U.S. metros in terms of population growth rate. In 2019, median house prices in Greater Austin had inched up to about $300,000, a cost sufficiently low to tempt some Silicon Valley information technology specialists to explore job opportunities at, for example, Dell Computer of Round Rock, Texas, an Austin suburb.

Each proposed metric boils down a locality's complex set of land-use policies to a simple number. In brief preview, the first three metrics measure the extent of large-lot single-family zoning, of small-lot single-family zoning, and of zoning for multifamily structures. The next two metrics focus on the zoning of *undeveloped* sites. The fourth measures local tolerance of new multifamily housing at those locations. The fifth metric is particularly revelatory: it measures how localities zone privately owned but undeveloped tracts that have an area of 20-to-40 acres. The sixth metric aggregates the prior five. The appendix presents results for each of the 37 suburbs analyzed.

The six proposed metrics enable holistic assessment of localities' exclusionary inclinations. Researchers gathering data on zoning practices could apply these metrics to other metropolitan areas and across time. All metrics of zoning stringency, of course, have shortcomings. The ones proposed here give no weight to, for example, the burdensomeness of a suburb's impact fees or its willingness to impose procedural delays on developers. In most contexts, the six metrics represent a lower bound on a locality's exclusionary proclivities.

Metrics of Exclusionary Tendencies

All 41 localities studied in the three metros—37 suburbs, two counties, and portions of two central cities—impose zoning controls.[2] The denominator in the first four metrics is the jurisdiction's total residentially zoned area—the acreage in which the locality's various zones permit some residential use as-of-right.[3] Most contemporary U.S. zoning ordinances, including those of all 41 localities examined, are "noncumulative," barring residential uses in nonresidential zones (Hills and Schleicher, 2010). Some suburban zones are mixed-use, allowing, for example,

[2] The data presented in the exhibits and appendix reflect the contents of the zoning maps of 37 entire suburban municipalities: 15 in Silicon Valley, 14 in Greater New Haven, and 8 in Greater Austin. The data reported for Silicon Valley also include, in most instances, two neighborhoods of the City of San Jose (North San Jose and West San Jose) and some unincorporated areas of San Mateo and Santa Clara Counties. Also tabulated were the City of Austin's zoning policies in the northwestern portion of the city. A companion article (Ellickson, 2021a: 1638, 1650, 1667) includes maps that identify the exact areas studied.

[3] Another possible denominator, the entire land area of the locality, would be less revealing. Suppose a suburb were to have zoned exactly one-half its land exclusively for industry, and the remaining one-half solely for single-family detached houses on lots of one acre of more. In calculating the frequency of the one-acre requirement, the denominator used here—the area zoned for some sort of residential use—generates a result of 100 percent. If total land area instead were to be used as the denominator, the result would be 50 percent. Because the goal is to expose exclusionary tendencies, 100 percent in most contexts is more informative.

commercial uses as well as residential. This study treats these as residential zones. Localities' zoning maps in the three metros permit residential use on 78 percent of their total land area. In the remainder, the localities permit as-of-right only uses that are not residential—perhaps industrial, public-facility, or commercial.

The 37 suburbs studied set aside for detached single-family houses 91.0 percent of the area where they permit some sort of residential use. This is the equivalent of 70.7 percent of their total land area. Most developed nations other than the United States are less inclined to treat the detached house as royalty (Hirt, 2014: 6–7, 17–25).

Metric One: The Incidence of Large-Lot Zoning

Commentators commonly associate exclusionary zoning with a locality's insistence that the builder of a new detached house site it on a lot large in area (Boudreaux, 2016). Particularly in New England suburbs, American house-owners commonly live in neighborhoods where lots exceed 10,000 sq. ft. Ten thousand square feet is 0.23 of an acre (43,560 square feet), or 0.09 of a hectare. In a U.S. neighborhood where lots are larger than 10,000 sq. ft., sidewalks are uncommon, "walk scores" (Speck, 2012: 25–28) are low, and dependence on automobiles is close to universal. To justify their large-lot mandates, U.S. suburbs, especially ones that fail to provide sanitary sewers, commonly invoke a public health rationale, namely, the need for a lot large enough to permit safe disposal of septic-tank effluents.

A simple metric for measuring exclusionary zoning is the percentage of residentially zoned land that a locality places in zones that require house-lots greater than, or equal to, a particular size. Exhibit 1 presents, for minimums ranging from one-half acre to two acres, results for the three metropolitan areas. (Many suburbs treat 40,000 sq. ft. [0.92 acre] as the equivalent of an acre. The counts in exhibits 1 and 2 do as well.)

Exhibit 1

Metric One: Percentage of Residentially Zoned Land Requiring a Lot-Size Above a Specified Minimum

	≥ 1/2 acre (%)	≥ 1 acre (%)	≥ 1-1/2 acres (%)	≥ 2 acres (%)
Silicon Valley	52.8	51.0	36.1	36.1
Greater New Haven	76.1	74.0	47.7	32.0
Greater NW Austin	32.3	32.1	13.7	13.7

Source: Author's calculations based on research findings

The New Haven area, where 74 percent of the residentially zoned land in the suburbs is restricted to single-family detached houses on lots of one acre or more, leads the three metros in large-lot zoning. Municipalities in the Austin area are, by this metric, the least prone to exclude. No surprise there. Silicon Valley's results are middling. The huge lot-size requirements that San Mateo and Santa Clara Counties impose in Silicon Valley's foothill and mountain areas much affect that region's figures (Ellickson, 2021a: 1628).

Exhibit 2 reports how commonly specific localities in the three metropolitan areas require a lot of one acre on land where they permit some residential use. Each metro has at least one suburb that places over 99 percent of its land in these zones, and also one or more that declines to place any in that category. Exhibit 2 also indicates for each metro, in brackets, the municipality with the greatest amount of acreage in one-acre zones.

Exhibit 2

Municipalities with the Highest, Median, and Lowest Percentages of One-Acre Minimum House-Lot Zoning in Their Residential Zones

	Highest Percentage (%)	Median Percentage (%)	Lowest Percentage (%)
Silicon Valley*	Atherton (100), Los Altos Hills (100) [most acres: Portola Valley]	Cupertino (24)	Five cities with 0, including Menlo Park and Sunnyvale
Greater New Haven	Bethany (100) [most acres: Guilford]	Hamden (61)	West Haven (0)
Greater NW Austin*	West Lake Hills (99) [most acres: Georgetown]	Leander (38)	Rollingwood (0)

**Excludes unincorporated areas and neighborhoods in the cities of Austin and San Jose.*

Source: Author's calculations based on research findings

Metric Two: Zoning to Permit Detached Houses on Small Lots

Some commentators equate exclusionary zoning with requirements for multi-acre single-family lots. This is not correct. U.S. suburbs vary enormously in their willingness to tolerate the development of detached houses in subdivisions where lots are small. A suburb requiring one-half-acre lots in all single-family neighborhoods might be able to exclude homebuyers of modest income as successfully as one requiring 5-acre lots.

A larger house-lot tends to command a higher price, but, beyond 8,000 sq. ft. or so, not by much at the margin (Glaeser and Gyourko, 2002: 26–28; White, 1988: 380 [providing a graph showing the falloff in lot value as lot-size increases]). A larger lot provides more privacy, room to expand, and gardening options. But small-lot subdivisions also have advantages. A neighborhood with a finer grain (Lynch, 1981: 265–68) typically offers more nearby playmates for children, greater visual and social variety, and a higher walk score. It also enables utility companies to exploit efficiencies of scale, reducing utility costs.

U.S. Census Bureau (2017) data indicate that 38 percent of new U.S. single-family houses sold in 2017 were sited on lots less than 7,000 sq. ft. in area, and 62 percent, on lots less than 9,000 sq. ft. In New England, however, a bastion of exclusionary zoning, the median house-lot of a new detached dwelling was 17,000 sq. ft., roughly twice the national figure (Siniavskaia, 2017). U.S. house-lots tend to be larger than those in, for example, England, France, and Germany, in part because U.S. dwellings on average are roughly twice as spacious (Hirt, 2014: 23).

In 2014, France, to help assure that nation's residents access to dense residential neighborhoods, enacted a statute that prohibits municipalities from setting minimum sizes for house-lots (Noguellou, 2016 [citing Code de l'Urbanisme, § 123-1-5]). In the United States, where states and

localities traditionally have controlled land use policy, a national limit on lot sizes, as a political matter, is virtually inconceivable.

Metric Two measures localities' tolerances—in their zoning ordinances—of small house-lots for detached houses. The denominator, as usual, is the total acreage in zones that allow some residential use as-of-right. The numerator is the zoned acreage that would permit house-lots as small as the stated size. Exhibit 3 presents gross findings for the three metropolitan areas for lots of three relatively modest sizes: 6,000, 8,000, and 10,000 sq. ft.

Exhibit 3

Metric Two: Percentage of Residentially Zoned Acreage Permitting Single-Family Detached Houses on Lots Below a Specified Minimum

	≤ 6,000 sq. ft. (%)	≤ 8,000 sq. ft. (%)	≤ 10,000 s.f. (%)
Silicon Valley	20.5	24.9	32.3
Greater New Haven	0.2	1.0	3.6
Greater NW Austin	24.8	39.5	49.0

Source: Author's calculations based on research findings

Exhibit 3 identifies a stunning outlier. New Haven suburbs, honoring a distaste widely shared in New England, are vastly the harshest on would-be developers of subdivisions of modestly sized house-lots. Only one New Haven suburb, Milford, allows more than 2 percent of its residentially zoned territory to be developed into 8,000 sq. ft. lots. By contrast, the Silicon Valley cities of East Palo Alto, Sunnyvale, and the City of Santa Clara allow 8,000 sq. ft. house-lots on an average of 71 percent of their residentially zoned land. In two Austin suburbs, Cedar Park and Round Rock, the average rises to 79 percent. New England's hostility to walkable suburban neighborhoods is exceptional (Ellickson, 2021a: 1625, 1630).

Exhibit 4 helps unpack the gross data presented in exhibit 3. It reports only on suburbs' tolerances of houses on 8,000 sq. ft. lots.

Exhibit 4

Percentage of Residentially Zoned Land Permitting 8,000 Sq. Ft. House-Lots, or Less

	Highest Percentage (%)	Median Percentage (%)	Lowest Percentage (%)
Silicon Valley*	East Palo Alto (81.6%) [most acres: Sunnyvale]	Palo Alto (36.1%)	Four tied at 0%: Atherton, Los Altos, Los Altos Hills, Woodside
Greater New Haven	Milford (14.7%) [most acres: Milford]	0%. Only 3 of the 14 suburbs have a single-family zone allowing 8,000 sq. ft. house-lots	11 tied at 0%.
Greater NW Austin*	Round Rock (79.5%) [most acres: Georgetown]	Leander (24.9%)	Three tied at 0%: Bee Cave, Rollingwood, West Lake Hills

**Excludes unincorporated areas and neighborhoods in the cities of Austin and San Jose.*
Source: Author's calculations based on research findings

Metric Three: Zoning that Permits Multifamily Housing As-of-Right

Denser residential developments tend to be more affordable. Examples are apartment buildings, townhouses, and parks offering hookups for manufactured housing (mobile homes). Knapp et al. (2007) have analyzed barriers to building multifamily housing in six metropolitan regions, and Schuetz (2009, 2008) has focused on comparable efforts by Boston suburbs.

Metric Three tallies, for the various localities, the percentage of residentially zoned land on which a developer, as-of-right, could build one of these various types of denser housing at a density of at least eight gross dwelling units per acre. In all three metros, localities' zoning ordinances commonly assert that a would-be developer of a dense project has to apply for and receive a discretionary permit. This analysis assumes, however, that if a locality had gone so far as to name its zone "multifamily," "townhouse," "mobile home," or the like, it would grant the permit, a generous assumption.

Exhibit 5 indicates the percentage of residentially zoned land where zoning authorities in the three metros permit multifamily use, thus defined. As exhibit 5 implies, Silicon Valley is residentially denser than the other two metros. It also reveals that New Haven suburbs are especially hostile to multifamily development.

Exhibit 5

Metric Three: Percentage of Residentially Zoned Land Permitting Multifamily Use, Both Developed and Undeveloped Sites

Silicon Valley	10.0%
Greater New Haven	1.4%
Northwest Austin	6.0%

Source: Author's calculations based on research findings

To provide more texture, Exhibit 6 indicates variations in municipal policies governing the building of multifamily housing.

Exhibit 6

Municipalities with the Highest, Median, and Lowest Percentages of Multifamily Zoning in Their Residentially Zoned Area

	Highest Percentage (%)	Median Percentage (%)	Lowest Percentage (%)
Silicon Valley*	Mountain View (41.4%) [most acres: Sunnyvale]	Palo Alto (8.4%)	Tied at 0%:Atherton, Los Altos Hills, Woodside
Greater New Haven	Meriden (8.9%) [most acres: Meriden]	North Haven (1.0%)	Tied at 0%: Bethany, Branford, Madison, North Branford, Orange
Greater NW Austin*	Bee Cave (12.8%) [most acres: Cedar Park]	Leander (4.1%)	Tied at 0%: Rollingwood, West Lake Hills

** Excludes unincorporated areas and neighborhoods in the cities of Austin and San Jose.*

Source: Author's calculations based on research findings

Metric Four: Undeveloped Parcels Zoned for Multifamily Use

The fourth and fifth metrics measure the zoning policies that localities apply to undeveloped land. Both require a researcher to make a judgment about the extent of a particular parcel's development. For Metrics Four and Five, the aerial photographs available on Google Earth were used to decide the matter.[4] At times difficult to apply, the decision rule was whether buildings, asphalt, or intensive landscaping covered at least 50 percent of the parcel area. If so, it was deemed "developed" and, if not, "undeveloped." The payoff to this extra work is a deeper insight into the realities of zoning policies.

To ease the comparison of localities' zoning practices on developed and undeveloped multifamily land, the first column in exhibit 7 repeats data reported in exhibit 5.

Exhibit 7

Metric Four: Undeveloped Residentially Zoned Land Permitting Multifamily Use

	Both Developed and Undeveloped Sites (%)	Undeveloped Sites Only (%)
Silicon Valley	10.0	0.2
Greater New Haven	1.4	0.3
Northwest Austin	6.0	2.2

Source: Author's calculations based on research findings

Although localities in Silicon Valley show the greatest willingness to zone for multifamily development, virtually all of the lands that they zone in that fashion already have multifamily structures on them. The most notable finding in exhibit 7 is that undeveloped multifamily land is roughly 10 times more commonly available in the northwestern Austin sector than in the other two metros. In the three metros, the municipalities with the highest percentages of undeveloped residential land currently zoned for multifamily use were East Palo Alto, California (2.8 percent), Meriden, Connecticut (2.7 percent), and Bee Cave, Texas (7.3 percent). A multifamily housing developer looking for a permissibly zoned and undeveloped site would find fewer acres of it in the entire Silicon Valley than in any one of four suburbs northwest of Austin: Cedar Park, Georgetown, Leander, and Round Rock.

Metric Five: The Zoning of Large Undeveloped Private Tracts

A local government typically has greater freedom to change the zoning rules applicable to a large tract of undeveloped land. Consider a neighborhood that a locality had zoned solely for detached houses. Once developers had actually built houses complying with a minimum-lot requirement, local politics would make the suburb highly unlikely to rezone the neighborhood to permit greater residential density. A rezoning of that sort not only would threaten to waste some of the capital previously invested in detached houses but also likely would stir up greater opposition from homeowners (Ellickson, 2021b). When homeowners are not present in a neighborhood, a suburb has more freedom in choosing how to zone it.

[4] An alternative, not used for this study, would be the National Land Cover Database (2016).

Exhibit 8 reveals how localities in the three metros zone a tract of land that satisfies all of the following four criteria:

- It is mostly undeveloped.
- It is zoned to permit residential development.
- Its area is between 20 and 40 acres (roughly four to eight city blocks).
- It is owned privately, but not by a nonprofit corporation such as a country club.

Exhibit 8

Metric Four: Zoning of Residentially Zoned, Privately Owned, and Mostly Undeveloped Tracts of 20-to-40 Acres

	Silicon Valley	Greater New Haven	Greater NW Austin
Number of Qualifying Tracts	57	242	123
% Zoned for House-Lots of at Least One-Acre	96.5	90.9	41.5
% Zoned Multifamily or for House-Lots ≤ 8,000 sq. ft.	3.5	0.4	50.4
% Zoned Multifamily	1.8	0.4	17.1

Source: Author's calculations based on research findings

The advent of big data has enabled this sort of inquiry. Counties maintain parcel databases through which a researcher can readily locate sites of 20-to-40 acre tracts as well as the names of their owners. Aerial photographs available on Google Earth again enabled judgments about the extent of parcel development. Both supply-side and demand-side considerations may contribute to the nondevelopment of these large tracts. They are disproportionately likely to contain steep slopes, ledge, and wetlands, and to be remote from utility lines and employment opportunities.

Tracts that satisfy all four criteria are present in only four of the fifteen suburbs in Silicon Valley. In that metro, 81 percent of these large, privately owned, and undeveloped tracts are situated high in the upper-foothill and mountain areas of Portola Valley, Woodside, and unincorporated Santa Clara County. None of those localities permits, in these locations, a house-lot of fewer than 5 acres.

The 14 suburbs in the long-settled New Haven area have many more tracts that meet the four criteria. On average, a New Haven suburb has 17 of these privately owned, residentially zoned, and undeveloped tracts of 20-to-40 acres. Each town has at least two. Exhibit 8 indicates that New Haven suburbs require a house-lot of at least one acre on 90.9 percent of these undeveloped tracts. That figure far exceeds 74.0 percent, the overall large-lot proclivity of New Haven suburbs (see exhibit 1). Having fired the first barrel of the exclusionary shotgun, New Haven suburbs also fire the second. They permit house-lots of 8,000 sq. ft. or less on only 0.4 percent of these large private tracts.

Municipalities in Austin's northwestern sector tolerate far more growth. They zone 33.3 percent of privately owned, undeveloped parcels of 20-to-40 acres to permit subdivisions of house-lots no

larger than 8,000 sq. ft.[5] Austin's localities also permit multifamily construction on an additional 17.1 percent of these large undeveloped tracts. That percentage is almost three times 6.0 percent, the general tolerance of Austin localities for multifamily housing (see exhibit 5). In sum, on 50.4 percent of their spacious greenfield sites, Austin suburbs permit the development of either small house-lots or multifamily housing. That percentage is roughly 10 times greater than Silicon Valley's percentage and 100 times greater than that of the New Haven suburbs.

Aggregating the Five Metrics into an Overarching Metric

There are numerous methods of combining the five metrics just introduced. This article uses a simple one. It gives equal weight to each of five metrics: the percentage of residentially zoned land requiring house-lots of at least 40,000 sq. ft. (just shy of one acre); the incidence of zoning permitting 8,000 sq. ft. lots (or even higher residential density); the acreage zoned for multifamily development; the availability of undeveloped multifamily land; and the zoning of residentially-zoned, undeveloped, private parcels of 20-to-40 acres. For each of the five metrics, the author ranked the 37 suburbs from the most exclusionary to the least exclusionary. A suburb's aggregate metric is the average of its rankings.[6] The appendix presents results for all 37 suburbs examined.

This system of aggregation identified two Silicon Valley suburbs—Atherton and Los Altos Hills—as the most exclusionary of the 37. Silicon Valley also contains the three least exclusionary municipalities. In order, they are East Palo Alto, Campbell, and Sunnyvale. East Palo Alto requires a house-lot of only 5,000 sq. ft., while Atherton and Los Altos Hills uniformly require one acre, more than eight times more. East Palo Alto, however, is hardly a pushover for developers. East Palo Alto is firmly opposed to the densification of its existing single-family neighborhoods (Ellickson, 2021b: 407). In both suburbs and central cities, Not In My Backyard sentiment (NIMBYism) arises virtually everywhere.

The appendix rankings present few surprises to those who have perused the prior exhibits. Five of the eight Austin suburbs rank in the bottom third of exclusionary bent, as do 7 of the 15 in Silicon Valley. Of the 14 New Haven suburbs, only West Haven falls in the bottom third, and Bethany ranks as the most exclusionary.

Discussion

This article, part of a larger research project on zoning practices, proposes several metrics for measuring a suburb's exclusionary inclinations. In carrying out the research, I selectively read the texts of 41 local zoning ordinances, totaling some 10,000 pages. The principal goal was to calculate the acreages that localities' zoning maps placed in various residential zones. Total research time averaged over 8 hours per locality. Complications inevitably arose. Municipalities vary, for

[5] Georgetown, Texas, the oldest and least pro-development of the four suburbs in Williamson County north of Austin, authorizes the subdivision of 35 percent of its 48 large, undeveloped private tracts into house-lots as small as 5,500 sq. ft.

[6] Eleven Silicon Valley suburbs and three in Austin lack undeveloped tracts of 20-to-40 acres. In these instances, the rankings on the other metrics were divided by four, not five. Another approach, more time-consuming but arguably more accurate, would have averaged a suburb's standard deviation on the first five metrics.

example, in whether they define the area of a zone to include street rights-of-way. This complicated interjurisdictional comparisons. More than one-half of the research time was devoted to the calculation for Metrics Four and Five, the two that required a judgment about whether a particular parcel had or had not been developed.

Each suggested metric assumes that a locality's zoning map and ordinance sincerely express its future policy intentions. Other scholars of zoning have been willing to adopt that premise (for example, Glaeser and Ward, 2009: 267–68). Because a municipality retains the power to amend its map and ordinance, skeptics might contest that assumption. However, this research project revealed that zoning maps and ordinances are surprisingly static, particularly in the already developed single-family neighborhoods that make up most of the urban United States (Ellickson, 2021b).

Many simplifications are inevitably necessary to boil down a policy as complex as a zoning ordinance to a simple number. This article ignores, for example, both nonconforming uses and possible local awards of zoning variances. The popularity of planned unit development (PUD) zones poses special complications. The PUD variant, which first flowered in the United States during the 1960s, invites a developer owning a large tract to propose a mix of land uses, perhaps including multifamily housing (Mandelker, 2008). After bargaining, the locality signs off on the deal. Fast-growing Round Rock, Texas, has placed 30 percent of its residentially zoned land in PUD zones, the most of any of the 37 suburbs studied. The City of Santa Clara, California, with 18 percent, topped Silicon Valley. Identification of the residential components of these PUDs compelled resort to various online records.

In some applications, the proposed metrics may be misleading (Ellickson, 2021a: 1623). Orange, Connecticut, for example, has repeatedly increased the required acreage in its basic single-family zone. Orange, however, is both unwilling and unable to enforce its increased house-lot minimum against a nonconforming homeowner. The metrics thus exaggerate the exclusionary tilt of Orange's zoning restrictions. By contrast, the metrics likely underestimate the pro-growth inclinations of Round Rock, Texas. Round Rock's population exploded, partly because of annexations, from 3,000 in 1970 to an estimated 133,000 in 2019. The metrics understate Round Rock's proclivity of rezoning for denser PUD development. Any set of metrics invariably simplifies.

Conclusion

The first three metrics offered here, the easiest to calculate, indicate how commonly a locality insists on large house-lots, permits small house-lots, and allows the construction of multifamily housing. Metrics Four and Five, which focus on the zoning of undeveloped land, require more investigation but commonly reveal more. They demonstrate that, on undeveloped private land, Austin's northwestern suburbs have been particularly tolerant of both new multifamily development and small house-lots. Absent those policies, the population of Greater Austin would not have been exploding.

There are, of course, many methods of measuring whether zoning policies have an exclusionary bias. Some commentators stress, for example, the value of so-called "missing middle" forms of housing (Parolek, 2020). These include duplexes, triplexes, and other residential structures

potentially compatible in scale to nearby detached houses. By that measure, the standout among the suburbs studied was East Haven, Connecticut, which allows duplexes on 39 percent of its residentially zoned land. If developers were to build more of these structures, "missing middle" housing might become worthy of having its own metric.

The principal value of zoning metrics is enabling comparison of local land-use practices across both space and time. A researcher could use the metrics offered here, time-consuming though they may be to calculate, to compare the zoning policies of a Greater Denver, a Greater Mannheim, or a Greater Sydney. The suburbs northwest of the city of Austin, now generally friendly to development, may become less so in future decades. The proffered metrics provide an objective test for determining whether this will have occurred.

HUD could assemble a database on local zoning practices, one far larger than that provided here. There are about 15,000 zoning governments in the United States, most of which post their zoning maps and zoning ordinances online. Because of the tepid response rates to the Wharton Index questionnaires, the value of sending survey instruments to local governments is questionable and complete confidence in the accuracy of local responses is not warranted. Data collection is costly. Stress on breadth means less depth. HUD might consider the merits of a deeper study into local zoning practices, not in the entire nation, but in dozens of randomly chosen metropolitan areas.

Appendix

Exhibit A-1

How Each of the 37 Suburbs Rank on the Metrics (1 of 2)

	Metric 1: % resid. zoned land requiring ≥40,000 sq. ft. house-lot	Metric 2: % resid. zoned land allowing lot of ≤8,000 sq. ft. or denser	Metric 3: % zoned multifamily ≥8 dwelling units per acre	Metric 4: % vacant land in multifamily zones	Metric 5: median required house-lot, private undeveloped tract of 20–40 acres	Metric 6: Average rank on the five metrics
Silicon Valley						
Atherton	100.0	0	0	0	-	1.5
Campbell	0	88.7	21.9	1.0	-	36.0
City of Santa Clara	0.1	99.9	26.3	0.8	-	32.0
Cupertino	23.5	60.8	7.4	0.1	3 acres	20.0
East Palo Alto	0	99.9	15.1	2.8	-	37.0
Los Altos	0	2.6	2.3	0	-	16.0
Los Altos Hills	100.0	0	0	0	-	1.5
Menlo Park	0	54.3	21.4	0.8	-	30.0
Mountain View	1.5	85.2	41.4	1.0	-	33.0
Palo Alto	51.5	46.1	8.4	0.02	-	21.0
Portola Valley	96.7	1.1	0.05	0.03	7.5 acres	7.5

Exhibit A-1

How Each of the 37 Suburbs Rank on the Metrics (2 of 2)

	Metric 1: % resid. zoned land requiring ≥40,000 sq. ft. house-lot	Metric 2: % resid. zoned land allowing lot of ≤8,000 sq. ft. or denser	Metric 3: % zoned multifamily ≥8 dwelling units per acre	Metric 4: % vacant land in multifamily zones	Metric 5: median required house-lot, private undeveloped tract of 20–40 acres	Metric 6: Average rank on the five metrics
Redwood City	0.03	87.1	25.2	0.2	-	28.0
Saratoga	56.4	1.1	1.1	0.04	2 acres	13.5
Sunnyvale	0	99.9	28.4	0.3	-	35.0
Woodside	97.3	0	0	0	5 acres	4.0
Greater New Haven						
Bethany	100.0	0	0	0	65,000 sq. ft.	5.0
Branford	44.7	10.1	3.0	0	20,000 sq. ft.	17.0
East Haven	23.2	44.1	3.2	0	40,000 sq. ft.	18.0
Guilford	92.7	1.7	0.07	0.03	160,000 sq. ft.	9.0
Hamden	60.8	6.3	3.0	0.9	40,000 sq. ft.	19.0
Madison	99.8	0.2	0.1	0	80,000 sq. ft.	7.5
Meriden	35.2	16.0	6.7	1.0	40,000 sq. ft.	24.0
Milford	20.2	23.4	4.6	0.5	1 acre	23.0
North Branford	98.5	1.3	0	0	40,000 sq. ft.	10.0
North Haven	59.5	1.4	1.0	0.1	40,000 sq. ft.	15.0
Orange	99.6	0.2	0	0	60,000 sq. ft.	6.0
Wallingford	63.7	3.3	1.0	0.1	120,000 sq. ft.	13.5
West Haven	0	31.8	7.2	1.3	20,000 sq. ft.	29.0
Woodbridge	97.8	0.7	0.5	0.2	2 acres	12.0
Northwest Austin						
Bee Cave	47.9	12.8	12.8	7.3	-	26.0
Cedar Park	4.2	81.4	10.2	5.0	5,000 sq. ft.	34.0
Georgetown	47.9	52.0	2.8	1.7	2 acres	22.0
Lakeway	2.6	28.5	1.5	0.7	10,000 sq. ft.	25.0
Leander	38.4	29.2	4.1	3.5	9,000 sq. ft.	27.0
Rollingwood	0	0	0	0	-	11.0
Round Rock	7.5	89.1	6.8	2.0	5,500 sq. ft.	31.0
West Lake Hills	98.8	0	0	0	-	3.0

Source: Author's calculations based on research findings

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