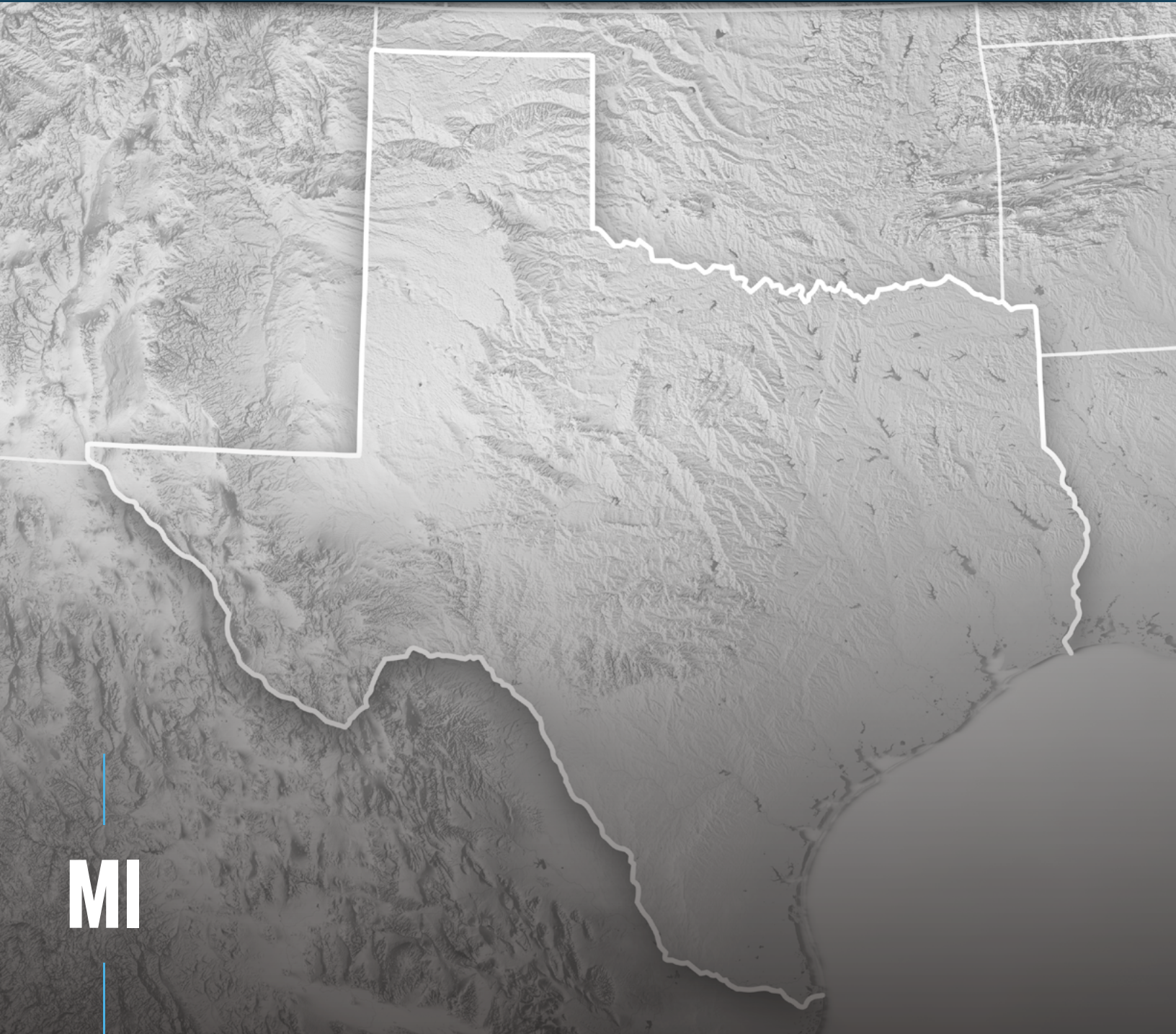


# LONE STAR SLOWDOWN?

How Land-Use Regulation Threatens the Future of Texas

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## About the Author



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## Executive Summary

Millions of Americans have found well-paying jobs and affordable houses in the rapidly growing cities of the South and Southwest. The Sunbelt's low taxes, extensive road networks, and easy growth into undeveloped land have provided upward mobility and prosperity at a far lower cost of living than the Northeast and California. Nowhere better exemplifies the Sunbelt model than the Texas Triangle, which encompasses Dallas, Fort Worth, Austin, San Antonio, and Houston.

Although laws in the Texas Triangle facilitate "horizontal" growth through exurban development, they restrict "vertical" growth, or the redevelopment of built areas. Even cities with loose zoning codes, such as Houston, impose some restrictions.

Thanks largely to restrictions on housing supply, house prices in the Texas Triangle have become markedly more expensive. This suggests that restrictions on vertical growth are beginning to cause a housing shortage in the region's more desirable areas. As horizontal growth reaches its limits, this shortage will only worsen. Unless restrictions on dense development, especially in central cities, are loosened, the Texas Triangle may come to resemble Los Angeles: a sprawl of unaffordable housing, slow transportation, and diminished social mobility.

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## Introduction

Millions of Americans have found well-paying jobs and affordable houses in the rapidly growing cities of the South and Southwest. The Sunbelt's low taxes, extensive road networks, and easy growth into undeveloped land have provided upward mobility and prosperity at a far lower cost of living than the Northeast and California. Nowhere better exemplifies the Sunbelt model than the Texas Triangle, which encompasses Dallas, Fort Worth, Austin, San Antonio, and Houston. In 2017, for example, the Dallas–Fort Worth area (DFW) added jobs more than twice as fast as New York City.<sup>1</sup>

Although laws in the Texas Triangle facilitate “horizontal” growth through exurban development, they restrict “vertical” growth, or the redevelopment of built areas. Even cities with loose zoning codes, such as Houston, impose some restrictions. Recent increases in house prices, furthermore, suggest that restrictions on vertical growth are beginning to cause a housing shortage in the region's more desirable areas. The revitalization of central-city neighborhoods, meanwhile, shows a large demand for urban living that is underserved by today's zoning codes and other land-use regulations. As horizontal growth reaches its limits, this shortage will only worsen. Unless restrictions on dense development are lifted, especially in urban cores, the Texas Triangle may come to resemble Los Angeles: a vast sprawl of unaffordable housing, beset by slow transportation and diminished social mobility.

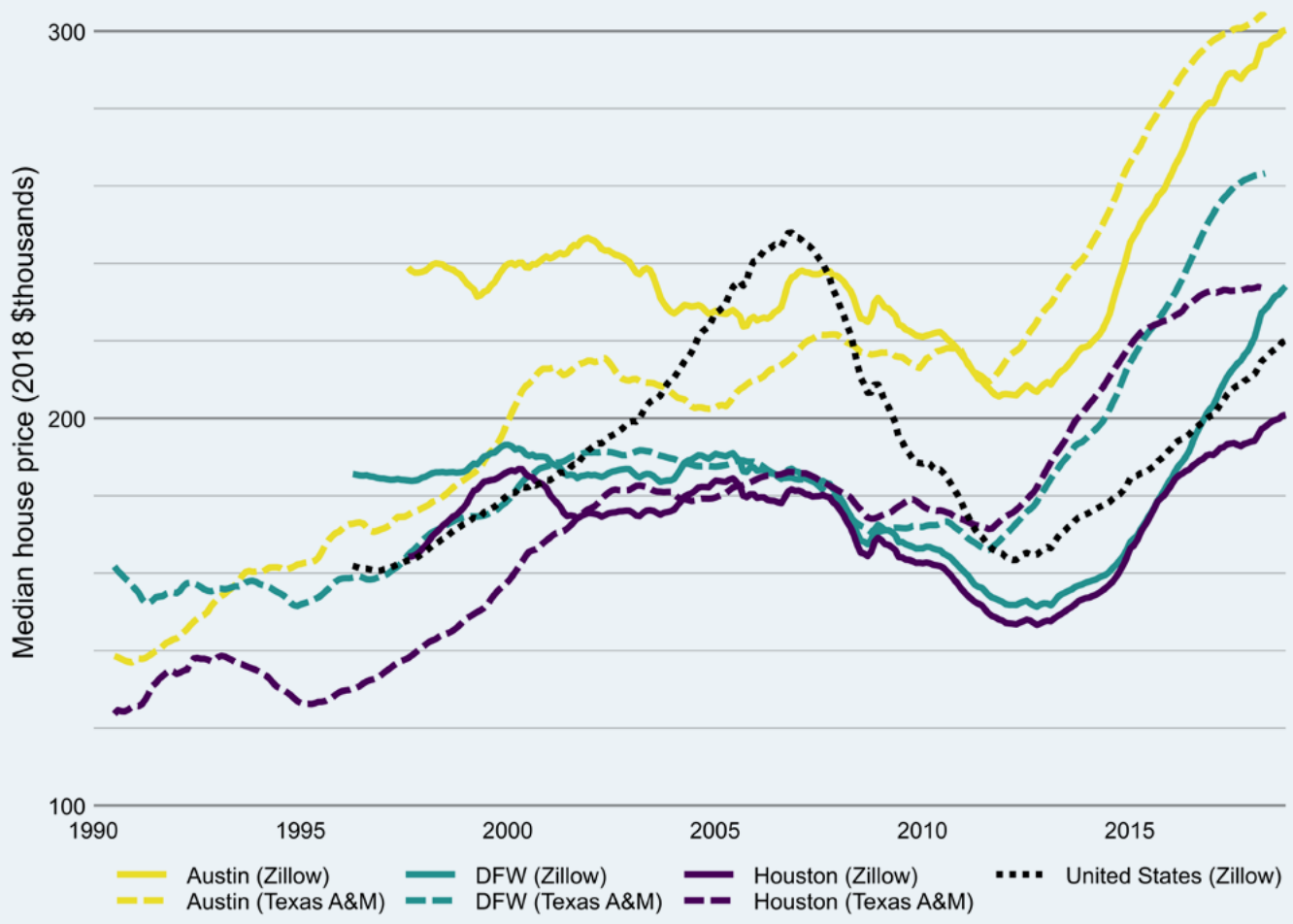
This report examines how land-use regulations in Dallas, Austin, and Houston affect the present and future economic vitality of the Texas Triangle. The dominance of the military in San Antonio, the other large metropolis in the region, has influenced its development in a way that makes any analysis difficult to generalize.

## Affordable Housing: Texas Is Losing Its Edge

Though housing in the Lone Star State remains generally affordable, it has become markedly more expensive. In 2016, one report noted that though housing in DFW cost far less than housing in U.S. coastal cities, the metro area “began to give up some of its enormous edge” in housing affordability in

FIGURE 1.

### House Prices: Texas Triangle Metropolitan Areas



Source: Zillow Research, "Home Listings and Sales"; Real Estate Center, Texas A&M University, "Housing Activity." The Texas A&M data are smoothed to remove seasonal fluctuations. Zillow's data consider price estimates of all houses, but Texas A&M's data consider only recently sold houses, so the two data series are imperfectly comparable.

the previous 10 years.<sup>2</sup> In fact, DFW housing prices in February 2016 overtook the national average housing prices for the first time since 2001 (Figure 1).

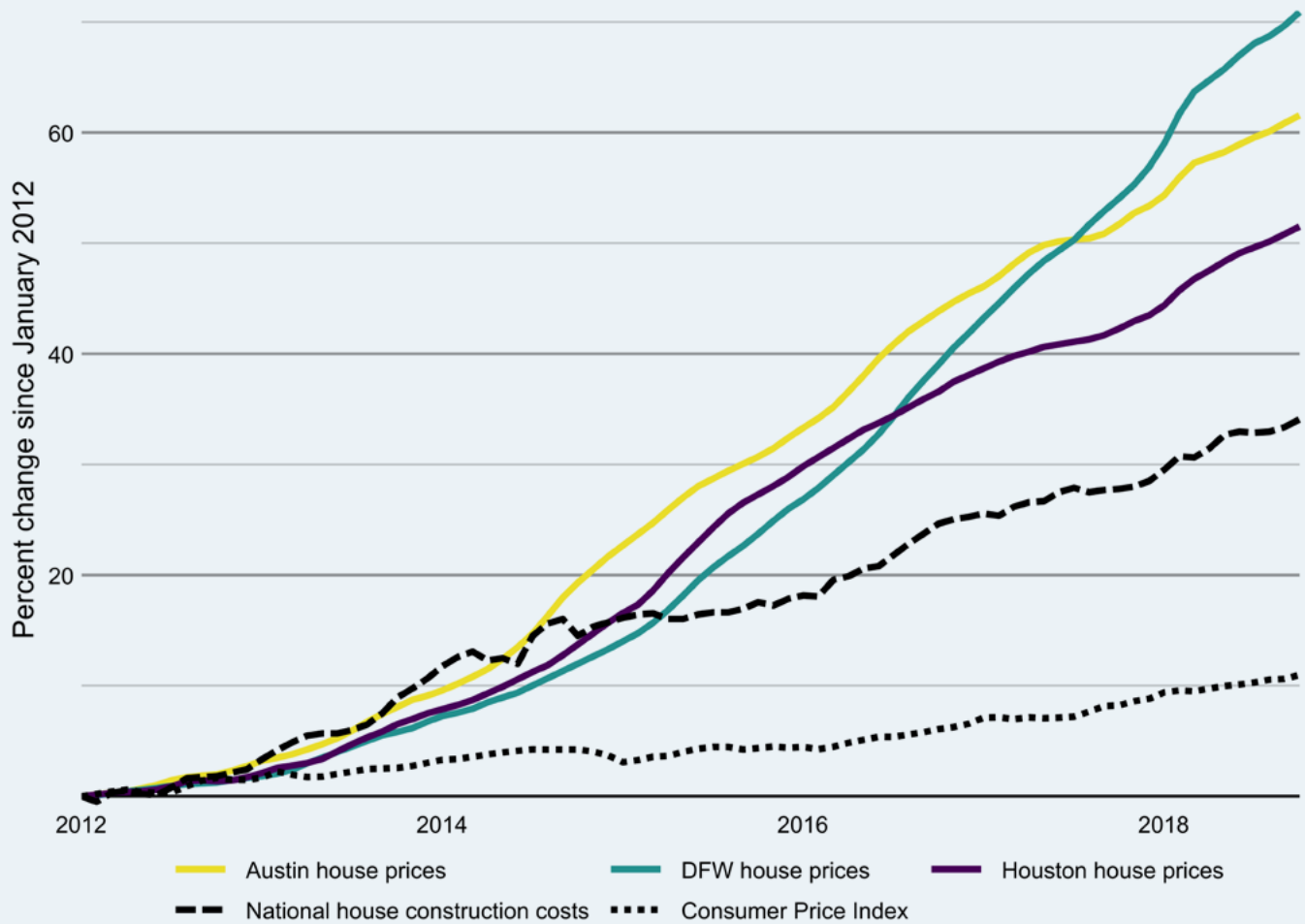
The Texas Triangle has since lost more of its edge. In May 2018, the average DFW house cost \$11,500 more than the national average. Austin has seen even larger increases. In March 2010, the average house in Austin cost just \$17,700 more than the national average; by May 2018, the cost premium was \$79,100.<sup>3</sup> Houston house prices have also increased, though they have stayed consistently below the national average. In all three metropolitan areas, housing prices since 2012 have increased significantly faster than national residential construction costs (Figure 2). Changes in the average understate the rapid decline in the least expensive housing stock. According to data collected by the

Texas A&M Real Estate Center, for example, 32.6% of houses sold in the Austin–Round Rock metropolitan area in 2011 had prices under \$150,000; in 2018, only 3.2% did. The shares of home sales under \$150,000 in the DFW and Houston areas fell from 50.0% and 47.9% to 13.0% and 18.0% in the same period.<sup>4</sup>

The rise in construction prices is especially noteworthy, given the almost complete lack of controls on outward expansion in Texas. Some writers on housing affordability have blamed restrictions on greenfield development for rising house prices in other cities, downplaying the role of restrictive zoning in established areas.<sup>5</sup> Their prescriptions have some merit for cities such as Portland, Oregon, where large tracts of accessible land have been artificially withheld from development. But such an analysis cannot

FIGURE 2.

## Indexed Texas Triangle House Prices and Residential Construction Costs



Source: Zillow Research, "Home Listings and Sales"; U.S. Census Bureau, "Construction Price Indexes"

explain rising house prices in the Texas Triangle. Texas urban areas are surrounded by vast expanses of unincorporated land with almost no restrictions on greenfield construction. Furthermore, though one might expect exurban construction to have the greatest moderating influence on prices in nearby suburban counties, price increases in affluent suburban areas such as Collin and Denton Counties in DFW have easily kept pace with those of central counties of metropolitan areas with hot housing markets, such as Travis County in Austin (Figure 3).

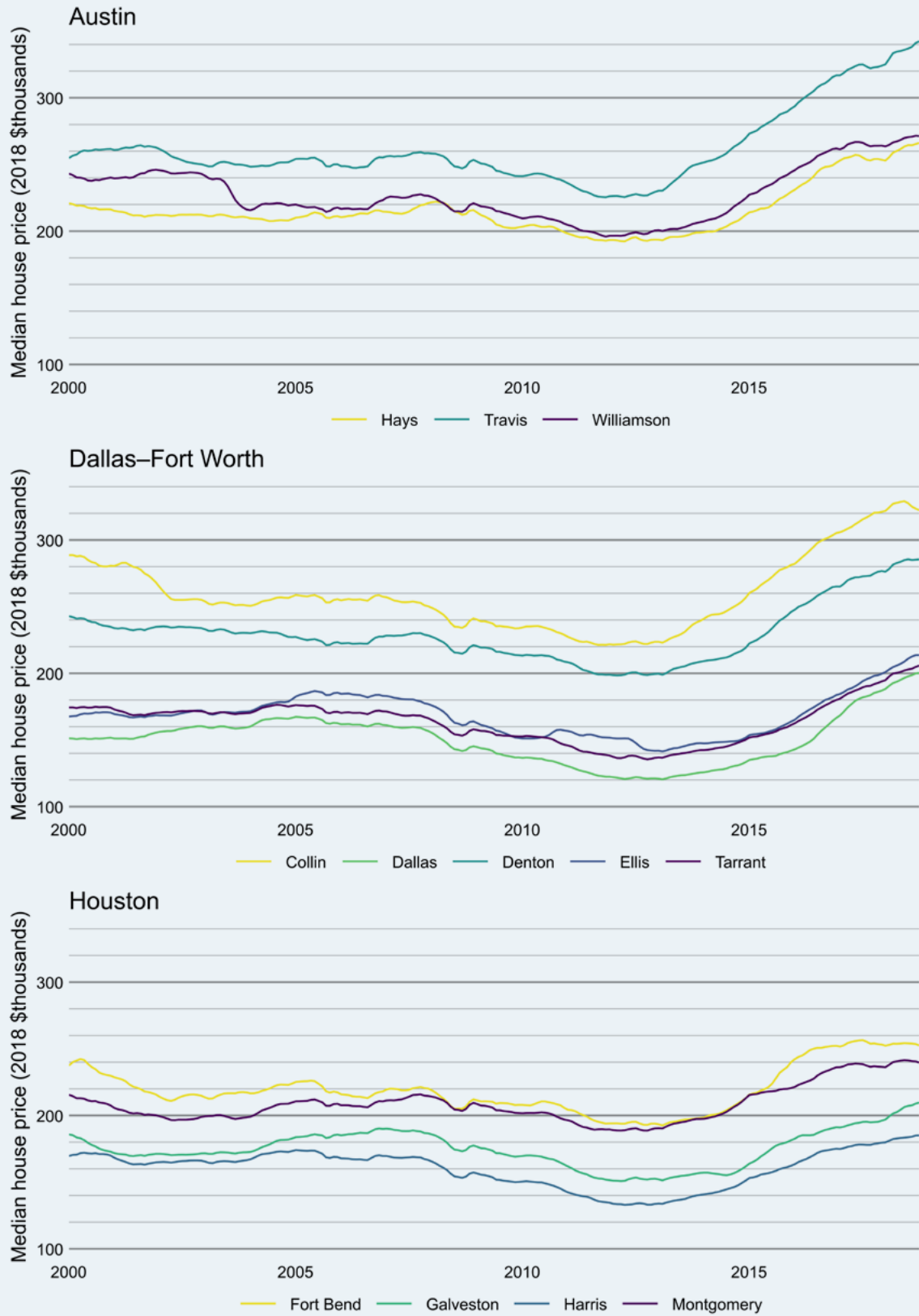
### The Demand for Downtown Living

Recent trends show a rising demand for living in Texas Triangle center cities. In 2000, 2,198 people lived in

Downtown Dallas, the area within the inner freeway loop; by 2010, the downtown population rose to 6,069. The adjacent Uptown neighborhood grew by 80%, from 7,257 to 13,070. Housing-price increases have been especially strong in central areas that have attracted many younger, educated workers.<sup>6</sup> For example, the total value of property in Uptown has increased from \$525 million in 1993 (about \$900 million, adjusted for inflation) to \$5.5 billion today.<sup>7</sup> Young educated workers have especially pronounced preferences for living downtown. The number of 25- to 34-year-old college graduates living within three miles of Downtown Dallas increased by 56%, from 1990-2012, compared with 12% in the rest of the DFW metroplex.<sup>8</sup> In Austin and Houston as well as Dallas, central areas have seen the greatest increases in average income and

FIGURE 3.

### House Prices: Texas Triangle Counties



Source: Zillow Research, "Home Listings and Sales"



in residents with college degrees.<sup>9</sup> **Figure 4** shows the sharp increase in housing prices near the downtown areas in Austin, Houston, and Dallas.

The demand for downtown living has revitalized inner-city areas such as Deep Ellum in Dallas. A cultural hub in the Jazz Age, the neighborhood fell into decrepitude for decades following World War II. It has seen a remarkable resurgence, with dozens of new businesses and restaurants and a popular music festival. Another sign of demand for urban living has been the growth of mixed-use developments in peripheral areas, such as the Shops at Legacy in Plano’s Legacy business park.

### The Role of Zoning

Economists have recognized that housing costs in expensive regions stem from artificial restrictions on supply. A 2003 study by Edward Glaeser and Joseph Gyourko, for example, found that U.S. house prices significantly exceeded construction costs only in a few small areas, such as in urban New York and California. Glaeser and Gyourko ascribed the expense in these regions to supply restrictions such as zoning.<sup>10</sup> Follow-up work by Glaeser and Bryce Ward, published in 2009, estimated that 61% of the average price of a house in metropolitan Boston stems from regulations, not construction costs.<sup>11</sup> A recent study by Jeff Tucker of Zillow estimates that a 10% increase in jobs corresponded to a 4.5% increase in housing prices in metropolitan areas with the least restrictive housing regulations, but a 25% increase in areas with the most restrictive regulations.<sup>12</sup>

Conversely, some cities have ended housing unaffordability by paring back zoning laws. Tokyo, for example, had a very costly housing market in the 1980s and early 1990s. House prices had risen 85%–90% from 1981 to 1992; by 1992, the average Tokyo house cost eight times the average annual salary.<sup>13</sup> But after reforms simplified land-use laws and transferred much power over land use from local to national authorities, housing prices greatly fell, even as the area’s population grew.<sup>14</sup>

Tokyo’s success is shown in a 2018 study by the consultancy Demographia, which computes the “median multiple”—the ratio of median housing prices to median annual household incomes—of hundreds of first-world metropolitan areas. The Tokyo-Yokohama area has a median multiple of 4.8, on par with American cities such as Orlando (4.6) and Las Vegas (4.7), and far below major financial centers such as New York (5.7, with a broadly defined metropolitan area that extends into Pennsylvania) and Los Angeles (9.4).<sup>15</sup> The Osaka metropolitan area, Japan’s second largest, has a median multiple of 3.5, below Houston (3.7), Dallas

FIGURE 4.

## House Price Trends in Austin, Houston, and Dallas, 2010–17



Source: Author’s calculations from U.S. Census Bureau, 2006–10 American Community Survey 5-Year Estimates, table B25077; and U.S. Census Bureau, 2013–17 American Community Survey 5-Year Estimates, table B25077.

(3.8), and Austin (4.1). Osaka and Tokyo have less expensive housing than any other area with more than 10 million residents in the Demographia survey. And far from a *Blade Runner*-like forest of skyscrapers, metropolitan Tokyo largely comprises small houses and low- to mid-rise apartment buildings: the majority of the Tokyo region's dwellings are in buildings of five or fewer stories.<sup>16</sup>

Expensive housing dampens the economy by preventing workers from moving to prosperous cities and joining high-productivity industries. One recent paper, for example, estimated that housing restrictions in wealthy areas lowered national economic growth by 36% from 1964 to 2009.<sup>17</sup> Other studies have blamed housing restrictions for significant increases in inequality between rich and poor regions of the United States.<sup>18</sup>

Economists widely agree that zoning makes housing not only less affordable but also less dense. Jonathan Levine, a professor of urban planning at the University of Michigan, notes: "A large body of empirical research concludes that current interventions in the form of municipal regulation *lower* densities below market levels and create more exclusivity in suburban municipalities."<sup>19</sup> Levine cites several scholars, such as Dartmouth land economist William Fischel, who point out that upzoning a parcel of land often greatly increases its price, showing that zoning inhibits denser construction for which there is market demand and that developers expect zoning to be difficult to change.<sup>20</sup> Land economist Issi Romem notes that most American zoning codes produce "pockets of dense construction in a dormant suburban interior."<sup>21</sup> Some small downtown areas see intense development, but most developed areas, including residential areas very close to city centers, have been left almost untouched. Lower- and middle-density construction continues mostly as low-density single-family residences (SFRs) in undeveloped land. The pattern is evident in the Texas Triangle region (**Figure 5**).

Texas cities have mostly grown through single-family housing. Large high-rise developments are a small fraction of the housing stock, as they are economical and legal in only a few central areas. Yet buildings of two to four units are also uncommon: regulations typically exclude them from most areas or force severe compromises to their design. These small "missing-middle" buildings have many advantages. They blend in better with low-density housing, while also reducing land and air-conditioning costs; and they do not require the specialized construction and maintenance that drive up the cost per built square foot of larger buildings. Families can buy a small multiple-unit building, live in one unit, and rent out the others for supplementa-

ry income.<sup>22</sup> Far fewer small apartment buildings have been built in core cities than in peripheral areas, likely because of zoning.

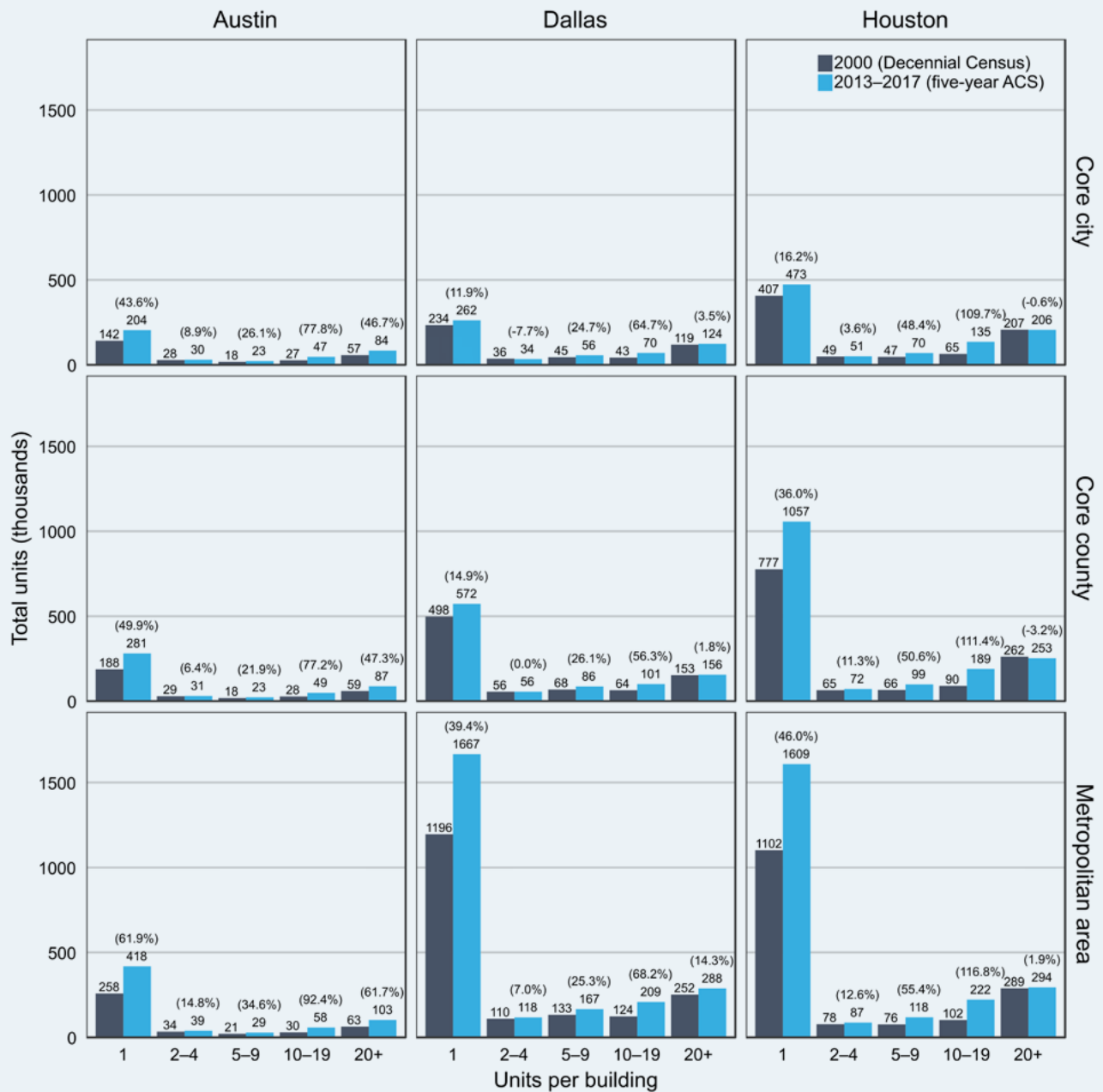
## An Overview of Texas State Land-Use Policy

All powers over land use in Texas, with a few narrow exceptions, are delegated from the state government. In one regard, the state's land-use policies are exceptionally unobtrusive: Texas counties have weaker control over unincorporated land than those of any other state. Counties can impose subdivision ordinances that regulate a few aspects of construction, such as street widths,<sup>23</sup> building setbacks from public roads (up to 50 feet from highways and 25 feet from other roads),<sup>24</sup> and minimum lot frontages on existing roads.<sup>25</sup> They may not, however, impose full zoning codes.<sup>26</sup> A report by the Capital Area Council of Governments, an association of local governments in the Austin area, notes that because of these limits on county authority, "Texas is the only state in the U.S. that restricts large areas within its boundaries from being zoned or effectively planned."<sup>27</sup> Subdivision ordinances can impose a few additional regulations: some have parking minimums,<sup>28</sup> and the ordinances of Travis and Hays Counties require developers to provide a minimum amount of parkland.<sup>29</sup> County subdivision regulations are nevertheless far less restrictive than full zoning codes: state law prohibits counties from limiting building sizes or residential densities and from mandating separation of residential, commercial, and industrial uses.<sup>30</sup>

Incorporated municipalities, however, have broad authority over land use. The Texas Local Government Code's zoning authorization, drawn from the same model statute as the zoning authorizations of many other states, gives municipalities authority to regulate groundwater pumping, the use of buildings, population density, and several aspects of building size, as well as to protect buildings and areas with historic importance.<sup>31</sup> There are some limits to zoning authority. For example, zoning changes require public hearings announced in a prescribed manner,<sup>32</sup> zoning rules must be uniform within each zone,<sup>33</sup> "spot zoning" of small tracts of land that lack any distinction from their surroundings is forbidden,<sup>34</sup> and all zoning codes must agree with the municipality's "comprehensive plan" and address one of seven general goals enumerated in the Local Government Code, such as "lessen congestion in the streets" and "prevent the overcrowding of the land."<sup>35</sup> One rule protects small-scale neighborhood interests: if the owners of 20% of the land affected by a proposed zoning

FIGURE 5.

### Changes in Texas Triangle Housing Stock, 2000 to 2013–17



Note: Core cities are the municipal boundaries of Austin, Dallas, and Houston, as defined at the time of the survey. Core counties are Travis (Austin), Dallas (Dallas), and Harris (Houston). Metropolitan areas comprise core counties as well as the following: Williamson (Austin); Collin, Denton, Ellis, Johnson, Rockwall, and Tarrant (Dallas); and Brazoria, Fort Bend, Galveston, and Montgomery (Houston). Numbers in parentheses represent the percentage changes from 2000 to 2013–17.

Source: U.S. Bureau of the Census, 2000 Census; 2012–16 American Community Survey 5-Year Estimates

change, or 20% of the land outside but within 200 feet of the affected area, file a written protest, then the change must pass with a three-fourths supermajority.

Municipal zoning regulations commonly limit building sizes, mandate setbacks from property lines,

confine commercial and industrial activity, and require automobile parking. Houston, unique among major U.S. cities,<sup>36</sup> has no unified zoning code, but city ordinances implement many typical zoning regulations. Other regulations require developers to pay municipal “impact fees” that ostensibly offset, but can

greatly exceed, the development's burden on infrastructure.<sup>37</sup> In some respects, including impact fees, Texas gives municipalities *more* ability to slow development than most other states.<sup>38</sup>

Despite the safeguards in state law, Texas courts have given local zoning codes very broad deference.<sup>39</sup> As Kathleen Hunker of the Texas Public Policy Foundation has noted, "Texas courts have exhibited a firm reluctance to police municipalities when zoning regulations test statutory boundaries."<sup>40</sup> The Supreme Court of Texas has noted that any legal challenge to a city zoning code faces "an 'extraordinary burden' ... to show that no conclusive or even controversial issuable facts or conditions exist which would authorize the City Council to exercise the discretion confided to it."<sup>41</sup>

A case in point is *Mayhew v. Town of Sunnyvale* (1998),<sup>42</sup> in which the Supreme Court of Texas upheld the zoning code of Sunnyvale, 12 miles east of downtown Dallas. Sunnyvale's zoning code included a one-acre minimum lot size (imposed in 1973 to prevent overloaded septic tanks but preserved after sewers were built)<sup>43</sup> and a 1983 ban on apartment buildings.<sup>44</sup> Neither of these provisions was reflected in the town's comprehensive plan, which had been drafted in 1965. (The majority of the town's residents lived on lots smaller than one acre.)<sup>45</sup> In 1986, the Mayhew family, working with town officials, applied to develop 1,200 acres at a higher density through an alternate zoning process for large-scale developments.<sup>46</sup> Although the town's consulting land planner supported the development and the 1965 comprehensive plan envisioned densities higher than one unit per acre on the Mayhews' property,<sup>47</sup> the town council rejected both the Mayhews' original proposal and a compromise with no apartments, and revised the comprehensive plan to lower densities while their application was pending.<sup>48</sup>

The Mayhews sued, claiming that the town violated their rights to due process and equal protection and that the zoning code was a "regulatory taking" for which they were due compensation.<sup>49</sup> An appeals court noted that "the zoning applied to Mayhew's property is irrational and unsupported by a logical or coherent comprehensive plan." That court criticized Sunnyvale's post facto revision of its comprehensive plan, stating: "This kind of after-the-fact justification of pre-judged ideas is the antithesis of comprehensive planning and fundamental fairness."<sup>50</sup> A district court to which the case was remanded found that the town's zoning code reduced the Mayhews' property values by 84%<sup>51</sup> and ruled in favor of the Mayhews, finding that the town's "one-acre zoning does not bear any relationship to valid planning principles or objectives."<sup>52</sup>

The Supreme Court of Texas reversed the district court's ruling. In a unanimous decision written by the state's future governor, Greg Abbott, the court found that in denying the Mayhews' application, the town was acting out of a "legitimate state interest" of preserving "the overall character of the community and the unique character and lifestyle of the Town[,] which is different from that of adjoining municipalities where there is a proliferation of multifamily and single-family homes on small lots."<sup>53</sup>

In another case, *Sheffield Development Co. v. Glenn Heights* (2004),<sup>54</sup> Gary Sheffield, the principal of Sheffield Development Co., bought 194 acres of land in Glenn Heights, south of Dallas, in an area that the town had designated for planned development. Soon after his purchase, the town council, which had held secret discussions of downzoning the area even while they were meeting with Sheffield, passed a moratorium on new development applications, which prevented Sheffield from "vesting" his development rights under the zoning code then in effect. The town then cut the maximum allowable density in the planned-development area by almost half, by increasing minimum lot sizes from 6,500 square feet to 12,000 square feet (sf), even though the area was already partially developed at the higher density.<sup>55</sup>

A jury estimated that the downzoning reduced the value of Sheffield's property by 50%; Glenn Heights itself admitted that the downzoning reduced the property's value at least 38%.<sup>56</sup> A court of appeals, though claiming that the downzoning could be justified as defending the community from the "ill effects of urbanization" (a phrase that the court noted was quite vague), nevertheless found Glenn Heights liable for damages from violating Sheffield's "investment-backed expectations."<sup>57</sup> The Supreme Court of Texas, however, ruled in favor of Glenn Heights. The court claimed: "The evidence is quite strong that the City [Glenn Heights] attempted to take unfair advantage of Sheffield."<sup>58</sup> It nevertheless decided that Sheffield was not due compensation, as Sheffield had bought his land below market value and thus could still sell it for a profit, and, as other planned-development areas were also downzoned, Glenn Heights's downzoning was "general in character and not exclusively directed at Sheffield."<sup>59</sup>

Texas tort laws also have been used to slow down dense development and extract damage payments from high-rise developers. In 2013, for example, a jury awarded about \$1.6 million in prospective damages to Houston homeowners near a planned high-rise tower near Rice University, the so-called Ashby high-rise. The homeowners had claimed that the tower would lower their property values by creating traffic problems, casting

shadows, and harming their neighborhood’s privacy.<sup>60</sup> A state appellate court overturned the award on the grounds of a general rule against awarding prospective damages<sup>61</sup> but confirmed that local homeowners would still be able to sue for damages after the tower was built.<sup>62</sup>

The Texas Property Code also allows developers of a neighborhood, or slim majorities of a neighborhood’s residents, to impose “deed restrictions” on every property in the neighborhood. Deed restrictions play an important role in regulating Texas land use, especially in Houston: they can stop property owners—and typically, any later purchasers of the property—from changing the appearance of their property or using it in certain ways.<sup>63</sup> Although most states adhere to the common-law rule that deed restrictions should be interpreted strictly, a 1987 state statute in Texas requires that “a restrictive covenant shall be liberally construed to give effect of its purposes and intent.”<sup>64</sup>

Deed restrictions can be imposed by the initial developer or, more cumbersome, imposed by a majority of residents, according to any of several processes set out in state statute. For example, under the Chapter 204 procedures valid in Harris County (which contains most of Houston), a property owners’ association that governs a deed-restricted neighborhood can impose new restrictions on the whole neighborhood with a 75% vote of the current property owners, with no ability for owners to opt out.<sup>65</sup>

## Zoning Restrictions in Austin, Dallas, and Houston

In most respects, Austin’s zoning is the most stringent. Dallas’s regulations are somewhat less restrictive than Austin’s, in general, although more restrictive in areas farther from downtown. Houston has the least restrictive regulations. In all three cities, furthermore, many regulations have tightened in the past several years.

### *Apartment Buildings*

In Austin and Dallas, zoning codes severely limit the amount of land on which apartments can be built. Through the 1980s, much of Austin’s growth was accommodated in small apartment buildings. But Austin’s city government also began limiting middle-density construction, especially in central areas. In 1984, Austin abolished a “cumulative zoning” policy that

allowed mixed-use apartment buildings in commercial districts.<sup>66</sup> Since 1997,<sup>67</sup> the Austin City Council has encouraged neighborhoods to create “neighborhood plans” that often include stringent development restrictions. The 2000 Old West Austin plan, for example, set out goals such as “protect[ing the] current pattern of single family uses” and “discourag[ing] any variances for parking reduction on any new or expanding developments, until the neighborhood attains greater levels of density, transit ridership, and pedestrian activity.”<sup>68</sup> The plan confined denser development to existing commercial corridors, especially an area in the neighborhood’s south, away from the “residential core.”<sup>69</sup> Such goals were typical of other neighborhoods; one review of Austin’s neighborhood plans found that their most frequent stated goal was “maintain[ing] established neighborhood character and assets.”<sup>70</sup> The result: between 1980 and 2000, apartment buildings of 2–49 units were the most common type of new construction in 28% of the residential areas of the Austin metropolitan area. Between 2000 and 2016, this figure fell to 18%, and the area with no appreciable construction almost doubled, from 9% to 17%.<sup>71</sup>

Apartments in Austin are essentially restricted to downtown, portions of the poorer southeast and along Interstate 35, and scattered peripheral areas. All multifamily zones have a minimum lot size of 8,000 sf, higher than in Dallas or Houston. Apartments in mixed-use (though not residential-only) districts are further subject to a “minimum site area” of 800–3,600 sf of land area per efficiency apartment and 1,200–4,400 sf per two-bedroom apartment.<sup>72</sup> Even the areas of Austin zoned for apartments are restricted by height limits, which range from 40 to 90 feet except in and near the central business district.<sup>73</sup> “Commercial compatibility requirements,” applicable to apartment buildings with three or more units, further limit building heights within 540 feet of SFR properties. No building taller than three stories is allowed within 100 feet of the property line of an SFR; even 300 feet away, no building can exceed 60 feet in height.<sup>74</sup>

Kevin Howard and Nicole Joslin, of the nonprofit group Austin Community Design and Development Center, note that unlike the precise residential compatibility requirements that govern one- and two-unit buildings, the commercial requirements use vague criteria such as “appearance or feeling of a residential scale” and “variety of scale relationships.”<sup>75</sup> They calculate that commercial compatibility requirements forced two typical four-unit buildings in SFR areas to be shrunk by 1,300 and 1,100 sf, about one-third and one-quarter of the otherwise permissible floor areas.<sup>76</sup>

Dallas allows less apartment construction than Austin in peripheral areas but more in inner areas; most

areas within two miles of the Dallas city center allow apartments. Minimum lot sizes in Dallas’s multifamily zones range from 1,000 sf to 6,000 sf, smaller than in Austin. Minimum site areas per apartment in Dallas affect all multifamily zones, not merely mixed-use areas as in Austin, and range from 225 sf to 1,000 sf for efficiency apartments, and 325 sf to 1,800 sf per two-bedroom apartment, somewhat lower than Austin’s mixed-use regulations.<sup>77</sup>

Multifamily height limits in Dallas are generally slightly lower than in Austin. Dallas’s most common multifamily zones and duplex zone have 36-foot height limits, below the 40-foot minimum in Austin, though permitted heights in smaller, denser districts reach up to 270 feet, and there are no height limits in the city center. But other regulations, such as the floor-area ratio (FAR)—which limits the ratio of a building’s total floor area to the land on which it is built—may limit practically attainable heights to lower than 270 feet.<sup>78</sup>

Multifamily building setbacks and lot coverage requirements are overall the strongest in Austin, followed closely by Dallas; Houston’s are the least restrictive. Especially tall buildings in Dallas and Houston, however, have additional setbacks, especially close to SFRs. Dallas’s “urban form” and “tower spacing” rules require upper floors of tall buildings to be recessed and mandate higher setbacks for buildings above 45 feet, or multifamily buildings adjacent to SFRs.<sup>79</sup> Houston also strengthens multifamily setbacks for buildings across the street from SFRs, from 10 feet up to 25.<sup>80</sup> And since 2011,<sup>81</sup> a “buffering ordinance” has required Houston developments higher than 75 feet that border a majority of SFRs to leave a setback of 30–40 feet from any adjacent SFRs, as well as comply with strict landscaping requirements.<sup>82</sup> (The ordinance exempts buildings along major thoroughfares or eight heavily commercial areas.)<sup>83</sup>

Houston does not have a unified zoning code and does not directly prohibit apartment construction. But it facilitates development restrictions through the enforcement of private deed restrictions. Outside Houston, deed restrictions must be enforced by lawsuits at private expense. But a 1965 state law authorizes Houston’s city government to investigate violations of deed restrictions on behalf of other holders of deed-restricted properties and to levy fines for violations.<sup>84</sup> The Deed Restriction Enforcement Team of the city’s legal office, authorized by the municipal code to enforce certain (though not all) deed-restriction provisions,<sup>85</sup> received 1,026 complaints in 2017.<sup>86</sup> Outside Houston, homeowners’ associations must enforce deed restrictions through lawsuits at their own expense. State laws also authorize Houston to deny building permits that violate private deed restrictions

and make it easier for homeowners in unzoned cities to vote to make existing deed restrictions more restrictive.<sup>87</sup>

Houston does not keep a register of deed-restricted land, but one report claims that the deed restrictions probably governed about a quarter of the city’s residential land from at least the 1970s to the 2000s.<sup>88</sup> A 2016 paper claims that half of all neighborhoods in Houston, and most neighborhoods in the suburbs, have deed restrictions.<sup>89</sup>

Deed restrictions are not the only mechanism by which Houston limits development. John Mixon, a University of Houston Law School professor and the author of a standard textbook on Texas zoning law, noted that when the Ashby high-rise developers initially applied for a permit, the city denied the application on the pretext of traffic impacts, using a regulation that gives the city’s Public Works department authority to reject any development with a driveway that lets out onto a city street. “The driveway procedure,” Mixon notes, “operates without clear standards, and the application of the driveway ordinance to control use may be unprecedented in local practice.”<sup>90</sup>

### *Limitations on Single-Family House Forms*

Even without apartment buildings, SFRs can produce relatively high density. Many smaller cities in Japan, for example, comprise mostly compact SFRs on small lots without setbacks.

Texas Triangle zoning, however, often imposes low-density forms on SFRs. Dallas and Austin require large SFR lot sizes even in many central areas. The average SFR minimum lot size in Austin’s inner neighborhoods is about 6,000 sf, more than in some small cities such as Lubbock (where single-family zones have a minimum of 5,000 sf).<sup>91</sup> Many reasonably central neighborhoods in Dallas also have very large lot sizes. Preston Hollow, for example, is an affluent area with half-acre lots only six miles from downtown.

Houston sets a much smaller SFR minimum lot size: 3,500 sf within the city limits and 5,000 sf in a zone beyond the city limits, called “extraterritorial jurisdiction,” in which Houston has limited land-use controls. Lot sizes smaller than the minimum, as small as 1,400 sf, are allowed in subdivisions that meet other requirements. Either the subdivision must provide “compensating open space” of up to 600 sf per lot (720 outside the city limits) and keep an overall density below 27 units per acre, or at least 60% of each undersize lot must be kept free of buildings.<sup>92</sup>

Unlike most other restrictions surveyed in this paper, minimum lot sizes in Houston have become more permissive over recent years. The city’s 1963 subdivision regulations required minimums of 5,000 sf in areas with sewers, and 7,000 sf elsewhere; in 1998, the minimum was reduced to 3,500 sf in “urban” zones of the city inside the Interstate 610 loop but maintained in “suburban” zones.<sup>93</sup> The whole area within city limits was brought under “urban” standards in 2013.<sup>94</sup>

Building-size restrictions in Austin and Dallas are comparable. Most single-family zones in Austin limit building heights to 35 feet, for example, compared with Dallas’s 30 feet or 36 feet. Setbacks are similar in all three cities: front-yard setbacks in Austin are typically 25 feet, though they reach 40 feet in “rural residence” areas and 15 in the SF-4A “small lot” area. Dallas SFR zones require 25- to 40-foot front setbacks, but only 5–10 feet on the sides.<sup>95</sup>

In 2006, Austin adopted “residential design and compatibility standards,” popularly known as the “McMansion ordinance.”<sup>96</sup> These standards apply in most of the older parts of the city zoned for low-density housing. The ordinances, though less restrictive than the standards for apartment buildings, do limit building

heights to 32 feet,<sup>97</sup> slightly below the 35 feet allowed in other single-family districts. Portions of buildings close to property lines have even lower height limits.<sup>98</sup>

Ordinary setback requirements in Houston are 20 feet from local streets and 10 feet from adjacent properties.<sup>99</sup> Though Houston has no lot-coverage requirement, setback requirements reduce the buildable area of a 100-by-100-foot lot (approximately a quarter-acre) by 44%, to a 70-by-80-foot rectangle. Houses accessible by public alleys or shared driveways have slightly reduced setback requirements.

Dallas and Houston allow slim majorities of an SFR neighborhood’s property owners to strengthen the entire neighborhood’s setback requirements. In Houston, ordinances passed in 2002<sup>100</sup> and expanded in 2007<sup>101</sup> and 2013<sup>102</sup> allow homeowners in predominantly SFR areas to impose more stringent setback requirements and minimum lot sizes. Such measures require only a petition signed by 10% of the affected landowners, a subsequent vote of approval by either 51% (for single blocks) or 55% (for larger areas), and approval by the city council. Special minimum lot sizes and setbacks last for 40 years and can be rescinded only by a petition from owners of two-thirds

FIGURE 6.

### Historic Preservation Districts in Austin and Dallas



Note: Districts on the National Register of Historic Places are in light blue; districts with local historic status are in dark blue-gray.

Source: City of Austin, City of Dallas GIS Services, Texas Historical Commission

of the affected properties and an approval by the city council.<sup>103</sup> Currently, about 6.6 square miles, mostly in areas within five miles of downtown, have a special minimum lot size, and 0.4 square miles have a special minimum setback requirement.<sup>104</sup> Areas governed by these ordinances are mostly in wealthier areas west of downtown.<sup>105</sup> Minimum lot size ordinances have been used to prevent owners of duplexes from splitting the buildings into two single-family homes.<sup>106</sup>

Dallas has had a similar process since 2005. Neighborhoods of 50 or more single-family homes in Dallas can petition the city government for a “neighborhood stabilization overlay” (NSO) that imposes more stringent minimum setbacks and maximum heights than required by the zoning.<sup>107</sup> Petitions require only a bare majority of the affected landowners.

### Historic Preservation

Designations of districts as historic areas typically slow or freeze redevelopment by requiring property owners

to get special government approval to demolish or alter existing buildings. Harvard economics professor Edward Glaeser has noted that in Manhattan, south of 96<sup>th</sup> Street, home of the most expensive real estate in the nation, nearly 16% of the developable land is under city historic preservation, including expensive residential areas that include hundreds of undistinguished buildings.<sup>108</sup> Austin, Dallas, and Houston all have several historically protected districts and hundreds of individually protected buildings on the National Register of Historic Places or local registries. Owners of historic buildings in all three cities can get significant tax benefits; in Austin, these benefits can be worth thousands of dollars per year.<sup>109</sup>

Austin and Dallas have placed similar proportions of their central land under historic preservation, including mid-rise portions of downtown (**Figure 6**). Austin’s historically preserved area, however, is worse for housing affordability. It includes most of the inner-ring neighborhoods north and west of downtown and the University of Texas, including many structures that date only from the postwar

era; according to Austin’s regulations, entire districts can be designated “historic” after an application from a majority of their property owners, even if only 51% of the buildings “contribute” to the area’s historic character. Austin’s over 600 individually landmarked buildings, likewise, are almost entirely in the city center and wealthy areas to the immediate north and west.<sup>110</sup>

Historic preservation usually preserves low population densities in valuable central areas. In the Hyde Park local historic district near the University of Texas, for example, the preservation ordinance prohibits multiple-unit housing on lots smaller than 7,000 sf and prohibits accessory dwelling units. A number of other Austin zoning overlays (out of 14 total), though not strictly “historic,” have similar goals of preserving the city’s appearance by limiting development. For example, the Capitol Dominance Combining District restricts building sizes and appearances within a quarter-mile radius of the dome of the Texas State Capitol, in order to protect its “visual and symbolic significance.”<sup>111</sup>

Dallas has 21 local historic districts and more than 100 individually registered

**FIGURE 7.**  
**Historic Preservation Districts in Houston**



Note: Districts on the National Register of Historic Places are in light blue; districts with local historic status are in dark blue-gray.

Source: City of Houston, Planning & Development, “Historic Preservation Manual,” 2014; Texas Historical Commission



structures. Most local historic designations protect small areas or buildings built during the late 19<sup>th</sup> and early 20<sup>th</sup> centuries.<sup>112</sup> (A few districts cover areas, such as the state fairgrounds, that are not under consideration for redevelopment.) The two most central, in downtown, cover small tracts of older commercial buildings; residential historic districts are mostly small and dispersed, and unlike in Austin, many of them are located in the less expensive areas south of the city center. The largest local historic preservation area, an assortment of several districts in Old East Dallas, covers less than a square mile. Unlike in Austin, a Dallas district can be designated historic only after a petition is signed by every property owner in the district,<sup>113</sup> though the city government can designate “conservation districts,” with a weaker set of controls over building size and architecture meant to preserve a location’s “sense of place,” with the support only of the majority of property owners.<sup>114</sup>

Houston protects a small assortment of residential areas, mostly in the more affluent western part of the city (**Figure 7**). Benefits of historic status in Houston include the ability to approve slightly more stringent special minimum lot sizes and setbacks.<sup>115</sup> Sixty-seven percent of the property owners of a Houston neighborhood must approve any historic designations. This threshold is higher than Austin’s 51% but far lower than the Dallas requirement of unanimity.<sup>116</sup>

### **Parking Minimums**

Zoning codes usually require new buildings to provide off-street parking. In urban areas, the required parking can far exceed the amount provided by older buildings or justified by market demand.<sup>117</sup> One owner of commercial buildings in metropolitan Dallas and Houston estimates that 37% of parking spaces in its Dallas buildings, and 37.7% in its Houston buildings, sit empty during peak hours.<sup>118</sup> Surface parking lots and structured parking garages can both be expensive. A compact surface lot uses about 300 sf per space, costing about \$45,000 per space at central Dallas land prices.<sup>119</sup> Donald Shoup, a professor of urban planning at UCLA, estimates that urban parking garages cost \$24,000 per space to build aboveground and \$34,000 belowground, not counting land costs or the opportunity cost of devoting floor space to parking rather than productive activity.<sup>120</sup> Shoup estimates that parking requirements add 30% or more to the cost of office buildings, and even more to the cost of shopping centers.<sup>121</sup>

The additional costs that parking requirements impose on housing can be significant. One study found that in Seattle, parking accounts for 15% of the cost of rent;<sup>122</sup> another study found that after Oakland, California,

began to require one parking space per unit in new apartment buildings in 1961, construction costs per unit increased 18% and the average number of units per acre in new apartment buildings fell 30%, as requirements encouraged developers to build fewer, larger units.<sup>123</sup> In suburban Seattle, by Shoup’s estimation, the costs of unused parking spaces add \$10,000–\$14,000 to the costs of apartments.<sup>124</sup>

Some writers have claimed that parking requirements in the Texas Triangle, even in Houston, are relatively high, both by the standards of the U.S. as a whole and by those of other large car-oriented cities.<sup>125</sup> Parking requirements can severely limit building sizes. Dallas’s requirement for restaurants, for example, is one space per 100 sf of floor area, which allows restaurants to build on only about one-fifth of the land that they own.<sup>126</sup> Austin requires the most parking for offices, 1 space per 275 sf. This is 21% more than Dallas’s requirement of one space per 333 sf, and 45% more than Houston’s requirement of one per 400 sf. All three cities require two parking spaces for SFRs, except that Dallas allows one space in townhomes and the highest-density SFRs. For apartments, Austin requires one space for efficiency units and 1.5 spaces for one-bedroom units, with an extra 0.5 spaces per bedroom beyond that. Dallas requires one space for efficiency units and one space per bedroom for larger units. Houston’s requirements, which range from 1.25 to 2 spaces per unit, are generally the lightest, especially for larger apartments.<sup>127</sup>

All three cities have modified parking policies downtown. Houston has long exempted its downtown from parking minimums.<sup>128</sup> Dallas’s central business district provides a significantly reduced parking minimum of one space per 2000 sf for all uses except low-density residential, and no required parking for ground-floor retail.<sup>129</sup> Austin not only lacks a downtown parking minimum but enforces a parking maximum, set at three-fifths of the minimum requirements elsewhere.<sup>130</sup> Even so, minimum parking requirements in noncentral areas may force developers in central areas, even ones with no parking minimum, to provide parking in order to attract suburbanites.<sup>131</sup>

### **Permitting**

The housing restrictions in Austin are aggravated by a burdensome permitting process.<sup>132</sup> One paper found that the average approval time for Austin housing permits was 223 days, almost twice the city’s 120-day legal requirement<sup>133</sup> and several times the south central U.S. average of 33 days.<sup>134</sup> In one survey of Austin developers, 82% of respondents considered the city’s development reviews “unnecessarily cumbersome or complex,” and 81% said that permitting delays in-

volved needlessly minor issues or were not “typically justifiable.”<sup>135</sup> This regulatory delay, according to one estimate, raises rents in new Austin buildings by about 4%, or \$720 per year, and encourages monotonous “big-box” building designs that pass review more reliably than innovative designs.<sup>136</sup>

Permit review outside Austin is much faster. One guide by the city of Dallas, for example, claims that site plans typically take two to three weeks to review. Building plans take an additional two to three weeks for commercial construction and two to three days for SFRs—and there seems no reason to doubt these claims.<sup>137</sup> Houston’s review process is quite fast for commercial properties: One recent study finds that “over the past three years, the slowest of Houston’s 5,974 new commercial building permits took just 28 days to process.”<sup>138</sup> One may presume that residential approvals are similarly swift.

### *The Role of the Suburbs*

The economies of Austin, Dallas, and Houston are intertwined with those of their suburbs, which set their own, typically more restrictive, land-use policies. All three cities have affluent, legally separate suburbs with stricter zoning laws occupying land a few miles from the city center. Examples include West Lake Hills near Austin, University Park and Highland Park near Dallas, and West University Place and Southside Place near Houston.

Suburbs devote most of their land to low-density SFRs and little to apartments. In DFW, for example, only 10 municipalities of 90 surveyed allow apartments in more than 5% of their land. Two of these municipalities are Dallas itself and Arlington, a city of almost 400,000 residents that holds a 40,000-student University of Texas campus. Other suburban regulations, such as minimum lot sizes, also enforce low density. For example, in Plano, an older suburb and a large job center, the average single-family lot size is 9,574 sf, more than a fifth of an acre. In other suburbs, average lot sizes of a third- or half-acre are not uncommon. These suburban restrictions can weigh especially heavily on university students. Many large Texas Triangle universities are located in low-density suburbs with almost entirely SFR housing. Two examples in the DFW area are the University of Texas at Dallas (actually in the neighboring city of Richardson), with more than 27,000 students, and the University of North Texas in Denton, with more than 38,000. And university students, who are less likely to be able to afford cars, have much less flexibility in determining where to live than others.

A state law called “extraterritorial jurisdiction” even gives Texas municipalities some control over unincorporated land up to five miles outside their boundaries.<sup>139</sup> Extraterritorial extension of land-use regulations is not automatic and is prohibited for certain types of regulation, such as separation of uses and maximum building sizes or FARs. But other regulations, such as setback lines, can be extended, and most Texas municipalities apply their subdivision regulations extraterritorially.<sup>140</sup>

### *Summary*

Despite Texas’s reputation for laissez-faire policies, land-use regulations in the state’s largest and most prosperous regions are often quite restrictive. Houston’s land-use regime, though far from a free-for-all, gives landowners the most freedom. Dallas and Austin are more restrictive; Austin, in particular, imposes stringent restrictions near downtown. Increasing obstacles, even in Houston, suggest that the relative scarcity of middle- and high-density housing is likely to worsen.

## **Job Decentralization and Its Consequences**

Restrictions on vertical growth will hasten job growth in dispersed commercial centers, or “edge cities.” Commutes are constrained by a phenomenon called “Marchetti’s constant”: irrespective of need, people budget an hour or slightly more, on average, for daily travel.<sup>141</sup> (The phenomenon is named after Cesare Marchetti, an Italian physicist who wrote a paper on its economic implications, though he attributed its discovery to others.)<sup>142</sup>

Marchetti’s one-hour travel-time budget means that workers who commute on uncongested freeways seldom look for jobs more than 20–25 miles from their home. Several Dallas and Houston suburbs are already this far from downtown, such as Katy and the Woodlands near Houston, and Frisco and McKinney near Dallas, and road congestion throughout metropolitan areas limits practical commutes to much less than 25 miles. There is some evidence that the effects of Texas congestion on commutes are worsening: average commute times for peak-hour commuters have increased by a few minutes over the last decade (**Figure 8a**) while commute distances have slightly decreased (**Figure 8b**).

Job decentralization is neither new nor wholly bad. In 1991, Joel Garreau documented growth in high-rise suburban business districts such as

FIGURE 8a.

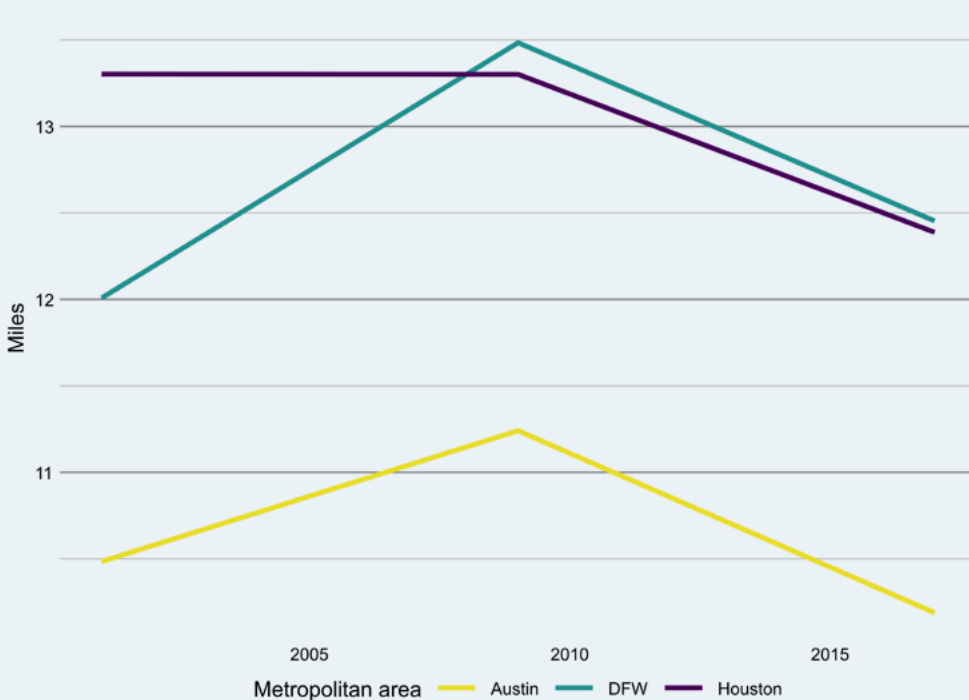
### Average Peak-Hour Commute Times



Note: Author's calculations from individual records provided by IPUMS-USA, University of Minnesota, [www.ipums.org](http://www.ipums.org).

FIGURE 8b.

### Average Peak-Hour Commute Distances



Source: U.S. Census Bureau, American Community Survey; Federal Highway Administration, National Household Travel Survey. Peak-hour commuters are defined as those who typically arrive at work between 8:00 and 9:30 a.m.

Houston's Galleria in his book *Edge City*. Many businesses that need large spaces for design and experimentation, or that can employ women who are looking for jobs near their suburban homes, have good reasons to locate in the suburbs.<sup>143</sup>

But job decentralization has two drawbacks. First, edge cities are less accessible than downtowns for lower-income workers. When companies move to the suburbs, they almost always go to wealthy areas near senior managers' residences. Garreau even says that "the prime location consideration when a company moves" is that "the commute of the chief executive officer must always become shorter."<sup>144</sup> For residents of poorer residential areas, especially those who rely on downtown-focused mass transit networks, these suburban areas are much less accessible than central business districts.

In Paris, France, for example, the city government limited building heights to 121 feet (since partially raised) in 1977.<sup>145</sup> Central Paris now has a shortage of office space<sup>146</sup> and, as of 2013, commercial rents a third higher than Manhattan.<sup>147</sup> Many corporations instead have offices in towers in La Défense, the largest business district in Europe,<sup>148</sup> just west of the Paris city limits and about five miles from central Paris. Residents of wealthy areas of Paris and upscale western suburbs can reach La Défense easily, but residents of poorer suburbs face drives on congested roads or indirect train trips. The region is currently facilitating travel to La Défense with the Grand Paris Express project, a set of expensive circumferential rail lines.<sup>149</sup> A height limit in Washington, D.C., has likewise displaced jobs to suburbs far from the region's poorer east and southeast.<sup>150</sup>

Suburban jobs in Texas follow similar patterns. In DFW, edge cities have formed in wealthy areas north of Dallas, far from poorer, ethnic-minority areas in the south. Toyota's new North American headquarters, for example, is in the Legacy business park in Plano, 22 miles from downtown Dallas along the Dallas North Tollway. Similarly, Houston's edge cities such as the Galleria have formed in wealthy northern and western areas. The inaccessibility of suburban jobs may keep many residents of poor areas from working at all. One study that examined differences between cities in interstate highway construction estimates that job suburbanization caused about half of the increase in the difference between black and white Americans' employment rates over the period 1970–2000.<sup>151</sup> As long as edge-city residential zoning remains predominantly single-family, the inaccessibility of edge-city jobs will only worsen.

Edge-city inaccessibility does not affect only workers in low-productivity support industries such as sanitation and food service. Many white-collar workers with little accumulated wealth, such as recent college graduates, may also find edge cities to be inaccessible, especially in areas with little rental housing.

The second drawback is that industries benefit from the clustering that density enables. In general, workers and firms are more productive in denser environments, a phenomenon known as "agglomeration," because they can find business partners (such as employees, customers, and suppliers) more easily, pool resources to create public goods, and benefit from knowledge-sharing.<sup>152</sup> Substantial evidence suggests that some agglomeration effects function on very small geographic scales, often less than a mile, and are particularly powerful for the most innovative industries.<sup>153</sup>

Paul Graham, an entrepreneur who founded the startup incubator Y Combinator, has noted that technology startups concentrate in a few cities because of small-scale agglomeration effects. Graham's explanations boil down to local and larger-scale agglomeration effects. Graham claims that startups are much more likely to succeed if the local culture encourages startups and if founders have chance meetings with other founders and investors. Both factors, he says, depend on the presence of "a *lot* of people interested in startups."<sup>154</sup> Graham has also proposed that a city could "buy a Silicon Valley" for about a billion dollars by funding a few hundred local startups. This initial group, if large enough, could start a "self-sustaining chain reaction" fueled by agglomeration effects: other startups and venture-capital firms would move to the city to take advantage of the startup ecosystem.<sup>155</sup>

The job density important to agglomeration is hard to obtain in edge cities. Edge cities typically have poor public transit access and are located near low-density residential neighborhoods; they are therefore limited by the low capacity of private cars. Joel Garreau claims that when an edge city reaches a FAR of 1.0, or one square foot of floor space per square foot of land, "traffic jams become a major political issue," and few edge cities grow beyond FAR 1.5. Light rail, however, only becomes economical at FAR 2, and the typical density of an "old downtown" is 5.<sup>156</sup>

Even mixed-use developments that incorporate housing alongside office space cannot solve more than a small fraction of this transportation crunch. There is no guarantee that tenants in edge-city housing would work in the edge city, especially in innovative industries with high rates of employee turnover and frequent corporate mergers and bankruptcies. Edge

cities' low job density and generally uniform stock of large developments, furthermore, may tend to promote monocultures of large numbers of employees who work similar jobs for a few corporations, and there is some evidence that employment diversity brings strong agglomeration benefits in itself.<sup>157</sup> In short, the best way to promote economic agglomeration, as well as employment opportunities for low-income Texans, is to center new commercial development near where people already live.

### **Transportation Improvements Alone Cannot Stop Decentralization**

It may seem that if transportation difficulties threaten the prominence of downtowns, transportation improvements could safeguard it. Unfortunately, current Texas Triangle land use dooms most large transportation improvements to be disappointments.

First, consider highway widenings. Expanding freeways in urban areas is expensive and disruptive to the surrounding areas. Moreover, traffic engineers have long recognized that highway congestion cannot be eliminated by widening highways. Additional highway capacity, rather than quickening traffic, is usually mostly consumed by additional trips, a phenomenon known (perhaps misleadingly) as “induced demand.”<sup>158</sup> One study estimated that 68% of added highway capacity is consumed by short-term increases in traffic; another found that in the long term, induced demand entirely consumes additional capacity.<sup>159</sup> Yet another study even observed that vehicle travel in several metropolitan areas increases in direct proportion to the size of the highway network, an observation that it named the “fundamental law of road congestion.”<sup>160</sup>

Houston has one excellent illustration of induced demand: 20 miles of the Katy Freeway, which connects central Houston with job centers and suburbs to the west, were widened in 2012. At \$2.8 billion,<sup>161</sup> or \$140 million per mile, the project cost more per mile than some subways.<sup>162</sup> The widening, which expanded some stretches of the freeway to 26 lanes, required paving over a railroad and demolishing an estimated 1,067 properties, including the houses on both sides of an entire residential street.<sup>163</sup> But by 2014, commutes took 30%–50% *longer* than just before the widened freeway opened.<sup>164</sup>

Some of this induced demand is good if it stems from additional workers taking downtown jobs. But induced demand can take less beneficial forms, such as by convincing commuters to drive alone, instead of taking transit or carpooling in HOV lanes. Beyond a certain volume, furthermore, private automobile commuting

is constrained by the essentially immutable downtown street grid.

Rail transit is also futile under current land-use regulations in the Texas Triangle. Even if public transportation induces some people to stop driving, the freed road capacity will be taken by other drivers just as if the freeway had been widened.<sup>165</sup> Moreover, rail transit cannot compete with Texas freeways on speed without congestion far worse than today's. The Dallas Area Rapid Transit (DART) light-rail system, for example, has a top speed of 65 miles per hour but an average speed of only 25–35 miles per hour, on par with the region's most congested downtown freeway segments—even though the 1.3-mile average distance between DART stops is longer than an industry standard.<sup>166</sup>

Texas's rail systems have, in fact, been disappointments. DART is the nation's longest light-rail system; many of its lines run alongside major highways and extend deep into low-density suburbs. But of 23 American light-rail systems tracked by the National Transit Database in 2017, DART ranks only sixth in the nation for ridership and 19<sup>th</sup> for boardings per track-mile, with a daily average of 398.<sup>167</sup> Austin's Capital Metro-Rail commuter-rail line gets only 35 riders per track-mile (albeit on a restricted schedule that ends after the evening rush hour).<sup>168</sup> Houston's METRORail did better, ranking 12<sup>th</sup> among light-rail systems with 835 boardings per track mile, but METRORail serves only dense central areas.<sup>169</sup>

Mass transit's primary benefit is not speed but space efficiency: it enables concentrated development by handling far more riders in less space than private cars.<sup>170</sup> Concentrated development, in turn, provides customers for mass transit.<sup>171</sup> But the policies that keep the Texas Triangle low-density and car-oriented will keep mass transit from providing an economic alternative to driving.

Some writers on transportation have recognized these disadvantages of rail transit and instead advocated better management of freeway capacity through bus service and freeway tolling. (Federal law generally prohibits the use of federal funds for tolled roads, with some narrow exceptions.)<sup>172</sup> Though such measures would certainly help, they are no panacea. No tolling scheme can fit more vehicles into downtown than the underlying capacity of the downtown streets and freeways. Downtown Houston and Dallas, each fed by about 30 freeway lanes with a capacity of about 2,000 vehicles per hour, could get, at most, 60,000 workers per hour into the city during the morning rush in single-occupancy vehicles alone. Express bus service to downtown, meanwhile, requires severe tolls or conges-

tion afflicting private cars before it becomes more convenient than driving, even with dedicated bus lanes.

In the sparse population of the Texas Triangle suburbs, the only practical bus service is express runs between job centers and park-and-ride facilities in residential neighborhoods. Peak-only routes do perform well on certain cost metrics, such as the number of boardings per mile. Yet park-and-ride bus service has its own problems. Midday and off-peak demand for long-distance park-and-ride service is typically quite low. In Houston, for example, peak-hour park-and-ride buses gained 25.64 customers per revenue mile in September 2018, but off-peak buses got only 13.10 customers per mile, despite a very sparing off-peak schedule on which some lines run only every 50–60 minutes.<sup>173</sup>

Concentrated rush-hour service is also difficult to provide. Buses must be bought for rush hours and left idle at other times of the day, driving up capital expenditures. The labor for rush-hour service is also expensive. Many transit workers' collective bargaining agreements mandate eight-hour days, so many workers hired for rush-hour service must spend a long time idle.<sup>174</sup> The alternative is to schedule drivers for "split shifts," typically two four-hour intervals on duty during rush hours, with a long midday break—a practice that workers often dislike and that may cause dangerous driver fatigue.<sup>175</sup>

The best way to promote downtown employment, in short, is to let more people live close to downtown and commute on local forms of public transit that can provide regular all-day service. Attempts to compensate for restrictive zoning policies with far-flung transportation improvements can only be an expensive second-best.

## Los Angeles: A Look into Texas's Future?

One possible future for the Texas Triangle is on display 1,200 miles west. Los Angeles resembles the Texas Triangle in many respects: suburban housing types, a wide expanse of developable land (albeit with some obstacles posed by mountains), and a transportation network designed for motorists.

Los Angeles's first zoning codes were set in the 1920s, in response to small-scale landowners' desires for rules that would facilitate construction, and created a vast supply of multiple-unit buildings, remarkable for a largely agricultural region. The city was downzoned in

the 1930s, largely to satisfy the Federal Housing Administration (which regarded SFRs as better mortgage risks) but still densified as its horizontal growth reached nearby mountain ranges: "[M]ulti-unit construction passed single-family construction in unit volume for the first time since the 1920s in 1957."<sup>176</sup> Most of these multiunit buildings were low- or mid-rise, including large tracts of two- or three-story apartment buildings called "dingbats."

After 1960, homeowners won several onerous construction restrictions. In 1965, for example, the city council "effectively doubled the parking requirements in all residential zones." Further downzonings culminated in the 1986 Proposition U, which halved the allowable FAR in 70% of the city's commercial land.<sup>177</sup>

By one estimate, this "homeowner revolution" reduced the population that the city's zoning code could accommodate from 10 million in 1960 to 3.9 million in 1990, even as the city's actual population increased from 2.5 million to 3.5 million.<sup>178</sup> The harms of the downzonings are compounded by the California Environmental Quality Act, an abuse-prone law that allows anonymous lawsuits against most large construction projects,<sup>179</sup> and by California's 1978 Proposition 13, a cap on property taxes that freed homeowners from worry that zoning restrictions that inflated their house prices would also increase their taxes.

Housing prices in Los Angeles stagnated during the early 1990s because of the 1992 riots and military retrenchment after the Cold War. But they soon began increasing far faster than the national average. The average inflation-adjusted house price in Los Angeles increased 131% from 1996 to 2018, or 3.9% annualized, according to the Case-Shiller indexes. Over the same period, national home prices increased 51%, or 1.8% annualized.<sup>180</sup>

Despite the Los Angeles region's decentralization, traffic congestion is notorious. The transportation analytics firm INRIX ranks Los Angeles the most congested city in the world. One segment of Interstate 10, which connects downtown with secondary job centers in the city's Westside, is the fourth most congested freeway in the U.S.<sup>181</sup> The congestion severely inhibits many workers' commutes: the average peak-hour commute distance in Los Angeles is only about 9 miles, well below that of Dallas or Houston.<sup>182</sup>

The secondary job centers in the Westside of Los Angeles are surrounded by largely single-family zoning and have seen few new developments; development in Los Angeles has instead concentrated in poorer

areas.<sup>183</sup> Development continues in some peripheral areas—the Inland Empire around San Bernardino and Riverside, the High Desert around Palmdale and Lancaster, and southern areas of Orange County, a drive of 50 miles or more from downtown. But this development has neither noticeably reduced housing prices in central areas nor attracted much white-collar employment. The major job centers of the Los Angeles metropolitan area are still the traditional centers in a narrow corridor stretching west from downtown Los Angeles, with secondary clusters in established Orange County cities such as Irvine.

Another factor of relevance to Texans: low population density and high land values in Los Angeles make new transportation infrastructure impracticable. The Los Angeles Metro is extending its Purple Line subway through the city’s Westside for a low cost per mile by American standards, but the low population density produces a construction cost of about \$45,000 per predicted daily rider. Most European countries, where subway projects typically cost \$10,000–\$25,000 per daily rider, would consider this cost unjustifiable.<sup>184</sup>

Recent freeway-expansion projects in Los Angeles have also been very expensive. A recent improvement of the 405 freeway through Sepulveda Pass cost \$1.1 billion for 10 miles and added only a single carpool lane in one direction,<sup>185</sup> for a cost per rider comparable with that of European subways, even under very optimistic assumptions about the use of the carpool lane<sup>186</sup>—and it still failed to reduce travel times. Another planned expansion of the 405 through flat terrain in Orange County will cost \$1.9 billion for 16 miles of an additional lane per direction and other minor improvements.<sup>187</sup>

The resulting economic dysfunction has driven many residents of the Los Angeles region out of the state. Between 2007 and 2016, California lost about 1 million residents to net domestic migration. Two-thirds of these emigrants left from five counties that comprise metro Los Angeles, which lost about 3.5% of their population to emigration, compared with only 2% in the rest of the state.<sup>188</sup> Residents who have remained face a weak economy. In 2017, the Los Angeles metropolitan region saw only an anemic 1.2% rate of job growth. This is far lower than the rates of growth in Austin (2.7%) and Dallas (3.1%) and lower than even the rate of growth in Houston, which added 1.3% to its employment numbers despite a severe contraction in the oil industry. And though California’s high state tax and regulatory burdens doubtless hamper Los Angeles industries, other less expensive California cities nonetheless posted far higher job gains, such as 2.3% in Fresno and 1.8% in Sacramento.<sup>189</sup>

## Conclusion

A Texas future characterized by increasingly unaffordable housing, ever-increasing traffic congestion, and out-migration—in short, Los Angeles—is not one that many Texans would find attractive. But it is not an inevitable future. Based on developments elsewhere, a number of changes in land-use regulations would avoid it.

### *Upzoning in City Cores*

Austin, Dallas, and Houston have a special incentive to allow more housing construction. Not only would freer zoning help region-wide housing affordability, but new housing near established downtown areas would encourage businesses to locate downtown rather than in edge cities, boosting both the economy through agglomeration effects and the cities’ own tax bases.

High-rise developments may be viable in a few small areas, most of which are already substantially urbanized, near established downtowns or other high-value locations such as universities. Elsewhere, however, new housing would more likely be mid-rise developments of perhaps two or three stories (such as townhouses) in less central areas, perhaps six to 10 stories in inner-ring neighborhoods—similar to the development in areas such as Dallas’s desirable Uptown neighborhood and the central areas of dense but skyscraper-free European cities such as Paris and Vienna. More widespread upzoning would even defray the demand for residential high-rises by diffusing housing demand over wide areas.

### *Navigating NIMBY in Edge Cities and Suburbs*

The rapid economic growth of the Texas Triangle means that even if edge cities lose some relative importance, they are unlikely to lose absolute numbers of jobs. Furthermore, jobs are still better kept in existing edge cities than lost to possible future developments in even more peripheral areas. Thus, suburbs, especially more central ones, would be well served by allowing additional housing.

One natural place for additional high-density housing in the suburbs is in edge-city developments. Edge-city residents’ demands for businesses such as restaurants and nightlife can help make edge cities into destinations in their own right, not mere office parks. Edge-city residents who work elsewhere can leave parking spaces vacant during work hours for workers who commute in from other areas, reducing the total amount of parking needed compared with separate

residential and commercial developments. And, of course, edge cities have few preexisting residents who would object to additional development. Donald Shoup has also suggested that large strip malls could harbor housing in the form of narrow buildings on the fringes of large block-size parking lots, reducing the supply of parking only slightly while also improving pedestrian experiences.<sup>190</sup>

Increasing the supply of housing in established suburban areas is more politically difficult but not impossible. The suburbs can add missing-middle housing without altering their suburban character. Many other jurisdictions have done so. In California, state laws now allow “accessory dwelling units”—small apartments or cottages separate from the main house—in almost every SFR area. Accessory dwelling units are an especially useful form of missing-middle housing because they can be built without demolishing an entire house; in suburban areas with a high demand for housing, such as near universities, they could be especially useful. A proposed revision to the Minneapolis zoning code would allow “fourplexes”—four-unit, two-story apartment buildings, often no larger than a two-story house—everywhere in the city. One local housing advocate noted that fourplexes were so “unobtrusive” that many Minneapolis residents who showed up to protest the proposed rezoning already lived in neighborhoods full of fourplexes without realizing it.<sup>191</sup>

### *For Houston in Particular*

Houston’s combination of size, prosperity, and affordable housing lacks a parallel anywhere else in the United States. The Houston model is not perfect. Houston allows citizens to file complaints about deed-restriction violations without providing a filing fee or any supporting evidence. As a result, Houston spent \$285,000 investigating 1,026 deed restrictions in 2017, of which 761, nearly three-quarters, were closed without litigation. Even the substantive violations that Houston found were often trivial matters, hardly affecting the city’s well-being, such as a \$1,000 fine levied for keeping landscaping equipment on one’s property, or \$600 for holding too many garage sales.<sup>192</sup>

Nevertheless, Houston’s system of city-enforced private deed restrictions is better than a zoning code. Homeowners must organize deed restrictions themselves, a barrier that imposes no financial burden but dissuades less motivated homeowners. Developers who want to redevelop a deed-restricted subdivision need only buy enough parcels to have the restriction changed, rather than lobby a city government to change the zoning code.

Some reforms, though, would likely make the system work better. Spurious reports of violations could be discouraged by requiring a small fee, perhaps \$50, to be submitted to the city with a complaint, refunded if the complaint is valid. The city could also impose stricter requirements on the types of deed restrictions that it will enforce, such as by requiring that deed restrictions be renewed by a majority vote of the affected homeowners every 20 years. The default terms of Houston’s special minimum lot sizes and setbacks could likewise be shortened from the current 40 years, a length of time in which neighborhoods are likely to see large turnover in their residents, to 10, or the supermajority requirements for approval raised, perhaps to 60%, from the current 51% or 55%. These measures would reduce the obstacles posed by these special zones and deed restrictions, without placing them out of the reach of neighborhoods that really want them, or imposing substantial financial obstacles that would treat lower-income neighborhoods unfairly.

### *Parking and Transportation*

There is a case for repealing parking minimums altogether: developers and business owners can assess how much parking their customers will need better than citywide zoning boards. And widespread parking-minimum abolition has some precedent in other large, car-oriented cities. For example, Mexico City and Buffalo, New York, have abolished them entirely.<sup>193</sup> Other cities and suburbs have made more modest reductions. For example, Decatur, Georgia, a suburb of Atlanta, eliminated parking requirements for commercial uses and reduced residential parking requirements.<sup>194</sup>

Still, parking minimums do address a perceived need: that in areas without ample parking, additional development would burden on-street parking, irritating existing residents who depend on parking spaces and encouraging double-parking. But a better way to address this need would be market-based parking management similar to San Francisco’s SFpark. Every month, SFpark sets a schedule of parking prices that differ for each city block, time of day, and day of the week. SFpark aims to keep 20%–40% of the parking spaces on every block free at any time, guaranteeing that drivers could always find parking spaces.<sup>195</sup> Parking prices are adjusted about once every two months: areas with more parking demand than the target had prices raised in increments of 25 cents per hour to encourage drivers to park in other areas instead; prices have been lowered in areas experiencing lower parking demand.<sup>196</sup> SFpark began in 2011; a pilot program in central areas reduced the amount of traffic congestion due to traffic searches by two-thirds.<sup>197</sup> The system has



been successful enough that in December 2017, the government decided to expand it to cover the entire city.<sup>198</sup> Donald Shoup has proposed that neighborhood residents could be persuaded to adopt market-based parking systems if some of the parking revenue is earmarked for neighborhood improvements.<sup>199</sup>

In urban areas with high enough residential density to let residents make local shopping trips on foot, cities could encourage a movement to a “common-garage” parking model. Under this model, developers can forgo forgoing building parking on their own property in exchange for contributing to a municipal fund used to build a large neighborhood parking garage where residents could store their cars.<sup>200</sup> Such a model could encourage residents to make short trips on foot and save cars for longer journeys, and allow developers to experiment with more pleasant and architecturally attractive forms of housing, such as the “euroblock,” a seven- or eight-story block-size building ringing a central courtyard. Dense portions of many Texas cities already commonly include “Texas doughnuts,” which are essentially euroblocks with a windowless parking garage instead of a courtyard.

Texas cities are already moving toward these kinds of reforms. Austin, Dallas, and Houston, as previously noted, have reduced or eliminated downtown parking requirements; Houston officials have mooted expanding the downtown parking-minimum exemption to the adjacent Midtown and East Downtown districts.<sup>201</sup> Houston has also enacted a “special parking district” in the Montrose neighborhood west of downtown, making it easier for businesses to provide customer parking in shared offsite lots.<sup>202</sup>

### *At the State Level*

State land-use policies in Texas, particularly the uniquely laissez-faire policy toward development in unincorporated land, have worked quite well to keep housing prices low. Texas Triangle growth has reached a point, however, that the state may want to consider certain reforms to its land-use policies in two fields: authorizing legislation for municipal zoning; and tort law as applied to high-rise development.

In the first case, Texas could enact legislation to allow additional, unobtrusive housing in suburban areas, overriding local ordinances. In California, for example, state bills that loosened the zoning requirements and permitting process for accessory dwelling units led to a 63% increase in permitted units, up to 4,352 in 2017.<sup>203</sup> A similar bill in Texas would provide more housing and give homeowners more freedom to use their property, without significantly abrogating local control of land use.

Tort reform would also facilitate more development. In particular, Texas could replace lawsuits over claimed nuisances caused by high-rise buildings, such as shadows cast on neighboring properties, with a fixed schedule of compensation—for example, some amount of money due to homeowners within a certain radius of development per yearly hour of shadow that the new a high-rise development causes. That would enable high-rise developers to make business plans with greater certainty about the expenses rather than budgeting for the uncertain prospects of lawsuits and jury awards, and would be fairer to lower-income areas whose residents cannot afford lawsuits.<sup>204</sup>

Low housing costs, combined with sound governance and low taxes, have fostered a booming economy in Texas accessible to workers of all types and income levels, providing perhaps the best reminder extant that America is still a land of opportunity. Lone Star land-use policies, however, have one weakness: regulations that prevent landowners in established residential areas from redeveloping their property at higher densities. These regulations will likely, over the coming decades, lead to the ever-more expensive housing and slow transportation characteristic of coastal metropolises such as Los Angeles. To be sure, Texas is far from alone in having such regulations, and housing even in its most expensive markets is still far more reasonably priced than in similarly prosperous coastal cities—but this is no reason for complacency. Texas has long prided itself on being exceptional, and reforms to land-use policies would keep housing prices for the working and middle classes low and keep Texas a beacon of opportunity for decades to come.

# Endnotes

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- <sup>25</sup> *Id.*, § 232.103. This provision appears in a subchapter of the code bearing the obsolete title "Infrastructure Planning Provisions in Certain Urban Counties." The population thresholds that once governed the subchapter were eliminated in 2007. See Paul J. Sugg, *County Subdivision Regulation Sourcebook*, Texas Association of Counties, 2010, p. 89.
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state law also provides for special airport zoning boards. See Tex. Loc. Gov't Code § 231, 241; Capital Area Council of Governments, "County Land Use Authority," p. 16.

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40 *Ibid.*

41 *Thompson v. City of Palestine*, 510 S.W.2d 579, 581 (Tex. 1974). This "extraordinary burden" notwithstanding, the plaintiff in *Thompson* prevailed, having shown that a rezoning of 4.1 acres that he owned amounted to illicit spot zoning.

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43 *Mayhew*, 964 S.W.2d at 925.

44 *Mayhew*, 774 S.W.2d at 295.

45 *Id.* at 287.

46 *Id.* at 287, 288, 291.

47 *Id.* at 287–88.

48 *Id.* at 290–91.

49 *Id.* at 288.

50 *Id.* at 295.

51 A district court had found that the parcel of land owned by the plaintiffs, the Mayhew family, had a fair market value of \$2.4 million as a consequence of Sunnyvale's rejection of their application for development, but would have been worth \$15 million had the application been approved. *Mayhew*, 964 S.W.2d at 922. The figure of 84% is also given by Hunker, "Bringing Down the Housing Restrictions," p. 7.

52 *Mayhew*, 964 S.W.2d at 927.

53 *Id.* at 935.

54 *Sheffield Development Co. v. Glenn Heights*, 140 S.W.3d 660 (Tex. 2004). This case overturned *City of Glenn Heights v. Sheffield Development Co.*, 61 S.W.3d 634 (Tex. App. 2001), in the Court of Appeals of Texas, Waco; the two should not be confused.

55 *Glenn Heights*, 62 S.W.3d at 639–40, 649.

56 *Sheffield*, 140 S.W.3d at 666–67.

57 *Glenn Heights*, 62 S.W.3d at 646, 646n14, 651.

58 *Sheffield*, 140 S.W.3d at 678.

59 *Id.* at 677–79.

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- <sup>138</sup> Michael Andersen, "What Makes Portland's New Apartments So Expensive?" Sightline Institute, Aug. 30, 2018.
- <sup>139</sup> Terrence S. Welch and Robert F. Brown, "Municipal Regulation of the ETJ," Brown and Hofmeister LLP, April 2005.
- <sup>140</sup> *Ibid.*
- <sup>141</sup> A recent literature review is Asid Ahmed and Peter Stopher, "Seventy Minutes Plus or Minus 10—a Review of Travel Time Budget Studies," *Transport Reviews* 34, no. 5 (2014): 607–25.
- <sup>142</sup> Cesare Marchetti, "Anthropological Invariants in Travel Behavior," *Technological Forecasting and Social Change* 47, no. 1 (September 1994): 75–88.
- <sup>143</sup> Garreau comments that women found edge-city employment easy to balance with household management. See Joel Garreau, *Edge City: Life on the New Frontier* (New York: Doubleday, 1991), pp. 111–13.
- <sup>144</sup> *Ibid.*, p. 468.
- <sup>145</sup> "Feu vert pour les grandes tours dans Paris," *Le Monde*, Nov. 11, 2010; Alex Davies, "Newly Freed from Height Limits, Paris Skyline Ready to Rise," *TreeHugger*, Nov. 21, 2010.
- <sup>146</sup> Knight Frank, "Paris Vision 2018: Offices," pp. 16–17.
- <sup>147</sup> Peter Sigal, "Project in Paris Reflects City's Ambitions for the Suburbs," *New York Times*, May 21, 2013.
- <sup>148</sup> EMLV Paris, "La Défense, Second Business District in Europe, Right After the City of London," *École de Management Léonard de Vinci*, Nov. 28, 2017.
- <sup>149</sup> One web page for Grand Paris Express advertises that the project will cut travel times from La Défense to the immigrant-heavy suburb of Saint-Denis from 26 minutes to 13. "Ligne 15 Ouest," Société du Grand Paris, July 5, 2018. The government consortium responsible describes one of its goals as "fixing territorial inequalities" (*corriger les inégalités territoriales*). See Axelle Choffat, "Grand Paris: Ce qu'ambitionne la métropole et les couacs," *L'Internaute*, Feb. 22, 2018.
- <sup>150</sup> Of the 23 "edge cities" or "emerging edge cities" that Garreau identified in the Washington, D.C., area in 1991, only four are located in Washington's eastern suburbs in Prince George's County, Maryland. See Garreau, *Edge City*, p. 345.
- <sup>151</sup> Conrad Miller, "When Work Moves: Job Suburbanization and Black Employment," NBER Working Paper no. 24728, June 2018, p. 33.
- <sup>152</sup> For a thorough discussion of the origins of agglomeration economies, see Gilles Duranton and Diego Puga, "Micro-Foundations of Urban Agglomeration Economies," in J. Vernon Henderson and Jacques-François Thisse, *Handbook of Regional and Urban Economics*, vol. 4 (North Holland: Elsevier, 2004).
- <sup>153</sup> For evidence on the importance of agglomeration to innovative activity, see David B. Audretsch and Maryann P. Feldman, "R&D Spillovers and the Geography of Innovation and Production," *American Economic Review* 86, no. 3 (June 1996): 630–60; Stuart S. Rosenthal and William C. Strange, "The Determinants of Agglomeration," *Journal of Urban Economics* 50, no. 2 (July 2001): 191–229. Studies of the limited geographic scope of agglomeration effects, especially "knowledge spillover" effects prominent in innovative industries, include Rosenthal and Strange, "Determinants of Agglomeration"; Stuart S. Rosenthal and William C. Strange, "Geography, Industrial Organization, and Agglomeration," *Review of Economics and Statistics* 85, no. 2 (May 2003): 377–93; Jordi Jofre-Monseny, "The Scope of Agglomeration Economies: Evidence from Catalonia," *Papers in Regional Science* 88, no. 3 (August 2009): 575–90; Mohammad Arzaghi and J. Vernon Henderson, "Networking off Madison Avenue," *Review of Economic Studies* 75, no. 4 (October 2008): 1011–38.
- <sup>154</sup> Paul Graham, "Why Startup Hubs Work," paulgraham.com, October 2011 (emphasis in original).
- <sup>155</sup> *Idem*, "Can You Buy a Silicon Valley? Maybe," paulgraham.com, February 2009.

- <sup>156</sup> Garreau, *Edge City*, p. 470.
- <sup>157</sup> See, e.g., Rosenthal and Strange, "Geography, Industrial Organization, and Agglomeration"; Jofre-Monseny, "Scope of Agglomeration Economies," p. 589; Vernon Henderson, Todd Lee, and Yung Joon Lee, "Scale Externalities in Korea," *Journal of Urban Economics* 49, no. 3 (May 2001): 479–504; Hongyong Zhang, "How Does Agglomeration Promote the Product Innovation of Chinese Firms?" RIETI Discussion Paper Series 14-E-022 (Tokyo: Research Institute of Economy, Trade and Industry), May 2014. Most studies of diversity effects concern relatively large geographical scales (e.g., large cities) and may not apply to smaller areas such as office parks, although Jofre-Monseny found diversity effects to be operative within municipalities of less than a square mile.
- <sup>158</sup> The word "induced" may suggest that new capacity creates new demand, rather than simply satisfying preexistent *latent* demand. See, e.g., Scott Beyer, "Is Induced Demand a Phony Theory?" *Market Urbanism Report*, Aug. 18, 2018.
- <sup>159</sup> Discussed in Angie Schmitt, "The Science Is Clear: More Highways Equals More Traffic. Why Are DOTs Still Ignoring It?" *Streetsblog USA*, June 21, 2017.
- <sup>160</sup> Gilles Duranton and Matthew A. Turner, "The Fundamental Law of Road Congestion: Evidence from US Cities," *American Economic Review* 101, no. 6 (Oct. 2011): 2616–52.
- <sup>161</sup> Jeff Inglis and John C. Olivieri, "Highway Boondoggles 2: More Wasted Money and America's Transportation Future," U.S. PIRG Education Fund, January 2016, p. 4.
- <sup>162</sup> Subways or rail tunnels completed within the past decade in Barcelona, Helsinki, and Seoul have cost \$110 million per mile or less in 2010 dollars, according to the list given by Alon Levy, "Comparative Subway Construction Costs, Revised," *Pedestrian Observations* (blog), June 3, 2013.
- <sup>163</sup> See "List of Things Demolished for Katy Freeway Expansion," HAIF (web forum), Jan. 8, 2013; Erik Slotboom, "Interstate 10 Right-of-Way Clearance," Houston Freeways, Aug. 18, 2005; "Living on Borrowed Time," TexasFreeway.com, July 2, 2001; John Rigg, "Hwy. 290 Project to Cause Future Business Displacement," *Community Impact Newspaper*, Aug. 15, 2012. The TexasFreeway.com and Community Impact Newspaper citations give the figure of 1,067 displaced properties, which the author of the present report has been unable to locate in an official source.
- <sup>164</sup> Inglis and Olivieri, "Highway Boondoggles 2," p. 4.
- <sup>165</sup> The formulators of the fundamental law of road congestion, for example, "find no evidence that the provision of public transportation affects VKT [vehicle-kilometers traveled]." Duranton and Turner, "Fundamental Law of Road Congestion," p. 2618; "Texas' Most Congested Roadways 2018," Texas A&M Transportation Institute, 2018.
- <sup>166</sup> Eric Nicholson, "DART Has Spent \$5 Billion on Light Rail. Is It Worth It?" *Dallas Observer*, June 10, 2016.
- <sup>167</sup> Author's calculations from "2017 Track and Roadway," National Transit Database, Federal Transit Administration; "2017 Annual Database Service," National Transit Database, Federal Transit Administration. The route lengths of two-track rail services are approximately one-half the National Transit Database's reckonings of track length.
- <sup>168</sup> "Capital Metropolitan Transportation Authority: 2017 Annual Agency Profile," National Transit Database, Federal Transit Administration.
- <sup>169</sup> National Transit Database, "2017 Track and Roadway" and "2017 Annual Database Service."
- <sup>170</sup> This point has been made by Jarrett Walker, a consultant on transit network design: e.g., Walker, "Why Cars and Cities Are a Bad Match," *Washington Post*, Mar. 2, 2016; idem, "The Problem of Space: Why Elon Musk Doesn't Understand Urban Geometry," CityMetric, July 26, 2016.
- <sup>171</sup> Idem, "Explainer: The Transit Ridership Recipe," *Human Transit* (blog), July 15, 2015.
- <sup>172</sup> Robert S. Kirk, "Tolling U.S. Highways," Congressional Research Service, Aug. 26, 2016.
- <sup>173</sup> Metropolitan Transportation Authority of Harris County, "September 2018 Monthly Ridership Report."
- <sup>174</sup> Stephen Smith, "Five Union Work Rules That Harm Transit Productivity," *Market Urbanism*, May 15, 2011.
- <sup>175</sup> One writer on labor relations notes: "Workers generally dislike split shifts because of the spread of time during which they are liable for duty and because of the inconvenience of traveling back and forth to work more than once a day." William Goldner, *Hours of Work* (Berkeley: University of California, Berkeley, Institute of Industrial Relations, 1952), p. 55. For the effects of split shifts on accident rates, see Thobias Sando, "Safety Implications of Transit Operator Schedule Policies (Phase II)," Florida Department of Transportation, November 2013.
- <sup>176</sup> Andrew H. Whittemore, "Zoning Los Angeles: A Brief History of Four Regimes," *Planning Perspectives* 27, no. 3 (July 2012): 399.
- <sup>177</sup> *Ibid.*, p. 401.
- <sup>178</sup> Gregory D. Morrow, "The Homeowner Revolution: Democracy, Land Use and the Los Angeles Slow-Growth Movement, 1965–1992" (Ph.D. diss., University of California, Los Angeles, 2013), p. 3.
- <sup>179</sup> CEQA's effects on housing construction, especially its frequent use against infill projects in dense urban environments, are analyzed in Jennifer Hernandez, "California Environmental Quality Act Lawsuits and California's Housing Crisis," *Hastings Environmental Law Journal* 24, no. 1 (Winter 2018): 21–71.
- <sup>180</sup> Author's calculations.
- <sup>181</sup> INRIX, Inc., "Los Angeles Tops INRIX Global Congestion Ranking," news release, Feb. 5, 2017.
- <sup>182</sup> Author's calculations from "2017 National Household Travel Survey," Federal Highway Administration.
- <sup>183</sup> Eve Bachrach, Paavo Monkkonen, and Michael Lens, "Is Los Angeles Destroying Its Affordable Housing Stock to Build Luxury Apartments?" Lewis Center for Regional Policy Studies, University of California, Los Angeles, 2017.
- <sup>184</sup> This cost range for European subways is given by Alon Levy, "Why It's So Expensive to Build Urban Rail in the U.S.," CityLab, Jan. 26, 2018. Levy also notes that in Paris, rail advocates widely oppose the planned Line 18 of the Métro subway system, with an estimated cost of \$49,000 per daily rider, on price grounds. See Levy, "Caltrain's Downtown Extension Hindered by 'Catastrophically Incompetent' Management," *Bay City Beacon*, July 9, 2018.
- <sup>185</sup> Adam Gropman, "\$1.1 Billion and Five Years Later, the 405 Congestion Relief Project Is a Fail," *LA Weekly*, Mar. 4, 2015.
- <sup>186</sup> If the lane allowed an additional 2,000 cars per hour (about the maximum capacity of a single freeway lane) with an average of 2.5 occupants per car for 12 hours a day, it would carry 60,000 passengers per day, for a cost per rider of about \$18,000. (The author could not locate any data on the actual usage of the carpool lane.)
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- <sup>188</sup> Brian Uhler and Justin Garosi, "A Look at County Level Domestic Migration," *EconTax Blog*, California Legislative Analyst's Office, Mar. 5, 2018.
- <sup>189</sup> Maciagi, "Metro Areas with the Most Job Growth."
- <sup>190</sup> Donald Shoup, *High Cost of Free Parking* (New York: Routledge, 2011) p. xxxiv.

- <sup>191</sup> John Edwards, "Fourplexes Everywhere? Bold Reform Proposed in Minneapolis," *Streets.mn* (blog), Mar. 14, 2018. The proposed reform has since been weakened; see Andy Mannix, "Minneapolis Planners Suggesting Triplexes, Not Fourplexes, Citywide," *Star Tribune*, Sept. 14, 2018.
- <sup>192</sup> Blain, "Why Are Tax Dollars Used to Enforce Houston Deed Restrictions?"
- <sup>193</sup> Angie Schmitt, "It's Official: Mexico City Eliminates Mandatory Parking Minimums," *Streetsblog USA*, July 19, 2017.
- <sup>194</sup> Rachel Quednau, "How to Get Rid of Parking Minimums, Decatur, GA," *Strong Towns*, Nov. 24, 2015.
- <sup>195</sup> "SFpark Project Pilot Evaluation," San Francisco Municipal Transportation Agency, June 2014, p. 8.
- <sup>196</sup> *Ibid.*, p. 12.
- <sup>197</sup> *Ibid.*, p. 10.
- <sup>198</sup> Ben Jose, "San Francisco Adopts Demand-Responsive Pricing Program to Make Parking Easier," San Francisco Municipal Transportation Agency, Dec. 5, 2017.
- <sup>199</sup> Shoup, *High Cost of Free Parking*, pp. xxviii–xxix.
- <sup>200</sup> The author's thoughts on common-garage parking have been influenced by Charlie Gardner, "Common Garage Parking, in Practice: Part II," *Old Urbanist* (blog), June 10, 2013.
- <sup>201</sup> "Ditch Houston's Burdensome Parking Regulations," editorial, *Houston Chronicle*, Sept. 11, 2018.
- <sup>202</sup> Gail Delaughter, "A Section of Montrose Tries Out a New Parking Plan," Houston Public Media, Mar. 6, 2017.
- <sup>203</sup> Jacob Passy, "Could 'Granny Flats' Be the Solution to America's Affordable-Housing Crisis?" *MarketWatch*, Mar. 26, 2018.
- <sup>204</sup> The point about fairness to lower-income areas is made by Matthew Festa, "What the Ashby High-Rise Case Means for the Future of Urban Development," Kinder Institute for Urban Research, Rice University, July 15, 2016.

