Research Report

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The High Cost of Producing Multifamily Housing in California

Evidence and Policy Recommendations

For more information on this publication, visit **www.rand.org/t/RRA3743-1**.

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About This Report

This report presents analyses of a large sample of data on production costs for both privately funded, market-rate apartments and publicly subsidized affordable apartments in three states: California, Colorado, and Texas. The goal of the study is to document production cost differences between these states and across regions within these states and to identify policy reforms that can lower production costs and increase housing affordability in California, the highest-cost state in the sample.

This research was conducted by the RAND Center on Housing and Homelessness, part of the Community Health and Environmental Policy Program within RAND Social and Economic Well-Being. The RAND Center on Housing and Homelessness is focused on providing policymakers and stakeholders with timely research and analysis addressing the dual crises of housing affordability and homelessness. For more information, visit www.rand.org/chh.

Community Health and Environmental Policy Program

RAND Social and Economic Well-Being is a division of RAND that seeks to actively improve the health and social and economic well-being of populations and communities throughout the world. This research was conducted in the Community Health and Environmental Policy Program within RAND Social and Economic Well-Being. The program focuses on such topics as infrastructure, science and technology, industrial policy, community design, community health promotion, migration and population dynamics, transportation, energy, and climate and the environment, as well as other policy concerns that are influenced by the natural and built environment, technology, and community organizations and institutions that affect well-being. For more information, email chep@rand.org.

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Summary

Issue

The high cost of housing has become a defining characteristic for California. A 2021 cost of living index indicates that seven of the ten most expensive metro regions in the United States are in California (Mak, 2021). Outmigration from the state since the 2010 census has resulted in a lost congressional seat. The state has also experienced the notable departures of multiple high-profile employers (Cain and Hehmeyer, 2023).

The California legislature recently declared its intent to reduce the cost of living in the state (Sabalow and Kamal, 2025). Lowering the cost of housing production is critical for achieving this goal because housing is the largest expenditure for virtually all households and because production costs directly influence housing costs, particularly rental prices. As production costs rise, the break-even rents required for a project to reach financial viability rise (Eriksen and Orlando, 2024). High costs also directly reduce the number of publicly subsidized affordable housing units. This is because as the gap between break-even rents and the restricted rents that tenants are required to pay in these developments increases, the operating subsidy required for each unit grows, and the same pool of public money produces fewer apartments (Christopher, 2023).

Lowering housing production costs also increases affordability through a supply effect that reduces the rate of increase in rental prices. In recent years, areas with lower production costs have seen the greatest levels of new supply. Metro areas such as Austin, Texas, and Dallas, Texas, have even seen substantial price declines and the use of such renter incentives as introductory rent-free months and fee waivers (Kolomatsky, 2024).

This report highlights major cost differences between California and two other western U.S. states: Colorado and Texas. We also compared production costs in three major metro regions in California—Los Angeles, San Diego, and San Francisco—and found that, even among regions subject to the same state-level requirements, production costs vary substantially.

Approach

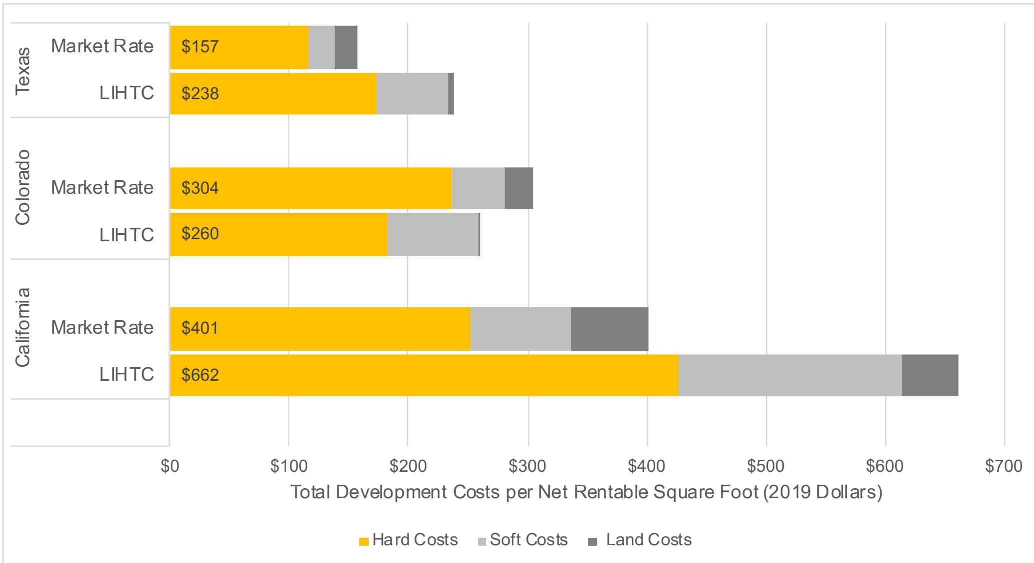
This report uses data from more than 100 completed multifamily housing projects in these three states. We employed a regression-based statistical model to account for differences in development costs according to building type, size, and whether a project is produced using private or public funding to isolate both state-level and in-state differences in production costs. We then conducted a variety of exercises to explore the role of various factors in driving the cost differences we identified.

Key Findings

As a result of this research, we found the following:

- California is the most expensive state for multifamily housing production in every cost category we considered (Figure S.1). Production costs per net rentable square foot for market-rate housing in California are 2.3 times the average cost in Texas. California's publicly subsidized affordable housing costs are even higher, at 1.5 times the average cost of market-rate housing in California and more than four times the cost of market-rate housing in Texas.
- Longer production timelines are strongly associated with higher costs. The time to bring a project to completion in California is more than 22 months longer than the average time required in Texas.
- Municipal impact and development fees are less than $1,000 per unit on average in Texas. They are more in Colorado, averaging $12,000 per unit, and much more in California, averaging $29,000 per unit; in San Diego, where fees are more than $30,000 per unit on average, they make up roughly 13 percent of total per-unit development costs.
- Key drivers of the remarkably high cost of publicly subsidized affordable housing production in California include requirements for affordable housing developers to pay substantially above-market wages and unusually large architectural and engineering fees (particularly in Los Angeles) likely related to highly prescriptive design requirements.
- In California, production costs vary substantially across metropolitan regions.
  San Diego has the lowest average cost for privately financed apartments, at roughly twice the Texas average; costs in Los Angeles are 2.5 times the Texas average; and costs in the San Francisco Bay Area are three times the Texas average.
- Halving the difference in market-rate production costs between California and Texas could reduce rental prices for new apartments in California by roughly 15 percent. Additionally, if California had Colorado's production costs for publicly subsidized affordable apartments, the roughly $1.25 billion in recent spending by the state's four largest funding programs would have produced more than four times as many units.

Figure S.1. State-Level Estimates of Total Development Costs and Major Cost Categories



NOTES: *N* = 115. LIHTC = Low Income Housing Tax Credit Program. Costs are adjusted to 2019 dollars using the approach described in the main report and annex. Bars indicate mean costs per net rentable square foot. Regression results and cell-specific sample sizes are in a separate annex of this report.

Recommendations

We suggest multiple policy changes that would lower multifamily housing production costs and directly increase affordability across the state.

- California should adopt a policy similar to state law in Texas that requires local jurisdictions to approve or deny a proposal for a housing development within 30 days (and proposed projects not approved or denied within 30 days would be presumed to be approved). This reform could reduce the 15-month average gap in predevelopment time between California and Texas, leading to a meaningful reduction in production costs. The state's builder's remedy law provides recent precedent for such a policy in California.
- Policies to speed construction timelines (such as synchronized, rather than sequential, inspections) could contribute to reducing the seven-month average gap in construction time between California and Texas.
- Policymakers should reconsider the effects on production costs of municipal impact and development fees that are roughly ten to 40 times the level observed in Texas by weighing this fee revenue against potential gains from increased property tax revenue and other local revenue and welfare gains resulting from more new housing production.
- The environmental gains from new housing subject to California's current, strict energy efficiency requirements should be weighed against the disincentive effects on housing production from higher costs, because even typical new housing produced in a less restrictive state like Texas represents a major improvement on the average efficiency of the state's remarkably old multifamily housing stock.

- Remarkably high production costs for publicly subsidized affordable housing relative to both market-rate housing in California and affordable housing in Texas and Colorado suggest that policymakers should carefully weigh the trade-offs from prevailing wage and related labor requirements in terms of forgone affordable housing units. Policymakers should also review all design requirements associated with public funding sources and remove those that are not essential for safe, sanitary, and habitable housing.
- Housing policies in both Texas and Colorado should be studied by state and local policymakers in California who have a serious interest in lowering the cost of housing production. Closer to home, policymakers should learn from San Diego, which has the lowest average production costs of the major California metro regions in our study.

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Chapter 1

Introduction

The high cost of housing and its associated effect on homelessness has become the defining policy issue in California in recent years (Public Policy Institute of California, 2025). The state has ranked second only to Hawaii in housing and rental costs for decades (Bennefield, 2003; Bonnette, 2003). Many other U.S. regions have also experienced dramatic increases in the cost of housing in recent decades (Feiveson, Levinson, and Schreiner Wertz, 2024; Joint Center for Housing Studies of Harvard University, 2024), and the issue has increasingly become a topic of national interest (Boak, 2024; Ocasio-Cortez and Smith, 2024). The metro areas around the country with the highest housing costs also have among the highest shares of renters, and most renters live in multifamily housing (Thompson, 2023). Thus, increasing the affordability of multifamily housing is a critical goal.

The new supply of apartments in a region is likely the single largest factor affecting affordability. Following steep increases in rents during the coronavirus disease 2019 (COVID-19) pandemic, rental price growth has declined substantially across the country because of a substantial new supply of rental units coming online since 2023 (Airgood-Obrycki and Wedeen, 2024; Henderson, 2023; Katz, 2024). Areas with the greatest level of new supply, including Austin, Texas, and Dallas, Texas, have even seen absolute price declines (Kolomatsky, 2024), a remarkable development during years characterized by inflation levels not seen since the 1980s.

Production costs are the most critical factor influencing whether new projects are pursued. For-profit developers make decisions according to whether a project will *pencil*, meaning whether it will produce a sufficient return on investment. If the costs of production increase but the expected sale price of a new development to an operator does not increase proportionally, some share of formerly feasible projects will not be pursued, and new supply will decrease.

Even if production costs do not prevent a project from being produced, they can affect the housing type produced. Targeting the development of apartments aimed at middle-income renters is a common strategy for diversifying risk in real estate investing (Marquez, 2024), and some large developers aim to create apartments serving middle-income households (Business Wire, 2022; Wyatt, 2023). However, as production costs increase, this type of project will be eschewed in favor of luxury apartment projects that will still pencil. Some production cost increases arise from macroeconomic conditions (Obando, 2023) that may moderate over time, but these increases often reflect purposeful choices by policymakers, suggesting that different choices can contribute to declines in production costs.

For many concerned with housing affordability, there is a persistent skepticism that privately produced housing can increase affordability (Nall, 2024; Procter, 2023). Often those subscribing to this "supply skepticism" insist that publicly subsidized affordable housing is the answer (Been, Gould Ellen, and O'Regan, 2024). However, in recent years, this subsector of multifamily housing has seen unprecedented cost increases related in large part to the adoption of policies that prioritize factors other than the efficient production of affordable housing units (Dillon and Poston, 2022; Lenney, 2024; Ward, 2024a). High costs reduce the amount of such housing that can be produced and risk decreasing public support for necessary funding (Janoski, 2024).

Study Description

The primary goal of this research is to quantify production cost differences across and in three states—California, Colorado, and Texas—and to consider policy-relevant factors that drive these cost differences. Our data sample includes completed cost data on both privately financed, market-rate apartment developments and publicly subsidized, affordable apartment developments, because these developments often face highly prescriptive, expensive requirements tied to common funding sources that increase costs.[1] We describe substantial differences in overall production costs across these states and across regions in California. We then present evidence on differences in specific cost categories and consider the potential role of various economic and policy factors in driving these differences.

Existing Research on Geographic Variation in Housing Production Costs

All of the recent academic research on geographic differences in housing construction costs that we are aware of has used estimated cost data (Albouy and Ehrlich, 2018; Eriksen and Orlando, 2021; Glaeser and Gyourko, 2002).[2] These studies have focused on the substantial role of restrictive zoning and land use regulations on construction costs and the role of changes in such physical characteristics as building height in driving cost differences.

We are aware of two studies using completed cost data for publicly subsidized affordable housing funded by the federal Low Income Housing Tax Credit Program (LIHTC) (Lubell and Wolff, 2018; United States Government Accountability Office, 2018). Though the projects used in both studies predate the oldest projects used in this study (2016), some of the key findings, such as substantial cost differences between California and Texas, are nearly identical.

This report is the first, at least in recent decades, to use actual cost data from privately financed multifamily housing projects to compare costs across and within states and to decompose these cost differences by category.[3]

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[1] Costs in this sector in California have been growing rapidly in recent years (Dillon and Poston, 2022). Many cost differences arise from prescriptive policy requirements related to a development's labor force, energy efficient features, appearance, and other amenities (Abramson, Hunter, and Ward, 2024; Raetz et al., 2020; Ward, 2024). Such differences are important to understand because costs are highly amenable to policy reforms and because these projects are primarily or entirely financed through scarce public dollars. Evidence shows that there is often substantial crowd-out of privately financed housing by publicly subsidized affordable housing (Baum-Snow and Marion, 2009; Eriksen and Rosenthal, 2010).

[2] These cited studies all use cost estimation software from RSMeans, a widely used tool in the construction industry to assist in developing project *pro formas* (estimated costs to use in financial calculations).

[3] The closest related study we are aware of is a 2022 report funded by an industry group, the National Association of Homebuilders. That report used 49 survey responses from developers around the United States to calculate the cost of regulatory compliance on production costs, concluding that these costs compose nearly 40 percent of total costs, though the study does not quantify how these costs vary across states or regions (National Association of Home Builders, 2022).

Chapter 2

Data, Study Design, and Limitations

For this analysis, we used a large sample of multifamily housing production cost data for both privately funded market-rate housing and publicly subsidized affordable housing built between 2015 and 2024 in three states: California, Colorado, and Texas.[4] Our cost data on market-rate housing developments were obtained from a national builder with substantial operations in at least five states. Cost data on publicly subsidized developments were obtained through state agencies that allocate LIHTC funding, the largest source of public subsidies for affordable housing production in the United States.

Analysis Data

Privately Funded, Market-Rate Housing Development Cost Data

Our sample of privately funded market-rate multifamily housing development cost data is from Trammel Crow Residential, a large, for-profit firm operating in several states in the United States that agreed to provide its data for use in this research. We received complete, detailed production cost data for 27 projects and their key characteristics (location, building type, number of buildings, stories, units, average unit size, net rentable square foot [NRSF] totals, land costs, and project timeline). For an additional 28 projects, we received these project characteristics and less-detailed cost data (aggregated hard costs and land costs). Table A.4 in the separate annex details these 55 projects by state according to the level of detail available.

Publicly Subsidized, Affordable Housing Development Cost Data

Our sample of publicly subsidized, affordable housing cost data was obtained through public records requests to state agencies in California, Colorado, and Texas responsible for allocating LIHTC funding. The federal LIHTC provides the equivalent of roughly $13.5 billion in annual funding through competitive awards of federal tax credits (many states also issue additional credits) that are sold by developers to financial institutions to typically raise between 30 and 70 percent of the capital for affordable housing projects (Keightley, 2023). Part of the requirement for receiving these

[4] Among five states in which our data provider had substantial operations in recent years, we requested data on projects from California, Colorado, and Texas due in part to the fact that they each had qualitatively meaningful differences in average rental housing costs. Using 2024 rent price data calculated as average cost per square foot (so that we consider a measure that is not dependent on regional differences in unit size), the unweighted national average of all 50 states plus the District of Columbia is $1.87. California ranks 5th highest in the nation at $3.00; Colorado is closer to the national average, at $2.20; and Texas is moderately below the national average at $1.64. See Figure A.1 in the separate supplementary annex for a graphical distribution of the rental prices.

tax credits is providing documentation of the completed project costs that is certified by an outside accounting firm. These LIHTC cost certification data required extensive cleaning, including converting scanned PDF documents to tabular data, quality-checking these conversions, doing extensive manual cleaning in a statistical software environment, and harmonizing many disparate line item cost titles and groupings. Annex Table A.5 details the metro-area breakdowns across states of these 89 projects.

Levels of Detail in Production Cost Data

Because of the substantial variation in the level of detail and in other aspects of data quality, we identified common levels of categorical detail across our production cost data to use in analyses. Aside from geography, the criteria for these categories are project type and cost type. There are four basic project types in our sample:

- high rise: typically 10+-story buildings of poured concrete or steel; these are typically built in dense urban areas where land costs are relatively high
- podium: typically five- to seven-story structures with the first one or two stories of poured concrete and the remaining stories wood framed; this is a common urban infill development type in California
- garden: typically a project comprising multiple low-rise wood-framed buildings with grade-level parking; these are typically built in areas with lower land costs
- wrap: similar to a garden project with one or more wood-framed low-rise buildings surrounding (wrapping around) a concrete parking structure.

In terms of costs, we consider total development costs (TDCs) and three major cost subcategories: land costs, hard costs, and soft costs (we provide detailed discussion of these categories). In certain cases we further disaggregate costs to consider, for example, municipal development and impact fees and architectural and engineering fees, which are both components of soft construction costs.

Annex tables A.4 through A.6 present the sample sizes for various levels of detail in the analyses throughout the report.

Limitations to Comparing Projects Across Regions and Time

There are important limitations in any research of this kind. The ideal study of production cost differences would involve building exactly the same building in different areas at the same time. This would hold constant the design of the building and the cost of materials, financing, and professional services over time that could otherwise be hard to adjust for. That study is infeasible to conduct. Many past studies have attempted to simulate such an approach using costing software to generate estimates for producing the same building in different places at the same time (Albouy and Ehrlich, 2018; Eriksen and Orlando, 2021; Glaeser and Gyourko, 2002).

In contrast, our research used a large sample of cost data for actual completed projects of different types over several years to make comparisons between average differences in overall costs and costs by category across states and metro regions. This approach has the strength of using many realized projects and a basic but credible statistical modeling approach to identify common cost differences between regions. However, there are multiple factors that can affect the validity of such comparisons.

First, projects built at different times have different costs related to inflation that may vary by cost type (for example, building materials versus labor versus the cost of borrowing). Our sample is composed of projects constructed between 2016 and 2024. During this period there was substantial inflation related to the COVID-19 pandemic that varied considerably across cost types. For example, building materials experienced large amounts of inflation, while the wages of professional service workers had much lower levels of inflation (East, Edelberg, and Steinmetz-Silber, 2023; McDaniel, 2022).

Second, there might be systematic differences in the types of buildings built in one region versus another that could influence costs. Consider an example in which a high-cost region builds only relatively lower-cost garden apartment projects and a low-cost region builds only relatively higher-cost high-rise apartments. Comparisons of per-unit costs might make it appear that there are no cost differences between these regions. In other words, differences in the mix of project types across areas can bias the measurement of average cost differences.

Additionally, areas with higher costs might systematically produce smaller apartments relative to lower-cost areas because rents are typically not linearly related to size. This can downwardly bias per-unit cost difference measures because, all else equal, larger apartments cost more per unit to build. Finally, our market-rate data, as mentioned earlier, come from one large, multistate developer that is likely more efficient than smaller developers, so more analysis with data from a larger sample of private developers would be a useful area for future research.

How We Address These Limitations

We cannot perfectly address all of these issues, but we adopted a modeling approach that accounts for each in a credible manner given the limitations of our data sample. Our estimates were generated using a simple linear regression model, and we outline each feature of the modeling approach meant to address these specific challenges.

First, we adjusted costs to account for the substantial inflation during this period using price indexes that most accurately reflected the average inflation level for different cost categories in our data so that comparisons across states and regions would be as accurate as possible regardless of when the project was built. We chose to adjust costs to be in terms of 2019 dollars because this was the most common year of construction in our data set (31 of 144 total projects), meaning that the largest number of projects possible would need no adjustment, and because it was the last year prior to the COVID-19 pandemic, which triggered a complex pattern of cost increases over subsequent years. Using the most recent year prior to these inflationary changes meant that adjusting pre-2019 projects to 2019 dollars was likely to be a more accurate process because annual cost inflation was low between 2016 and 2019, a period during which nearly 40 percent of the projects in our sample were built. Crudely, the 2019 costs in this report can be scaled up by 20 to 25 percent to reflect 2025 prices. We provide more detail on our cost adjustments in the supplementary annex, in Appendix A.

To address issues with cost comparability related to differences in unit size, we present TDC differences at both the per-unit level and the per-NRSF level. The NRSF approach partially controls for potential differences in unit size that are directly related to production costs and allocates costs associated with common features of a building (for example, a pool, exercise facilities, or a shared roof deck) to a standardized measure of residential space in each development. However, the NRSF measure still has important limitations. If a building has relatively more units of smaller size but these units all have a full kitchen, then this may bias upward the cost per NRSF for the building with more small units because a building with large units will have relatively fewer kitchens compared with a project with smaller units but the same total NRSF. Throughout the report, we discuss and consider the extent to which unit size is used to compensate for cost differences across regions. We include a linear control for the number of units in a project. This partially controls for the NRSF issues mentioned and at least partially addresses issues concerning *economy of scale*—the phenomenon of the marginal cost of an additional housing unit declining as the number of units in a project grows.

To address the fact that regions have different shares of building types that may vary systematically according to region-specific production cost differences, we include a binary variable in our statistical model for each of the four building types presented in Table 3.3 that we use to classify projects in the sample so that we are generating comparisons that compensate for different shares of projects across states or metro regions. Doing this allows each project type to have an average cost that is estimated independently of region-specific cost differences.[5]

Finally, to account for the influence on costs of state and local design and other requirements for receiving public subsidies to produce affordable apartments, we include an additional state- or region-specific indicator variable for LIHTC-funded projects as controls, and, throughout the report, we present and discuss cost differences stratified by whether the projects are publicly subsidized LIHTC projects or privately financed market-rate projects.[6]

There are remaining limitations we cannot address. First, though we spent a substantial amount of time and effort cleaning and harmonizing data for this study, we have almost certainly classified some costs inconsistently across projects and have been unable to resolve certain issues of measurement error—for example, arbitrary combinations of relatively small cost categories into a single reported cost. This issue is of little concern for analyses of broad cost categories (e.g., TDC and even the major categories of hard, soft, and land costs). But when we assess certain specific cost categories (for example, municipal impact and development fees), there might be modest measurement error in these estimates. However, given the paucity of research on the topic of multifamily housing production costs, we believe that these limitations are outweighed by the important contributions of this report to filling critical knowledge gaps on the topic of multifamily housing production costs.

Second, our sample is small enough that we are relatively constrained in terms of how many variables we can control for in our regression model. If we had more projects, it would be useful to control for additional factors beyond those we include, such as the number of buildings, number of stories, and perhaps a measure of the urbanity or rurality of the project site. However, we note that

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[5] These project-type fixed effects also work in concert with the control for the number of units by assuring that the cost slope estimated for the number of units is the average of within-building-type economies of scale effects rather than simply cross-sectional variation in costs by number of units across any type of project.

[6] LIHTC projects nearly always use both LIHTC funding, which in California has the most lenient guidelines around design and other conditions, and other state and local funding sources, which often have much more prescriptive requirements—a topic that we discuss in more detail below.

our models, though sparse, have remarkably high levels of explanatory power. And although some of the estimated differences here do not reach the level of statistical significance at the 95 percent confidence level, many are quite precise, and we reproduce the basic model results for all estimates in this report in full in a separate supplemental annex. We leave the development of a larger sample and greater levels of project detail for future research.

Statistical Model and Approach to Constructing Cost Comparisons

The approaches described above are implemented via the following state-level regression model:

$$y_{ci} = \beta_0 + \beta_1 CO_i + \beta_2 CA_i + \gamma_1 LIHTC_i + \gamma_2 (LIHTC_i * CO_i) + \gamma_3 (LIHTC_i * CA_i) + \pi \, units_i + \rho_i^{BldgType} + \epsilon_{ci}.$$

The outcome, y_{ci}, is cost outcome in dollars (per NRSF or per unit) for cost category *c* for project *i*. The constant term β_0 estimates the state-specific cost for Texas. β_1 and β_2 are the state-specific differences from this Texas average for Colorado and California, respectively. The γ terms are estimates of the average cost difference for LIHTC-funded projects in, respectively, Texas, Colorado, and California. We control linearly for the number of units, measured by the coefficient π. $\rho_i^{BldgType}$ represents a set of building-type fixed effects (with garden apartments as the omitted category), and ϵ_{ci} is an error term capturing all other project-specific differences not explained by the included variables. We also estimate a version of this model that substitutes the state-level indicator for California with indicators for three distinct metro regions.

We use the model results to construct cost estimates by generating linear combinations of the elements in the model to create the most apples-to-apples comparisons we can across states and metro regions. Specifically, we take the share of projects by building type for each state (or metro region) and use these shares to create a weighted average project cost for market-rate projects in Texas made up of the shares of each of the four main project types in the sample weighted by their respective shares. We then add a unit-size-effect component by multiplying the unit coefficient, π, by the mean number of units in the sample, 185. This improves the quality of comparisons between market-rate and LIHTC projects because, in general, it relatively raises the average cost of market-rate projects because the market-rate unit average is considerably larger (314 units) than LIHTC projects (118 units). This is the baseline cost we use for comparisons.

We then generate state- or metro region–specific costs by adding the respective geographic differences from the regression model to this baseline cost estimate. For example, for California market-rate projects, we add the coefficient value β_2, so the estimate reflects the baseline cost of the average project type across the sample plus the state-specific difference for market-rate construction in California. For Colorado LIHTC projects, we add the coefficient β_1 and both γ_1 (the main effect term of LIHTC financing reflected in the Texas projects) and γ_2 (the interaction between the Colorado indicator and the LIHTC indicator, capturing any Colorado-specific difference in LIHTC production costs), and so on, building a full set of cost estimates for each state-by-LIHTC category.

For each estimate, we generate error bars reflecting the 95 percent confidence interval of the combined estimate.[7]

The strength of this approach is that it captures persistent cost differences between projects and does not rely on direct project-to-project, case-study-style comparisons, which may lead to differences that are biased either upward or downward in magnitude by idiosyncratic, unobservable project-specific differences not related to average cost differences across geographies. Thus, these comparisons are estimates of average cost differences across states (or metro regions) for the two subsectors of interest: privately financed market-rate apartments and publicly subsidized LIHTC apartments—for a common, 185-unit, project type–weighted basic building cost across all states or metro regions.[8]

[7] These estimates are generated using linear combinations of components from the regression model's output, with standard errors generated using the delta method.

[8] For most analyses, this basic project type has a weighted average made of 49 percent of the average cost of garden-type apartment projects, 6 percent of the average cost of high-rise apartment projects, 38 percent of the average cost of podium-type apartment projects, and 7 percent of the average cost of wrap-type apartment projects.

Chapter 3

State and Regional Differences in Production Costs

We begin with a comparison of production cost differences across states and according to whether a project is a privately financed market-rate apartment project or a publicly subsidized, affordable (LIHTC) apartment project. Figure 3.1 presents differences in TDCs at the NRSF level (Panel A) and at the unit level (Panel B), so that we can consider how the outcome measure chosen influences cost differences and can also gain insights on how smaller unit sizes are used to compensate for higher costs.

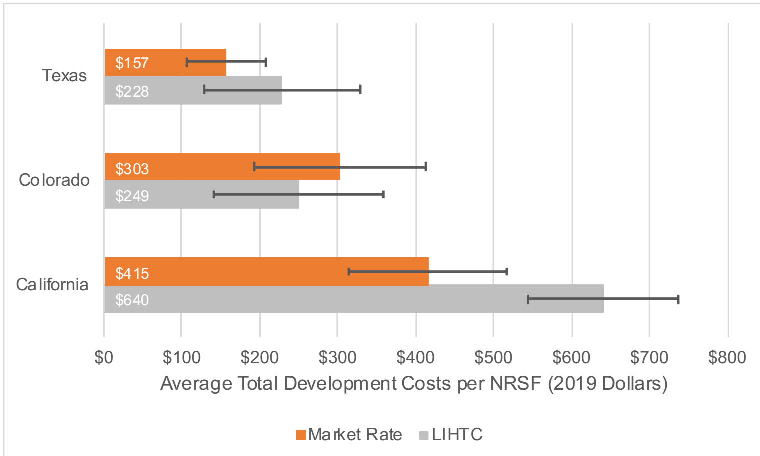
The average TDC per NRSF for market-rate development is $157 in Texas. This is the lowest overall cost per NRSF at the state level for either market-rate or affordable production. The average TDC for LIHTC projects in Texas is roughly 1.5 times the cost of market-rate production, at $228 per NRSF. The average cost for market-rate production in Colorado is 1.9 times the Texas average, at $303 per NRSF. However, Colorado LIHTC projects cost, on average, 0.8 times the market-rate production average cost in the state, at $249 per NRSF, an amount that is statistically identical to the cost of producing LIHTC housing in Texas. Colorado is the only one of the three states we consider with average LIHTC costs below the average market-rate production cost in terms of NRSF.

In California, market-rate production cost is $415 per NRSF, or 2.7 times the average cost in Texas. The average TDC for LIHTC production in California is $640 per NRSF. This is 4.1 times the average cost of market-rate production in Texas and 1.5 times the cost of market-rate production in California.

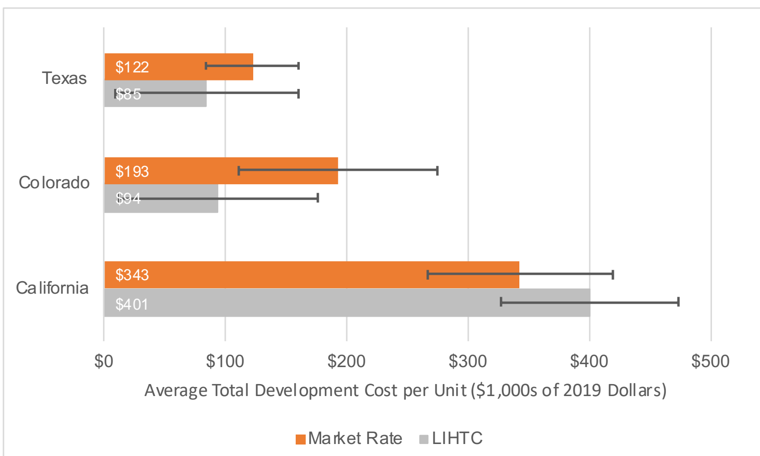
There are important differences if we consider TDC per unit instead of per NRSF. In contrast to the roughly 50 percent higher per NRSF costs for LIHTC production in Texas relative to market rate, at the per-unit level, LIHTC TDC per unit is substantially lower than market-rate projects. This suggests that LIHTC developers are addressing higher costs at the NRSF level by producing substantially smaller units. In Colorado, the lower costs for LIHTC production relative to market-rate production at the NRSF level are magnified when considering per-unit cost—the ratio of LIHTC to market-rate cost at the per-unit level is 0.5 versus 0.8 when looking at per-NRSF cost—suggesting that developers here are producing relatively smaller LIHTC units to reduce costs even further.

California cost differences decline in magnitude when using a per-unit measure. At the per-NRSF level, California LIHTC production costs are 1.5 times the cost of market-rate production in the state. At the per-unit level, LIHTC costs are 1.2 times the market-rate average. Again, this suggests that LIHTC units are smaller on average, but we note that market-rate unit sizes in California are smaller on average than in other states and further relative reductions in unit size for LIHTC projects may be limited by funding source–related minimum unit size requirements (see Appendix C in the supplementary annex for summaries of building requirements for LIHTC projects using three common funding mechanisms in the Los Angeles metro region).

Figure 3.1. State-Level Differences in Total Development Costs



Panel A. TDC per NRSF



Panel B. TDC per Unit

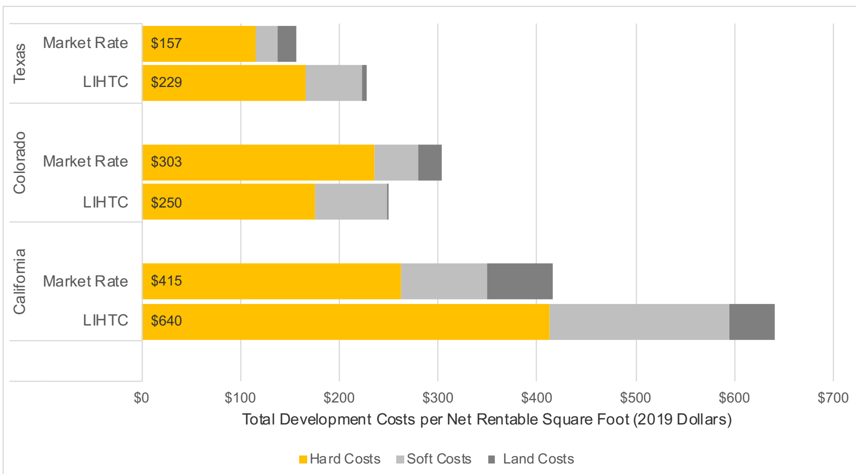
NOTE: *N* = 115 (market-rate project *n* = 27, LIHTC project *n* = 88). Estimates are created as regression-adjusted averages for each state and project type, as described in the text. Costs are adjusted to be in terms of 2019 dollars using the approach described in the main report and the supplementary annex. Bars indicate mean costs per NRSF (per unit). Capped whiskers indicate 95 percent confidence intervals of the mean cost estimate. Tables with the regression results and cell-specific sample sizes are available in the annex.

State-Level Differences by Cost Category

Next, we decompose these differences into three key cost categories: hard construction costs, soft costs, and land costs. Figure 3.2 and Table 3.1 present these results. On average, hard construction costs make up approximately 70 percent of TDCs for projects in the sample, soft costs make up 20 percent, and land costs make up the remaining 10 percent. However, these shares vary in economically meaningful ways by state and among market-rate or LIHTC projects.

Hard construction costs include all costs related to the process of physically constructing the buildings and the associated hard cost infrastructure of a project. This generally includes the necessary site work to prepare for construction, the costs of equipment (e.g., rental or use costs of heavy equipment, fencing, onsite storage, and office space), materials (e.g., cement, wood, doors and windows, insulation, electrical, plumbing), life safety systems (e.g., sprinklers, fire alarms), interior finish materials (e.g., drywall, paint, trim), appliances, and all costs of common building features (e.g., pools and common areas, landscaping, parking infrastructure).

Figure 3.2. State-Level Estimates of Total Development Costs and Major Cost Categories



NOTE: *N* = 115 (market-rate project *n* = 27, LIHTC project *n* = 88). Costs are adjusted to be in terms of 2019 dollars using the approach described in the main report and supplementary annex. Bars indicate mean costs per NRSF. This figure uses a weighted breakdown of cost category shares (with weights derived from the sum of category-specific estimates in Table 3.3) applied to TDC amount so amounts may vary slightly from amounts listed in Table 3.3. Regression results and cell-specific sample sizes are in the supplementary annex. Cost labels in each bar reflect the total cost per NRSF across all three categories.

Figure 3.2 presents the average cost per NRSF for each state by financing type (the label in each bar), and the bars show the proportional breakdown across these cost categories. Table 3.1 presents specific amounts for each of these categories. Across states, Texas has the lowest average hard cost, at $115 per NRSF. At $237 per NRSF, Colorado has hard costs that are 2.1 times the Texas average. The difference in hard costs between California and Texas is 2.2 to 1 ($253 to $115). This is lower than the overall difference in TDC between the states (2.6 to 1), indicating a relatively greater role for land and soft costs in the overall difference between these states.

Turning to cost differences for LIHTC projects, the difference between Texas hard costs per NRSF for market-rate and LIHTC production is proportionally equivalent to the TDC difference, at 1.5 to 1 ($173 to $115). The hard cost difference between LIHTC and market-rate production in Colorado (0.8) is identical to the TDC per-NRSF difference. California's within-state ratio between hard costs for LIHTC projects and market-rate projects is 1.7 ($427 to $253), and LIHTC hard costs per NRSF are 3.7 times the average for market-rate hard costs in Texas.

Table 3.1. Differences in Costs by Category Across States

State	Market Subsector (by Financing Type)	Cost per NRSF	Share of Total Costs (%)	Ratio Relative to Texas Market-rate Cost	Ratio of LIHTC to Market-rate Cost Within State
Panel A. Hard Costs					
California	Market rate	$253	63	2.2	
California	LIHTC	$427	65	3.7	1.7
Colorado	Market rate	$237	78	2.1	
Colorado	LIHTC	$183	70	1.6	0.8
Texas	Market rate	$115	73	1.0	
Texas	LIHTC	$173	73	1.5	1.5
Panel B. Land Costs					
California	Market rate	$64	16	3.2	
California	LIHTC	$47	7	2.4	0.7
Colorado	Market rate	$23	7	1.1	
Colorado	LIHTC	$1.5	1	0.1	0.1
Texas	Market rate	$20	13	1.0	
Texas	LIHTC	$5	2	0.3	0.3
Panel C. Soft Costs					
California	Market rate	$84	21	3.8	
California	LIHTC	$187	28	8.5	2.2
Colorado	Market rate	$44	15	2.0	
Colorado	LIHTC	$75	29	3.4	1.7
Texas	Market rate	$22	14	1.0	
Texas	LIHTC	$60	25	2.7	2.7

NOTE: N = 115 (market-rate project n = 27, LIHTC project n = 88). For land costs, N = 129 (market-rate project n = 54, LIHTC project n = 75). All costs are adjusted to be in terms of 2019 dollars using the procedure described in the report and supplementary annex. This table was revised in April 2025 to correct some column headings.

We next turn to land costs. Variation in land costs and the role this variation plays in both production costs and sale price is a topic that has been extensively studied in the housing affordability literature (Albouy and Ehrlich, 2018; Gyourko and Krimmel, 2021; Quigley and Raphael, 2005). Land costs are determined by the specific qualities of a piece of land (soil quality, flooding risk, etc.), the value (or disamenity value) of any existing structures on the land, and, perhaps most importantly, the relative scarcity of buildable land in a specific area. The relative scarcity of buildable land in a local area arises primarily from a combination of the local demand for land and regulations governing allowable land use.

The price effects of restrictive urban land use policies and the downstream effects of higher land prices on housing affordability are areas of substantial recent focus in urban economics. One influential paper focused on high-cost metro areas that the authors dubbed "superstar cities" models land costs as a "clearing mechanism by which higher income households crowd out lower income households from a scarce location" (Gyourko, Mayer, and Sinai, 2013). The link between land costs and overall housing costs means that higher land costs are often correlated with higher hard and soft costs through cost-of-living differences (for example, if it costs more to live in an area, the wages of construction workers, service professionals, and others will tend to be higher; Landis and Reina, 2021).

The average land cost per NRSF for market-rate projects in our Texas data is $20. This is the lowest for market-rate projects across the three states. Colorado is slightly higher (1.1 times this amount, at $23 per NRSF) and California is 3.2 times the Texas average ($64).

LIHTC projects in Texas have land costs substantially lower than Texas market-rate projects on average ($5, or 0.3 times the market-rate average). Average land cost for LIHTC projects in Colorado was $1.50 per NRSF, the lowest average in the analysis and less than 10 percent of the average cost of land for market-rate projects in the state. California has the smallest difference in land costs for LIHTC projects, with the average land cost per NRSF at 0.7 times the average for market-rate projects in the state ($47 versus $64).[9]

The soft costs category represents all other project costs, including such professional services as architectural and engineering costs and the cost of legal services, other nonphysical costs such as environmental reports and inspection or regulatory compliance costs, and financing costs. In states such as California, substantial local fees on projects (typically referred to as development or impact fees) that are related to hypothesized effects of development on traffic, utility infrastructure, and other dimensions are often included in soft costs (we provide more information on these fees later).

Across states and project financing types, soft costs show some marked differences from the other two categories we considered. Texas market-rate projects have the lowest soft costs by far, at an average of $22 per NRSF. Colorado's market-rate soft costs are twice this level ($44), while market-rate project soft costs in California are nearly four times the average in Texas and double the level in Colorado ($84).

There is also a positive, economically large difference in soft costs for LIHTC projects compared with market-rate projects in each state. In Texas, average soft costs per NRSF for LIHTC projects are nearly three times the level of market-rate projects ($60 versus $22). In Colorado, LIHTC soft costs

[9] For our analysis we dropped projects that had zero or near-zero land costs. We do this because the provision of repurposed public land parcels at no cost for affordable housing production is becoming increasingly common, particularly in areas with very high housing production costs (U.S. Department of Housing and Urban Development, 2024). Thus, we choose to focus on land costs that appear to reflect arms-length acquisition transactions to better capture the general distribution of land costs. Specifically, we cut projects with total land costs of $10 or less because some free land programs include a de minimis lease or purchase cost. This restriction removed 14 LIHTC projects from the analysis sample. However, these low costs still likely reflect situations where land for LIHTC projects is explicitly or implicitly subsidized.

are 1.7 times the market-rate level ($75 versus $44). The highest soft costs, though, are for LIHTC projects in California. These costs ($187) are more than double the relatively high state-level soft costs for market-rate projects ($84) and are 8.5 times the average soft costs for market-rate projects in Texas.

Cost Differences by California Metro Region

We have presented evidence of large differences in production costs at the state level, but because most housing policy is developed and enforced at the local level, it is also important to understand the extent and nature of within-state variation in production costs. To do so, we explore regional variation in California and relate this variation to state-level averages in our two comparison states: Texas and Colorado.[10] We note that state-level amounts for Colorado and Texas in this analysis do not exactly match the previous amounts in the state-level comparisons with California. This is a feature of regression analysis—estimates can shift when the set of included variables changes, but none of these differences are statistically distinguishable or economically large (in general, costs for Colorado and Texas increase by roughly 8 to 10 percent when we disaggregate California projects into regions).

The California metro regions we define for this exercise are given in Table 3.2, which shows the abbreviated region name we use, the municipalities each region comprises, and the U.S. Census Bureau's combined statistical area that corresponds most closely to our regional definitions.

Table 3.2. Metro Region Definitions

Abbreviated Region Name	Cities with Projects Included	Census Combined Statistical Area Name
Los Angeles region	Anaheim, Arcadia, Carson, El Monte, Fullerton, Irvine, Long Beach, Los Angeles, Monrovia, Montclair, North Hollywood, Rancho Cucamonga, Santa Ana, Westminster	Los Angeles-Long Beach
San Diego metro area	Chula Vista, San Diego	San Diego-Chula Vista-Carlsbad
San Francisco Bay area	Bay Point, Danville, Emeryville, Fremont, Livermore, Oakland, Richmond, San Francisco, San Mateo	San Jose-San Francisco-Oakland

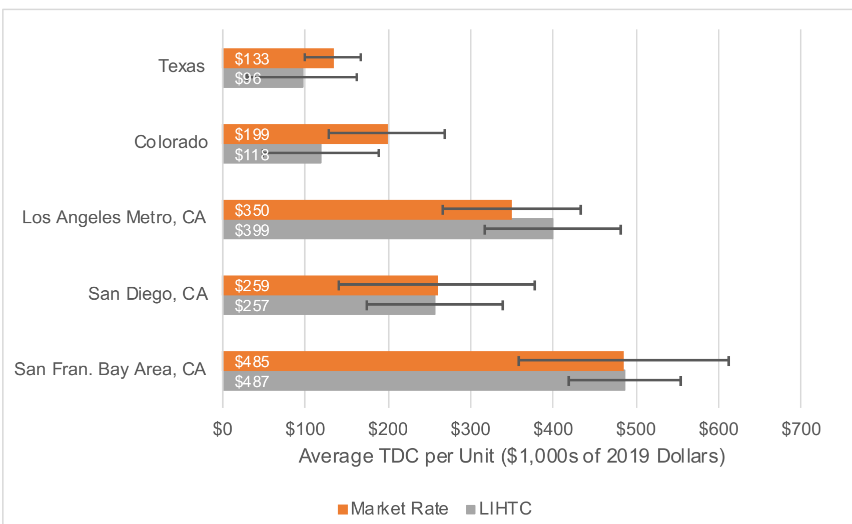
Panel A of Figure 3.3 presents differences in TDC per NRSF separately for California market rate and LIHTC projects at the metro region level. Regional variation in California at the NRSF level is substantial. In all three regions, market-rate and LIHTC costs differ substantially (at a statistically distinguishable 1.4 to 1.5 times the relevant market-rate average). San Diego has the lowest costs among metro regions in the state for both market-rate and LIHTC projects. The average market-rate TDC per NRSF of $335 is still double the average market-rate cost in Texas but is close to the

[10] In exploratory analyses, regional differences at the metro level in these two states were substantially smaller than those in California, rarely rising to the level of even marginal statistical significance. For this reason, and to improve the precision of estimates in California by preserving model degrees of freedom, we use state-level averages for the other two states.

Colorado market-rate average. Average TDC per NRSF for LIHTC projects of $481 is also double the cost of LIHTC projects in Texas and is 1.8 times the LIHTC average in Colorado. Costs in the Los Angeles metro region are moderately higher in each category by a factor of roughly 1.3.

Figure 3.3. Metro Region–Level Differences in Total Development Costs

Panel A. TDC per NRSF



Panel B. TDC per Unit

NOTE: N = 115 (market-rate project n = 27, LIHTC project n = 88). Costs are adjusted to be in terms of 2019 dollars using the approach described in the main report and supplementary annex. Bars indicate mean costs per NRSF (per unit). Capped whiskers indicate 95 percent confidence intervals of the mean cost estimate. A table with the regression results and cell-specific sample sizes is contained in the supplementary annex.

The San Francisco Bay metro region has the largest cost differences in California for both market-rate and LIHTC projects. The region's average TDC for market-rate projects of $531 per NRSF is

1.6 times the cost in San Diego, while the average TDC for LIHTC projects of $731 per NRSF is 1.5 times the cost of LIHTC projects in San Diego. To put the costs of production in the San Francisco Bay area, which are the highest costs of any region in the sample, in an absolute context across regions **and** financing types, market-rate projects are 3.2 times the cost of the average market-rate project in Texas, and LIHTC production costs are 3.1 times the cost of LIHTC projects in Texas and 4.4 times the cost of market-rate projects in Texas.

Panel B presents comparisons of TDC at the per-unit level for metro regions in California relative to state averages for Colorado and Texas. As in the prior state-level analysis, the gap between LIHTC and market-rate projects in Texas goes from positive to negative, and in Colorado the negative cost gap grows ever larger in magnitude, indicating that LIHTC developers build smaller units than market-rate developers on average.

In California, these two comparisons suggest substantial differences in unit size between market-rate and LIHTC apartments. The average difference between market-rate and LIHTC costs per unit disappears in San Diego and San Francisco. In Los Angeles, the gap declines from a ratio of 1.5 for NRSF to 1.1 for per-unit TDC.

Table 3.3 presents results on metro region–specific variation in costs by category. Consistent with the discussion above, the table includes one column that characterizes the cost in each region as a ratio of the average market-rate costs in Texas. For example, the average land cost for market-rate projects in Los Angeles, California, is $61 per NRSF versus $23 in Texas, meaning that the average land cost for these projects in Los Angeles is 2.7 times the Texas average. The final column shows within-region differences between the average LIHTC project and the average market-rate project.

The category with the lowest level of variation in these comparisons is land costs (panel A). California has higher land costs across the board, with ratios for both market-rate and LIHTC projects indicating that land cost is roughly two to six times the average for market-rate projects in Texas (and the Texas land cost average for LIHTC projects is slightly lower than the market-rate average (a small, nonstatistically significant difference).

San Diego has the lowest market-rate land costs—2.1 times the Texas average, with no meaningful difference between LIHTC and market-rate projects. The Los Angeles region has average land costs that are around three times the average cost in Texas, while San Francisco has LIHTC land costs that are roughly identical to San Diego (twice the Texas average), but the average cost for land for market-rate projects is nearly six times the Texas average.

Turning to hard construction costs (panel B in Table 3.3), across California regions, market-rate hard costs vary from $211 to $292 per NRSF. The middle value, Los Angeles at $259, is only slightly (and not statistically significantly) higher than Colorado market-rate costs and is 2.2 times the Texas average.

The proportional difference in LIHTC hard costs in Los Angeles and San Diego is similar to the difference in Texas (1.3 to 1.4 times the within-region market-rate average). The high outlier for both market-rate and LIHTC projects is the San Francisco region, with average market-rate hard costs of $292 per NRSF and average LIHTC hard costs of $511 per NRSF—4.4 times the Texas market-rate average.

Table 3.3. Differences in Costs by Category Across Metro Regions

State or Metro Region	Market Subsector (by Financing Type)	Cost per NRSF	Ratio Relative to Texas Market-rate cost	Ratio of LIHTC to Market-rate cost Within Area
Panel A. Land Costs				
Texas	Market rate	$23	1.0	
Texas	LIHTC	$20	0.8	0.8
Colorado	Market rate	$27	1.1	
Colorado	LIHTC	$14	0.6	0.5
Los Angeles Metro	Market rate	$61	2.6	
Los Angeles Metro	LIHTC	$86	3.7	1.4
San Diego	Market rate	$49	2.1	
San Diego	LIHTC	$48	2.1	1.0
San Francisco Bay Area	Market rate	$136	5.8	
San Francisco Bay Area	LIHTC	$45	1.9	0.3
Panel B. Hard Costs				
Texas	Market rate	$118	1.0	
Texas	LIHTC	$152	1.3	1.3
Colorado	Market rate	$238	2.0	
Colorado	LIHTC	$185	1.6	0.8
Los Angeles Metro	Market rate	$259	2.2	
Los Angeles Metro	LIHTC	$333	2.8	1.3
San Diego	Market rate	$211	1.8	
San Diego	LIHTC	$286	2.4	1.4
San Francisco Bay Area	Market rate	$292	2.5	
San Francisco Bay Area	LIHTC	$518	4.4	1.8
Panel C. Soft Costs				
Texas	Market rate	$25	1.0	
Texas	LIHTC	$72	2.9	2.9
Colorado	Market rate	$47	1.9	
Colorado	LIHTC	$83	3.4	1.8
Los Angeles Metro	Market rate	$86	3.5	
Los Angeles Metro	LIHTC	$221	9.0	2.6

State or Metro Region	Market Subsector (by Financing Type)	Cost per NRSF	Ratio Relative to Texas Market-rate cost	Ratio of LIHTC to Market-rate cost Within Area
San Diego	Market rate	$82	3.3	
San Diego	LIHTC	$168	6.8	2.0
San Francisco Bay Area	Market rate	$100	4.0	
San Francisco Bay Area	LIHTC	$190	7.7	1.9

NOTES: N = 115 (market-rate project n = 27, LIHTC project n = 88). For land costs, N = 129 (market-rate project n = 54, LIHTC project n = 75). All costs are adjusted to be in terms of 2019 dollars using the procedure described in the report and supplementary annex. This table was revised in April 2025 to correct some column headings.

Soft costs (panel C) for market-rate projects in California range from $82 to $100 per NRSF, roughly three to four times the average in Texas. But soft costs for LIHTC projects across California are dramatically higher—between roughly seven and nine times the average soft cost for market-rate projects in Texas. The highest soft costs in the analysis are for LIHTC projects in the Los Angeles region, at $221 per NRSF.

To give a better sense of how unusually large LIHTC soft costs in Los Angeles are, **they are higher than average** hard costs **for market-rate projects in San Diego**, which are subject to California's rigorous seismic and energy efficiency requirements. In other words, among Los Angeles LIHTC projects, costs including architectural and engineering services, municipal fees, legal fees, various fees for management, monitoring, inspection, and so forth add up to more money per NRSF than all of the labor and materials and subcontractor profit required to physically construct an apartment in San Diego, just roughly 120 miles away. These soft costs are also equal to **two-thirds of the LIHTC hard cost average** in the Los Angeles region.

Factors Driving Cost Differences

We turn now to considering the extent to which these cost differences can be explained by factors that are a feature of the natural or economic environment of a region—for example, higher regional labor costs for the same occupation or area-specific engineering challenges such as designing buildings appropriate for the seismic conditions in California—and factors that represent discretionary choices made by policymakers, including, for example, the amount of municipal fees levied on new apartment development, environmental efficiency requirements, or prescriptive requirements concerning the size of units and amenities required in affordable housing developments.

Hard Costs

Hard costs are the largest share of TDC for any project, so understanding what drives the large variation observed across states and even across regions is of critical importance. Unfortunately, these costs are typically the most difficult to understand because of the way that projects are bid. Projects typically have a general contractor with overall responsibility for the construction, and that contractor may have a workforce that handles some or even many facets of basic construction, such as foundation and framing work. But many components of a typical project (such as roofing, plumbing, electrical, landscaping, fire safety systems, and numerous others) are built or installed by subcontractors who typically provide a single bid for their portion of the project work. For this reason, it is all but impossible to obtain data that break down a project's hard costs into even simple components like labor and materials. Generating such a breakdown would require getting actual detailed cost data on labor versus materials from perhaps a dozen or more subcontractors and summing all these data up. However, discussions with individuals in charge of construction operations for our market-rate data provider have estimated that in a lower-cost state like Texas, hard costs for garden apartments, which are generally the lowest-cost and least-complex development type in our data, are roughly 45 percent labor and 55 percent materials. In higher-cost states like California, a typical garden project would be 60 percent labor and 40 percent materials.

In our analysis data, we have a limited subsample of detailed market-rate project data that breaks out hard cost spending into more-detailed categories. This allows us to consider the extent to which overall hard cost differences are or are not reflected proportionally across major hard cost categories. Table 3.4 presents a simple analysis using mean spending per NRSF for both garden- and wrap-type apartment projects. These averages use five projects in California (four in the Los Angeles metro region and one in San Diego) and six in Texas (four in the Dallas metro area and one each in the Houston and Austin metro areas).[11] We present spending per NRSF (in 2019 dollars) for the 21 largest hard cost categories in our detailed cost data (for compactness, we dropped categories with an average cost below $3 per NRSF in California). Although these comparisons use relatively small samples and are simple averages rather than the results of a regression model, the totals from the included categories add up to roughly 95 percent of the average hard cost per NRSF estimates for market-rate apartments in both states using our regression-based approach, suggesting that they are reasonably representative of state-level costs for this project type.

As with other analyses, we include a ratio of the costs in California to the costs in Texas. We also include a column categorizing several of these categories according to whether they are likely to be substantially affected by either seismic or energy efficiency requirements.

Across all categories, costs in California are, unsurprisingly, higher than in Texas. In terms of the ratio of California to Texas costs, these differences range from a low of 1.1 (for onsite land development) to a high of 3.2 (for foundations). The overall (cost-weighted) average indicates that hard costs for market-rate projects in California are, on average, 2.3 times the cost in Texas, a number that is nearly identical to the overall hard cost ratio in our state-specific estimates of 2.2.

Using the estimated state-specific ratios of labor to materials above as rules of thumb suggests that the California to Texas cost ratio for materials across these categories is 1.5 and the cost ratio for labor is 2.6. In annex Figure A.18, we include an additional comparison of costs provided by our market-rate data provider of two *wrap* apartment projects (i.e., low-rise wood-framed apartments built around a cement parking structure) that are currently in development in Texas and California. These projects are of similar size and type and were being bid at the same time, so no price adjustments were required. The cost differences in this comparison are broadly similar to the differences in Table 3.4, with an overall hard cost ratio between California and Texas of 2.1.

[11] We only had one garden-type project with the appropriate level of cost detail for Colorado, so we excluded the state from this comparison.

Table 3.4. Hard Cost Differences per Net Rentable Square Foot for Garden Projects in California and Texas

Cost Category	California	Texas	California/Texas Cost Ratio	Most-Relevant Regulations
Framing	$36.05	$21.81	1.7	Seismic
General conditions	$24.06	$8.83	2.7	
Electrical	$20.44	$9.51	2.1	Energy
Plumbing	$19.97	$7.90	2.5	Energy
Drywall	$19.38	$6.65	2.9	Seismic
Foundations	$15.03	$4.65	3.2	Seismic
Masonry and cladding	$14.14	$5.16	2.7	Seismic
General contractor fee	$11.84	$7.08	1.7	
Onsite land development	$9.83	$8.84	1.1	
HVAC	$7.95	$4.17	1.9	
Cabinets	$7.94	$4.35	1.8	
Sitework	$6.24	$2.60	2.4	Seismic
Miscellaneous steel	$6.13	$2.38	2.6	
Roofing	$5.51	$2.42	2.3	Energy
Window and glass	$5.06	$1.88	2.7	Energy
Painting	$4.53	$2.35	1.9	
Appliances	$4.49	$3.40	1.3	Energy
Flooring	$4.23	$1.60	2.7	
Site amenity package	$4.09	$1.98	2.1	
Landscaping	$3.12	$1.55	2.0	Energy
Total	**$230.02**	**$109.12**	**2.3***	

SOURCE: Author calculations from detailed Trammel Crow Residential hard cost data, provided to authors.
NOTE: All costs were deflated to 2019 dollars using a hybrid price index as described in the report. The total cost ratio followed by the asterisk (*) is the average of the per-category cost ratios weighted using California cost values as weights. HVAC = heating, ventilation, and air conditioning.

Hard Cost Implications of State-Level Seismic and Energy Efficiency Requirements

There are at least two important factors that might affect hard costs in California. The first is the state's requirements for seismic resilience, and the second is state requirements for energy efficiency. The effects of both types of requirements on costs are difficult to pin down precisely, but, broadly speaking, their scope in California is in stark contrast with Texas, where they are not meaningfully present, and with Colorado, where state requirements for energy efficiency and seismic resilience are much less stringent.

Minimum seismic requirements in California are part of the state building code (California Department of General Services, undated), but many metro areas also have local requirements that exceed state-level requirements. These requirements are primarily focused on preserving life during extreme events and include requirements for shear walls, bracing systems, and flexible structural connections. Texas has no statewide seismic-specific requirements for residential construction, consistent with a very low level of seismic risk in the state (FEMA, 2023).[12]

Energy efficiency requirements also vary substantially by state. California has, by far, the nation's most stringent requirements, which include, for example, that all new buildings must have a solar photovoltaic system, appliances that meet or often exceed national energy efficiency standards, energy-efficient windows, and high levels of insulation (California Energy Commission, 2022). Additional requirements include the use of drought-resistant landscaping and high-efficiency irrigation systems. In Texas, there are no mandates for solar equipment, appliances, or windows, and requirements for insulation are present but lower than in either of the other states (Texas State Energy Conservation Office, 2016). In both Colorado and Texas, there are state and local programs that may effectively incentivize many of these requirements, but they are not mandatory (Austin Energy, 2024; Colorado Department of Revenue, 2021).[13]

The cost differences between California and Texas in the categories we identify as being related to seismic requirements are 14 percent higher than the cost differences between California and Texas in the residual set of costs that we do not strongly associate with either seismic or energy efficiency requirements (a ratio of 2.4 versus 2.1). Adjusting this difference by the share of hard costs we associate with seismic requirements suggests that seismic requirements add roughly 6 percent to total hard costs **over and above the average hard cost difference between California and Texas**. For energy efficiency requirement–sensitive categories, the estimated specific difference is smaller, at 7.3 percent, translating to a roughly 2 percent difference in total hard costs over and above the average hard cost difference between California and Texas.

For the additional analysis of projected hard costs for two current wrap apartment projects in California and Texas mentioned above (annex Table A.18), the regional leads for our market-rate data provider consulted with structural engineers in each state to identify key cost differences related to California's seismic requirements, leading to estimates that the concrete parking structure for the California project would cost 15 percent less without these requirements and that the framing would cost 10 percent less. These differences are roughly equivalent to those we estimate using the data in Table 3.4.

However, it is highly important to note that there might be other cost differences outside those captured by this narrow hard cost analysis, such that these estimates likely represent the lower bound of cost differences resulting from these requirements. For example, there might be costs related to additional consulting and testing and, perhaps most importantly, longer project timelines related to multiple inspections or other approval-related delays that feed into differences in a variety of categories, including the cost of general conditions (fixed costs of a job site and other related costs, a

[12] Colorado has a state code that is less stringent at least in part because, while seismic risk is present in the state, it is generally lower than the substantial risk in California (Code of Colorado Regulations, 2016).

[13] In Colorado, there has been no statewide requirement for solar equipment or high-efficiency appliances, and there are requirements for efficient windows and insulation but at levels generally lower than those in California (Colorado Energy Office, undated). However, in 2022, the state passed a law that might lead to requirements more similar to those in California (Colorado Energy Office, 2023; Colorado General Assembly, 2022).

category we count as not related to either set of seismic or energy efficiency requirements), higher costs associated with carrying land and property tax costs without rental revenue for longer periods of time, and higher labor costs across the board because of simply having workers on site for longer periods of time. Next, we consider the role of direct labor costs in explaining hard cost differences, but we also return to the issue of longer project timelines and their potential role in overall cost differences.

How Much of Observed Hard Cost Differences Can Labor Costs Explain?

Although we cannot, as mentioned above, directly observe spending on labor versus materials, we can consider how much of the overall variation in hard costs can be explained by some simple measured differences in labor costs. We collected data on carpenter wages, a common job on residential construction projects, and used differences in the average hourly wage across regions to explore hard cost differences that could relate directly to regional wage levels. We take two approaches to attributing wages to areas. In the first approach that we use to generate a wage difference comparison across market-rate projects, we collect average carpenter wage rates reported by the website of the job listing firm ZipRecruiter that are the mean wage for listings on the company's site as of January 2025 (ZipRecruiter, undated). For the second approach, which we use to generate wage difference comparisons across LIHTC projects, many of which are subject to requirements to pay prevailing or union-level wages in California, we use a weighted average of the county-level prevailing (union-level) journeyman carpenter wage for Los Angeles, San Diego, and San Francisco counties reported by the California Department of Industrial Relations and the market wages reported by ZipRecruiter. The shares of each wage (market or prevailing wage) are weighted to match the regional shares of LIHTC projects that paid prevailing wages using a sample of more than 800 recent LIHTC projects across California (Terner Center for Housing Innovation, 2024).[14] These wages are notably higher than the market wages in each California region (around 1.5 times the market wage in Los Angeles and San Diego and 2.2 times the market wage in San Francisco), so this adjustment matters a great deal. Past research has estimated that prevailing wage requirements can add 13 to 15 percent to the TDC of LIHTC projects in California (Reid, 2020). Our review of available documents from our project data, along with discussions with developers and officials familiar with LIHTC in these states, led us to conclude that the payment of prevailing wage on LIHTC projects is, at minimum, much less common in Colorado and Texas.

We use these wage measures to estimate how much of the overall hard cost variation can be explained by wage differences. The simple formula we use first generates a wage ratio for a focal area relative to the Texas average (for either market or LIHTC wage estimates) then multiplies the average hard cost per NRSF in Texas by this wage ratio. This is the *counterfactual hard cost* for the focal area that we would expect to observe if wage differences were the only difference in hard costs. We then estimate how much of the observed hard cost differences are explained by wage differences by generating the following ratio:

[14] These shares are weighted averages using the specific project cities within each region multiplied by the share calculated in Terner (2024). They are 56 percent in the Los Angeles metro region, 33 percent in San Diego, and 73 percent in San Francisco.

$$Explained\ Hard\ Cost\ Difference = \frac{Counterfactual\ Hard\ Cost - Texas\ Hard\ Cost}{Focal\ Region\ Hard\ Cost - Texas\ Hard\ Cost}.$$

In Table 3.5, we present these results. The third column reproduces average hard costs, the fourth column shows the ratio of each hard cost average relative to either the respective market rate or LIHTC average in Texas, and the final column reports the share of each hard cost difference that can be explained using the approach just outlined.

Across market-rate projects in Colorado and California, advertised wage differences with Texas are generally relatively small and, thus, have limited explanatory power (the mean of our sample of market wage data is $25 and the standard deviation is $2). These differences explain just 8 percent of higher hard costs in Colorado, 10 percent of higher hard costs in the Los Angeles metro region, and 16 to 17 percent of higher hard costs in the San Diego and San Francisco metro regions.

The hard cost difference between LIHTC projects in Colorado and Texas is relatively small to begin with, so the relatively small market wage difference can explain around 40 percent of the hard cost difference. Using the weighted average of market and prevailing wages described for LIHTC projects in California, we estimate that labor costs can explain a nontrivial portion of hard cost differences. In San Diego, we estimate that wage differences can explain 32 percent of the hard cost difference with Texas. In Los Angeles, they can explain 35 percent of observed differences, and, in San Francisco, where both prevailing wages and the incidence of LIHTC projects using prevailing wages are the highest in the state, wage differences can explain 56 percent of the hard cost difference with Texas.

This exercise is not rigorous enough to make conclusive claims because we use wage measures for only one job, though we note that regional wage differentials, especially between market wages and prevailing wages, are similar across other common construction jobs such as electricians. Taking this evidence at face value, cost-of-living differences cannot explain much of the variation across hard costs in market-rate projects, though we note that we may modestly underestimate wages in this sector for California because, for example, high-rise projects in major California markets such as San Diego and San Francisco use a substantial share of union labor, which we do not model in this simple exercise because of the lack of a credible data source for estimating these hybrid wages. However, for LIHTC projects, these results indicate that a simple measure of wage differences between market wages in Texas and Colorado and a credible weighted average of local prevailing wages and market wages in California regions using a common job in the construction workforce can explain a large share of the hard cost differences between these regions and a lower-cost state like Texas.

Soft Costs

Soft costs can be broken down into multiple components that have potentially important implications for policymaking. Next, we assess the magnitude and nature of soft cost differences in two major components of soft costs: architectural and engineering fees and municipal development fees.[15]

Table 3.5. The Role of Labor Cost Differences in Explaining Regional Hard Cost Differences

State or Metro Region	Market Subsector (by financing type)	Hard Cost per NRSF	Ratio Relative to Texas Costs (separately for market rate or LIHTC)	Share of Difference with Texas Explained by Carpenter Wage Differences (within market rate or LIHTC sectors, %)*
Texas	Market rate	$118	1.0	-
Texas	LIHTC	$152	1.0	-
Colorado	Market rate	$238	2.0	8
Colorado	LIHTC	$185	1.2	38
Los Angeles	Market rate	$259	2.2	10
Los Angeles	LIHTC	$333	2.2	35
San Diego	Market rate	$211	1.8	16
San Diego	LIHTC	$286	1.9	32
San Francisco Bay	Market rate	$292	2.5	17
San Francisco Bay	LIHTC	$518	3.4	56

SOURCE: Author calculations using carpenter hourly wages from two sources: market wages from aggregated job listings data provided on the website of ZipRecruiter from January 2025 that have been deflated to 2023 levels (using a 2024 BLS deflator for construction occupation wages) and 2023 published hourly prevailing wages for journeyman carpenters for Los Angeles, San Diego, and San Francisco counties (State of California Department of Industrial Relations, 2024; ZipRecruiter, undated).
NOTE: Comparisons for LIHTC hard costs in California use a weighted average of market and prevailing wages for comparison, while market-rate projects use the average carpenter market wage from ZipRecruiter. The explained share is calculated as the difference in hard costs for Texas market-rate or LIHTC projects scaled by the wage ratio (the ratio of the wage in the focal region over the Texas wage) minus the actual hard costs in Texas over the actual hard costs for the focal region minus the actual hard costs in Texas. This table was revised in April 2025 to correct some column headings.

Architectural and Engineering Fees

These fees cover design services, including the engineering requirements of a development relating to soil quality, flood risk, and seismic risk (for California in particular), among other factors, as well as the layout and overall aesthetic characteristics of a development and assuring that it conforms with specific building codes. The size of these fees is also correlated with the stringency of local zoning, land use, and building codes that—aside from whatever direct relationships to public health and safety these regulations might have—may serve, in practice, as a constraint on the financial feasibility of

[15] We also assessed but did not find substantial differences in financing costs, consistent with a relatively efficient market for real estate finance. We did find that average LIHTC construction financing costs were roughly double the cost of market-rate projects, but this LIHTC premium did not vary by state.

housing production by increasing costs (Glaeser and Gyourko, 2003; McFarlane, Li, and Hollar, 2021; Schill, 2005). More-restrictive regulations require greater levels of knowledge, more attention to detail, more-literal output of drawings and documents, and, in general, more work, leading to higher costs.

We use the same regression-based model described earlier to estimate differences across metro regions in these fees. To make these estimates easier to interpret, we present them in costs per unit.[16] Using per-unit measures in our earlier analyses tended to result in lower levels of cost differences overall because unit size often appeared to be adjusted by developers to partially compensate for higher per-NRSF costs. Thus, the differences we highlight here are smaller than they would be at the NRSF level on average.

Table 3.6 shows the average fee in each region according to whether the projects are market-rate or LIHTC apartments. The range of fees observed among the 115 projects for which we have these data range from a low of roughly $3,200 per unit for LIHTC projects in the Houston metro region to more than $25,000 per unit (nearly eight times as much) for LIHTC projects in the San Francisco Bay metro region. The fourth column presents the ratio of average architectural and engineering fees in each area to the average for market-rate development in the Houston, Texas, metro region. The Los Angeles and San Francisco Bay metro regions have average fee differences that are statistically significantly different from Houston at the 90 percent confidence level or greater.

In the fifth column we generate a ratio that is the average fee for LIHTC projects over the average fee for market-rate projects to quantify the within-region gap in these fees by multifamily housing subsector. For all Texas regions, these fees are slightly lower than the relevant market-rate average (and none of these differences are statistically significant). For Colorado and San Diego, California, the average fees for market-rate and LIHTC projects are roughly identical. The San Francisco Bay area has average fees for LIHTC projects that are 1.5 times the region's market-rate average, and the level of these fees is more than six times the level of fees for LIHTC projects in the Houston metro region. The largest within-region difference in architectural and engineering fees is in the Los Angeles metro region, where LIHTC projects have average fees that are two times the average cost among market-rate projects. This difference obviously cannot be explained by differences in regional cost of living. To put this difference into a more understandable context, the average per-unit architectural and engineering fee difference between LIHTC and market-rate projects is more than one-quarter of the entire average TDC difference per unit ($12,413 of an average TDC difference of $48,333).

One explanation for these large differences could be the highly prescriptive requirements associated with common funding sources used in the city and county of Los Angeles. Interested readers can find summaries of the documents with these requirements for projects funded by either the Los Angeles Housing Department (LAHD) or the Los Angeles County Development Authority, which has a notably complex set of guidelines for both the design review phase and the building phase, in the annex for this report. One additional factor that might contribute to higher costs of LIHTC

[16] We use one additional control for this model, an interaction term between units and LIHTC projects. This adjustment is informed by the intuition that LIHTC projects might have different scope to realize economies of scale in terms of architectural and engineering fees (for example, a 12-story high-rise building may have ten floors of nearly identical plans, but such large buildings are more rare among LIHTC projects) and by the fact (discussed in more detail below) that these projects often have much more prescriptive design requirements that may simply make them less efficient to design even when they are relatively large projects. This coefficient is large in magnitude and is fairly precisely estimated ($p = 0.186$).

projects within the city of Los Angeles is substantially higher scrutiny of accessibility requirements by the city.[17]

Because variation in architectural and engineering fees might reflect a variety of differences in the cost of doing business, including salaries, rents, and other inputs to these professional services, we estimate how much area cost-of-living differences can account for regional architectural and engineering fee differences. A cost-of-living index (COLI) represents differences in the cost of a common basket of goods and services across areas, and we use this measure as a proxy for how much the aggregated factors composing architectural and engineering services may proportionally vary by region.[18]

We express the COLI as a regional multiplier relative to the cost of living in Texas (we use an aggregated measure for the four metro areas that contribute project data in Texas weighted by the approximate proportion of projects in each area). So, for example, the value for the San Francisco Bay area is 1.82 (the cost of living in San Francisco is 182 percent of the cost of living in Texas), and the value for Colorado is 1.16. We multiply the average architectural and engineering fee for Texas market projects by this amount to get a hypothetical cost-of-living-adjusted fee for other regions and then compare the difference between that adjusted fee and the actual average fee in Texas with the difference between the actual average fee we observe for a given area and the actual average fee in Texas. The ratio between these two differences is the amount of the fee difference that can be explained by cost-of-living differences. These values are shown in the last column of Table 3.6.

In Colorado, where costs are 1.5 times the Texas average for market-rate projects, cost of living explains 34 percent of these fee differences. In Los Angeles, where the COLI value is 1.43, this cost-of-living difference can explain 30 percent of the difference for market-rate projects but only 10 percent of the very large average fee difference for LIHTC projects. Across both market-rate and LIHTC projects in the San Diego metro region and market-rate projects in the San Francisco Bay metro region, cost of living also explains approximately 30 percent of observed fee differences. For the much-higher average fee for San Francisco LIHTC projects, cost of living only explains 18 percent of the difference with Texas projects.

However, it is important to note that the seismic requirements mentioned earlier also could be expected to have a meaningful effect on architectural and engineering fee differences for California projects. To generate an estimate of the share of the fee differences explained by both cost-of-living factors and additional expertise and effort required by California's unique seismic requirements, we adopt an additional allowance for seismic-related differences by subtracting 30 percent of this amount from the per-unit fee averages for each regional estimate in California. We use 30 percent as rule of thumb derived from discussions with a seismic engineer who suggested that seismic requirements

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[17] LAHD has reached multiple settlements with the U.S. Department of Housing and Urban Development (HUD) in recent years over allegations that the city systematically underprovided accessibility features in affordable housing projects (Alpert Reyes and Zahniser, 2016; Office of Public Affairs, 2024). LAHD is currently operating under a voluntary compliance agreement with HUD that holds newer city-supported developments to a higher "alternative accessibility standard" that may contribute directly to higher architectural fees through both more work for architects per se to meet these requirements but also due to additional requirements to have specific consultants certify that plans meet all these requirements (U.S. Department of Housing and Urban Development and the City of Los Angeles, California, 2014).

[18] We use a COLI developed by a large insurer, AdvisorSmith, that reflects a mix of 2019 and 2020 prices (Mak, 2021). We note that this index includes housing costs so that it is conceptually likely to modestly overcompensate for the fee differences we consider because they are direct contributors to regional housing cost differences.

could explain 20 to 30 percent of a typical fee difference (we take the high end of this range to be as conservative as possible in accounting for these differences).

Table 3.6. Metro Region–Level Architectural and Engineering Fee Costs

State or Metro Region	Market Subsector (by Financing Type)	Cost Per Unit ($)	Ratio Relative to Texas Market-Rate Cost	Ratio of LIHTC to Market-Rate Cost Within Area	Share of Difference with Texas Explained by Cost of Living (within market rate or LIHTC sectors, %)
Texas	Market rate	4,440	1.0	–	–
Texas	LIHTC	3,131	0.7	0.7	–
Colorado	Market rate	6,502	1.5	–	34
Colorado	LIHTC	6,730	1.4	1.0	36
Los Angeles	Market rate	10,835	2.4	–	30 (61*)
Los Angeles	LIHTC	23,249	5.2	2.1	10 (16*)
San Diego	Market rate	10,267	2.3	–	31 (66*)
San Diego	LIHTC	10,835	2.3	1.0	30 (63*)
San Francisco Bay	Market rate	16,494	3.7	–	30 (51*)
San Francisco Bay	LIHTC	24,943	5.6	1.5	18 (28*)

NOTE: All dollar amounts are adjusted to 2019 dollars using approach outlined in the report and supplementary annex. Cost of living is measured using an index from AdvisorSmith (Mak, 2021) but is set to be relative to the index value for Texas. Explained share is calculated as the following ratio: the cost of architectural and engineering services in Houston multiplied by the index value minus the cost of these services in Texas over the actual cost of architectural and engineering services in the focal region minus the cost of these services in Texas. Amounts followed by an asterisk (in parentheses) reflect the share of variation explained under the assumption that 30 percent of the cost by financing status in the focal region is attributable to the specific state and local seismic requirements. These adjusted shares are how much cost-of-living differences can explain differences between the average cost for market-rate projects in Texas and the average cost in each California region minus this amount. This table was revised in April 2025 to correct some column headings.

These adjusted estimates (in parentheses in the same column) are meaningfully different from the unadjusted estimates. For San Diego, this seismic cost allowance raises the share of average fee differences that can be explained by these combined factors to roughly two-thirds of the difference for both market-rate and LIHTC projects. However, in San Francisco, the share of variation in adjusted fees explained by cost of living is still between 28 percent (LIHTC projects) and 51 percent (market-rate projects). In Los Angeles, this adjustment raises the explained fee difference for market-rate projects to 61 percent, but, even after making this seismic cost allowance, cost of living explains only 16 percent of the remarkably large architectural and engineering fee differences for LIHTC projects.

It may be the case that much of the additional costs in California arise from stringent building codes. This is another area where regulatory reform to bring California more in line with national norms could potentially directly lower costs. However, two regions—Los Angeles and San Francisco—are uniquely notable for the large difference between architectural and engineering fees for market-rate projects and those for LIHTC projects. There is no legitimate difference in terms of building safety or other key objectives or needs present in affordable housing that are absent in market-rate housing that could explain the more-than-50-percent-higher average fees in San Francisco and, particularly, the average fee difference within the Los Angeles metro region between these project types of more than 115 percent.

The most likely explanation is that policymakers have, over time, repeatedly added additional discretionary design requirements that have had substantial negative effects on cost. See Appendix C in the annex for examples of the requirements for design review to receive funding consideration from the Los Angeles County Development Authority. The other states in this study, Texas and Colorado, and the San Diego metro region do not have any notable difference in these fees by project type, suggesting that review and reform of design requirements for these projects could substantially lower project costs. For example, reducing the fee gap within the Los Angeles metro region between LIHTC and market-rate projects to zero would reduce the overall TDC difference between these projects in per-unit terms by more than 25 percent.

Municipal Impact and Development Fees

Municipalities commonly levy fees on new developments for direct costs, such as those associated with utility hookups for a new building or buildings. However, virtually all local jurisdictions in California also charge multiple fees for indirectly related costs, such as potentially increased attendance in local schools or the estimated effects of new development on traffic and other factors, including fees related to conjectured negative impacts of new housing on housing affordability, though such fees run counter to both economic theory and credible empirical evidence on the effects of increased supply on affordability (NYU Furman Center, 2023).

Jurisdictions in California assess these impact fees at roughly triple the national average, a development related in large part to the passage of Proposition 13, which greatly restricted the latitude of local jurisdictions to raise revenue through property tax levies (Stockinger et al., 2024). State law in California requires that these fees must be justified through nexus studies that establish an empirical link between the magnitude of the fee and the hypothesized effect it is aimed at addressing. But both research and state legislation have called into question the rigor of these studies (California Legislative Information, 2021; Cray, 2011; Terner Center for Housing Innovation, 2020) because they often justify fees that can vary by as much as an order of magnitude across geographically proximate, observably similar communities (Mawhorter, Garcia, and Raetz, 2018). Critically, large impact and development fees serve a direct role in limiting the financial feasibility of housing production, thus serving as a de facto exclusionary zoning mechanism (Been, 2005).

In contrast, Texas state law puts substantial limits on impact fees (Texas State Legislature, undated-a). In nearly all cases, these fees might only be charged for costs related to water and wastewater infrastructure, and the amount charged must be wholly dedicated to servicing debts or other contractual obligations related to this infrastructure. Additionally, water and wastewater impact fees might be partially or even fully offset by credits for the increased property taxes and utility revenue resulting from a new development or by up to one-half of the capital improvement costs associated with the project.

In Table 3.7, we present simple estimates of the average per-unit fee in each region. We use this approach rather than the more complex regression-based approach used elsewhere because these fees are generally levied at the per-unit level and are not contingent on building type.

Table 3.7. Metro Region–Level Municipal Impact Fees

State or Metro Region	Market Subsector (by Financing Type)	Cost per Unit ($)	Ratio Relative to Texas (Market Rate or LIHTC) Average	Share of Average TDC per Unit (%)
Texas	Market rate	816	-	0.6
Texas	LIHTC	1,196	-	1.2
Colorado	Market rate	12,088	14.8	6.1
Colorado	LIHTC	4,802	4.0	4.1
Los Angeles, California	Market rate	20,266	24.8	5.8
Los Angeles, California	LIHTC	14,292	12.0	3.6
San Diego, California	Market rate	36,992	45.3	14.3
San Diego, California	LIHTC	31,872	26.7	12.4
San Francisco Bay, California	Market rate	30,712	37.6	6.3
San Francisco Bay, California	LIHTC	14,609	12.2	3.0

NOTE: N = 115 (market-rate project n = 27, LIHTC project n = 88). All dollar amounts are adjusted to 2019 dollars using approach outlined in the report and annex. This table was revised in April 2025 to correct some column headings.

The average impact fee amount for market-rate projects in Texas is $816 per unit, while the average for LIHTC projects is $1,196. Municipal fees in Colorado for market-rate projects are nearly 15 times the Texas average ($12,088), while per unit fees for LIHTC projects are much lower ($4,802 per unit, or four times the Texas average).

Across both market-rate and LIHTC projects in California, regional average impact fees are 12 to 45 times the Texas average. San Diego market-rate projects have average impact fees of $36,992 per unit (45 times the Texas average), while LIHTC projects are only slightly lower, at $31,872 per unit (27 times the Texas average). San Diego impact fees are the highest in the sample for both market-rate and LIHTC projects.

Impact fees for market-rate projects in the Los Angeles region are around one-half the magnitude of San Diego, at $20,266 (25 times the Texas average). Fees for LIHTC projects in the region are notably lower at $14,292 (12 times the Texas average), likely due in large part to a substantial exemption from the Los Angeles Unified School District development fee for 100 percent affordable housing projects (Knott et al., 2005). San Francisco levies fees at a level similar to San Diego for market-rate projects ($30,712, or more than 37 times the Texas average) but has average fees that are less than one-half this size for LIHTC projects ($14,609 or 12 times the Texas average) because of various fee waivers (San Francisco Planning Code, 2024).

In the final column of Table 3.7, we attempt to further contextualize the size of these fees by presenting them as a share of TDC per unit for each region-by-financing type. Across all regions and finance categories in Texas, impact fees make up no more than 1 percent of TDC per unit, which, we note again, are the lowest per-unit costs in the sample. By contrast, market-rate fees in Colorado, Los Angeles, and San Francisco are 3 to 6 percent of TDC per unit, though per-unit costs for Los Angeles and San Francisco are the highest in the sample.

The San Diego region, because of its unique combination of high impact fees and low (for California) overall production costs, is a notable outlier. Impact fees represent more than 14 percent of TDC per unit for market-rate projects and more than 12 percent of TDC per unit for LIHTC projects. This suggests that San Diego has the potential to meaningfully lower costs if it can find more broad-based funding approaches to reduce reliance on these large fees.

Land Costs

Land is the one completely finite component of housing production. Leaving aside occasionally meaningful historical examples of making new land through land reclamation (Sengupta, Chen, and Meadows, 2018), new land cannot be created or destroyed, and, at least approximately, all the land that will ever exist in a local jurisdiction (assuming its boundaries do not expand) already exists. But, from the perspective of housing production, land can become relatively more scarce or plentiful through regulatory activities that restrict or allow residential use.

Although land costs are often a relatively small part of TDCs, variation in land cost is one of the most substantial factors determining the level of housing supplied because development projects are typically assessed for financial viability by estimating all the hard and soft costs, including the necessary profit margin to be able to attract financing and provide a sufficient return for the builder, then subtracting those costs (along with operating costs) from the potential income from a project's rental revenue. The amount left over is the *residual land value*, the maximum price the project can offer for a piece of land and remain financially feasible (Garcia, 2019). For this reason, even modest differences in land cost can make or break a project.

Table 3.8 presents a comparison of land costs with multiple measures of land use restrictiveness to demonstrate the strength of the correlation between land costs for housing production. We use the regression-based approach used elsewhere in this report to estimate average land costs at the per-unit level, but we limit the comparisons to market-rate projects to avoid potential biases from LIHTC projects tending to be built in lower-cost areas within a metro area and from the growth of programs providing subsidized land for these projects. To make land cost estimates easy to relate to a series of measures of land use restrictiveness that we introduce below, we follow the creators of these measures in using six core-based statistical areas (CBSAs) defined by the U.S. Census Bureau that nearly all the projects in our analysis sample (49 of 55 possible projects) fall into.

Table 3.8. Land Costs and Measures of Land Use Restrictiveness

Core-Based Statistical Area	Cost Per Unit	Ratio Relative to Dallas	WRLURI (2006)	WRLURI (2018)	Share of Highly Regulated Jurisdictions Within CBSA in WRLURI (2018)	Ratio of Average SFH Value to SFH Construction Cost (2016)
Dallas-Fort Worth-Arlington, Texas	$13,011	1.0	41	18	0.31	1.12
Houston-The Woodlands-Sugar Land, Texas	$23,366	1.8	38	32	0.25	1.54
Denver-Aurora-Lakewood, Colorado	$13,816	1.1	7	14	0.44	1.77
San Diego-Carlsbad, California	$37,574	2.9	20	17*	-	2.29
Los Angeles-Long Beach-Anaheim, California	$45,023	3.5	18	5	0.46	2.53
San Francisco-Oakland-Hayward, California	$135,122	10.4	6	1	0.78	2.98

SOURCE: Features data from Romem, 2017; and Gyourko, Hartley, and Krimmel, 2021.

NOTE: *N* = 50. SFH = single-family home; WRLURI = Wharton Residential Land Use Regulatory Index. To avoid confounding from programs aimed at lowering land costs for LIHTC projects, we restrict this analysis to land costs for market-rate apartment developments. All dollar amounts are adjusted to 2019 dollars using approach outlined in the report and supplementary annex. *Highly regulated jurisdictions* are defined in Gyourko, Hartley, and Krimmel (2021) as the share of local jurisdictions in a CBSA scoring in the top quartile of the WRLURI (2018) measure of regulatory restrictiveness.

* Gyourko, Hartley, and Krimmel (2021) excludes the San Diego-Carlsbad, California CBSA from the rank ordering of CBSAs because it had survey responses from fewer than ten municipalities (six municipal officials from the CBSA completed surveys) but reports that if it were included, it would have ranked 17th.

Estimates of the average land price range from a low of roughly $13,000 in the Dallas-Fort Worth-Arlington, Texas CBSA to costs an order of magnitude higher (more than $135,000) in the San Francisco-Oakland-Hayward, California CBSA. These costs also make up dramatically different shares of TDC per unit. For the Dallas CBSA, land costs are about 10 percent of the average per-unit cost for market-rate apartments in Texas. By contrast, the average land cost in the San Francisco area makes up 28 percent of TDC per unit.

The next two columns of Table 3.8 are rankings of the relative level of land use regulation from the WRLURI (Gyourko, Hartley, and Krimmel, 2021; Gyourko, Saiz, and Summers, 2008). This is a measure of land use restrictiveness derived from survey responses from more than 2,500 local municipal planning directors and administrative officers initially created in 2006 and updated in 2018. The ranked positions of the regions in our analysis sample from among CBSAs in terms of the restrictiveness of land use regulation are given in columns four (2006 index) and five (2018 index). In column six, we present an additional measure from the 2018 WRLURI that measures the share of local jurisdictions in each CBSA that fell into the top quartile of highly regulated housing markets.

Finally, we include a novel measure of restrictive land use regulation on prices: the ratio of the average price of existing SFHs to local estimates of new home construction costs (Romem, 2017). Greater land use restrictions tend to result in situations where the price of existing homes exceeds the local cost of building a new home, so that a value of two indicates that the cost of an existing SFH is twice the cost of building a similar new home. If we assume that, for example, the depreciated value of an existing SFH structure on a piece of land is 50 percent of the cost of a newly constructed home, then this would indicate that the local price of land alone is 1.5 times the total cost of constructing a new SFH in the area.

We can observe a high negative correlation between land prices and the rankings of relative land use restrictiveness in the WRLURI. The primary exception is for projects in our sample from the Denver-Aurora-Lakewood, Colorado CBSA, which is nearly equal to the lowest observed average land cost, though the region ranks relatively high in terms of land use regulation, at 7th in 2006; however the region was also the only one to decline in terms of its relative ranking in the 2018 index, moving down to 14th. The other six regions have a nearly perfect inverse relationship with the 2006 rankings. The 2018 rankings reflect increasing levels of regulation for all regions except for Denver, Colorado, perhaps indicating that other CBSAs have outpaced the Denver region in terms of becoming more heavily regulated housing markets over time.

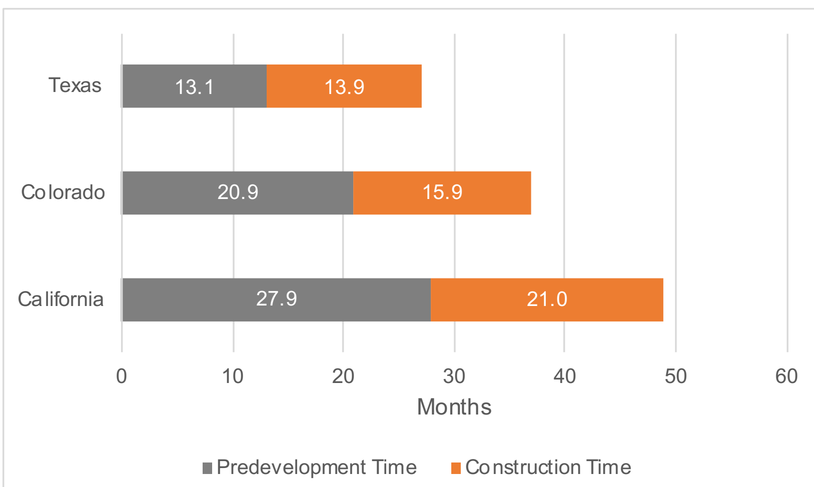
The share of highly regulated housing markets in each CBSA (column six) is nearly perfectly correlated with the ranking of land costs (the only exception being the Dallas-Fort Worth-Arlington, Texas CBSA, which is modestly higher than the Houston area despite being home to the lowest average land costs in our data. Finally, the ratio of existing house prices to replacement house prices in column seven is similarly well-aligned with our observed land prices, with this ratio nearly reaching three in the San Francisco CBSA.

Interstate Differences in Production Time for Market-Rate Apartments

Production time is a key cost driver for any housing production. Longer production times mean that, for example, equipment and workers must be on a job longer, land costs and property taxes must be paid without any realized revenue from the project, and borrowing to finance a project must be repaid over a longer time horizon. The two major phases of production are the predevelopment period and the construction period.

Figure 3.4 shows average total production time subdivided into predevelopment time and construction time for 50 market-rate projects in our data set (17 in California, seven in Colorado, and 26 in Texas) using the same regression framework used in our other analyses. The average predevelopment time in Colorado is 1.6 times the Texas average of 12 months, while the average predevelopment time in California is 2.1 times that of Texas. There is little difference between the average construction time in Texas and Colorado, but construction time in California is 1.5 times the Texas average. Overall, average project time in Colorado is 37 months, or 1.4 times the 27 months that Texas projects average in our sample, while California's average combined time is 49 months, nearly twice the Texas average.

Figure 3.4. Average Production Times by State for Market-Rate Apartments



In general, predevelopment time differences are related to approval processes (O'Neill, Gualco-Nelson, and Biber, 2018; O'Neill, Gualco-Nelson, and Biber, 2019). Many California municipalities handle these approvals very slowly, but such developments are also exposed to litigation under the California Environmental Quality Act (CEQA), which has been shown to not only substantially lengthen the timeline of affected projects, but the threat of facing a lawsuit related to CEQA also prevents many projects from being pursued. Blocking infill housing developments has been the most common use of CEQA in recent decades (Hernandez, 2022).

Construction time differences in California are often related to delays in the issuance of permits for approved projects and long waits for routine inspections to occur (California Department of

Housing and Community Development, 2023; Choi, 2024). But how much do these delays increase costs? We can provide preliminary evidence on this question through a regression model that uses the same structure of our other models in the study but adds a measure of combined production time.

Estimated Association Between Production Time and Total Development Costs for California Projects

Using a modification of our main regression model for state-level cost estimates, we can estimate the association between production time and TDC. Although this is not a causal estimate, it is an estimate that uses variation in time both between and within states while controlling for the project type and the number of units. Table 3.9 presents these associations as the estimated savings per month of production time in terms of TDC per unit and TDC per NRSF, with the relevant average TDC per unit in the column labeled Estimated TDC. We then calculate the savings associated with reducing the production time in California to the average production time in Texas and characterize this amount as a share of the TDC per unit in the second column.

These calculations suggest that reducing the production timeline by 22 months on average while holding other factors constant would reduce TDC by around 8 percent in California. But it is likely that the kinds of reforms that would lead to such a substantial reduction in production time (such as adopting the kind of state mandate to rapidly approve projects that is in place in Texas) would also have broader effects that would reduce costs in numerous other ways.

As an example, shortening timelines would have the implicit effect of growing the construction labor force because the existing workforce could work on many more projects in a given period because they would not being tied up for as long on one job. Shorter timelines would also tend to reduce the costs of leasing equipment, temporary structures, and other components of the "general conditions" category within hard costs. Faster production would also tie up capital for less time, potentially reducing the necessary average return on projects.

Table 3.9. Estimates of Production Cost Differences Associated with Shorter Production Time

	Estimated TDC Savings per Month of Production Time ($)	Estimated TDC ($)	Estimated Savings from Reducing Production Time to Texas Average	Reduction in TDC (%)
California (per unit)	1,284	343,012	$28,248	8.2
California (per NRSF)	1.44	415	$32	7.7

NOTES: *N* = 50. Estimates are a linear combination of production time and the interaction of production time and an indicator for the state of California. The combined estimate using TDC per unit as an outcome has a p-value of 0.116 (just outside statistical significance at the 90 percent confidence level), while the estimate using TDC per NRSF has a p-value of 0.029 (statistically significant at the 95 percent confidence level).

Chapter 4

Associations Between Multifamily Housing Production Costs and Rental Prices

The association between housing supply and rental prices is an area of increasing focus among policymakers as more households become burdened by high rental costs. A growing number of novel studies have shown that increasing supply either lowers the rate of rental price growth or may even lead to lower rent levels (Been, Gould Ellen, and O'Regan, 2024). However, there is less research considering the relationship between production costs and downstream rental prices. Economic theory is clear that increased supply leads to lower prices, but both theory and common sense suggest that projects will not go forward if they cannot be supported by a sufficient stream of income. Therefore, production costs should play an important role in rental prices, holding constant other supply and demand issues. Still, there is little empirical evidence on this relationship, largely because of a lack of quality data on production costs (Table 4.1).

Table 4.1. Estimated Elasticities of Rental Prices to Production Costs

Independent Variable	Elasticity	Model R^2	Includes LIHTC Projects	Sample Size
Log of TDC per NRSF	0.416*** (0.022)	0.765	Y	111
Log of TDC per NRSF	0.463*** (0.083)	0.562	N	26
Log of TDC per unit	0.451*** (0.023)	0.780	Y	111
Log of TDC per unit	0.447*** (0.080)	0.566	N	26

NOTE: These estimates are from a bivariate regression of the log of average rental prices from November 2023 through October 2024 on the log of either TDC per NRSF or TDC per unit. Standard errors are in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The data for this study can also be used to estimate a simple elasticity of observed rental prices to TDC—or the expected change in rental prices from a given change in total multifamily housing production costs. We do this by estimating a simple cross sectional regression model that regresses the natural log of rental prices (we use a 12-month average of metro-level multifamily rental prices from the Zillow Observed Rent Index from November 2023 through October 2024) on the natural log of either the TDC per NRSF or per unit for either a combined 111 market-rate and LIHTC projects or for 26 market-rate projects (as indicated) across the metro areas available in the Zillow data across the three states in our analysis (Zillow, undated). The results from this model are presented in Table 4.1. For each measure, we estimate this model first using the full sample, including LIHTC projects, and then using only the privately financed market-rate housing sample.

The estimated elasticities are highly consistent regardless of the specific cost measure used or whether we include publicly funded, income-restricted affordable housing developments. The mean elasticity across the four estimates is 0.44, meaning that a 10 percent increase in production costs is associated with a 4.4 percent increase in rental prices. These estimates are highly statistically significant, and the explanatory power of these models is high (for the full sample estimates, this very simple model explains more than 75 percent of the observed variation in rental prices across these regions).

It is important to note that this is not a causal estimate, as high production costs influence (and have likely influenced in the past) the number of housing units produced, so that high production costs affect rents both directly and indirectly. This estimate captures the combined effect of production costs and current excess housing demand resulting from underproduction at a minimum. Future research leveraging discontinuous changes in production costs that could be causally associated with changes in rent would be a major contribution to housing policy research.

However, given the lack of credible estimates linking production costs to rental prices, these elasticities may provide a useful point of comparison for better identified future research on this question. As a thought experiment, if we are willing to take these estimates as reflecting a causal relationship, we can apply this elasticity to potential rental price changes from lowering production costs in a high-cost region like Los Angeles. Consider the possibility that some concentrated reforms to zoning, land use, and municipal fees could reduce the cost difference between the Los Angeles metro area and Texas by one-half. The average TDC in Los Angeles is $613 per NRSF, and the average TDC across the three regions in Texas is $219 per NRSF. Reducing this gap by one-half would be a reduction in production costs of 32 percent. If we directly apply the average elasticity in Table 4.1, such a decline would reduce feasible rental prices by 14 percent, or roughly $363 from an average of $2,577 per month.

Future research that tracks how rents in new developments are associated with changes in production costs related to policy reforms or other unexpected cost changes for those specific developments would greatly contribute to a stronger evidence base on this important link.

Chapter 5

Conclusion

This report provides previously unavailable data and analysis to assist policymakers and stakeholders in developing a better understanding of the high costs of housing production in California and key factors that drive them. Better understanding these costs is a key requirement for developing housing policy reforms that can directly contribute to increased affordability.

Many of these costs among market-rate and, particularly, LIHTC projects are related to discretionary regulatory policies at both the local and state levels, such as energy efficiency requirements or the complex and prescriptive design requirements for publicly subsidized affordable housing. Although these regulations may be well-intentioned, they directly increase production costs and, consequently, decrease housing affordability.

Takeaways from State-Level Comparisons

In our analysis, Texas was the lowest-cost state across all regions and virtually all cost categories. Relatedly, average rental prices in Texas are slightly more than one-half as much as the average in California. How does Texas achieve lower costs? Discretionary local impact fees are dramatically lower in the state, at least in part because of strict state oversight of these fees. But substantially lower levels of regulation overall and state policies that tightly constrain approval times likely play the most important role. Texas state law requires that counties review and issue or deny a building permit within 30 days (Texas State Legislature, undated-b). This is in stark contrast to project approval times as calculated in multiple Southern California jurisdictions using data from 2014 to 2016, which ranged from a low of roughly 11 months in Long Beach to 48 months in Santa Monica (O'Neill, Gualco-Nelson, and Biber, 2019). Additionally, proposed projects in Texas not approved or denied within 30 days are presumed to be approved.

A state law limiting the time for local jurisdictions to approve or deny housing would be a powerful reform. Our analysis suggests that reducing development time in California to the average observed in Texas while holding all other factors constant would lower costs of market-rate projects by 8 percent. But the cost reduction would likely be greater because of its effect on other factors that would in turn be affected more broadly by shorter timelines. Los Angeles' recent experiment with a sharp reduction in approval times for 100 percent affordable housing developments suggests that such a reform could have much larger pro-supply effects (Ward, 2024b). Further emulating Texas law by changing the default assumption for housing developments to one of approval rather than denial would also have a substantial effect given recent evidence from the use of California's *builder's remedy*—the suspension of local land use and zoning rules and the temporary substitution of presumed approval for any submitted project that includes 20 percent or more affordable units and does not pose an immediate threat to public health or safety—on jurisdictions that have failed to meet state goals around planning for more housing production. The recent imposition of this rule has led to the rapid proposal of thousands of new housing units in Southern California (Christopher, 2023; Vincent and Dillon, 2024).

Labor costs also play an important role in overall production costs, though labor costs and housing are linked, so causality runs in both directions (high labor costs cause high housing costs, and high housing costs cause high labor costs). However, for LIHTC projects, rules requiring the payment of union-level wages explain roughly 40 to 60 percent of the difference in hard costs with Texas.[19] There does not appear to be any real debate at the state or local level about relaxing these requirements; indeed current policy debates on this subject have increasingly focused on requirements to use substantial shares of unionized construction labor on even small, affordable housing projects as a condition of funding (City of Oakland, 2024; Lenney, 2024; Tobias, 2021).

If addressing high labor costs in the publicly subsidized housing sector is not up for debate, policymakers concerned about the skyrocketing costs in this subsector of the multifamily housing market and the negative public perceptions that these costs engender (Dillon and Poston, 2022; Janoski, 2024) should focus on any and all other means to control costs so that the large sums of public money spent on these projects can produce the most housing units possible.

There may be costs to lower regulation. For example, homes built with less-stringent energy efficiency requirements may have a larger carbon footprint. But the data do not provide strong support for this concern. In 2020, the average home in Texas used about 20 percent more energy than the average home in California. The mean year of construction for apartment buildings of ten units or more is 1972 in California, 1985 in Colorado, and 1988 in Texas.[20] Even if lowering California energy efficiency standards resulted in more new homes that were less efficient on average, these buildings would be an alternative to an existing multifamily housing stock in California that is more than a half-century old on average.

Takeaways from Regional Comparisons Within California

We have also highlighted large differences in production costs across California metro regions, including between two geographically proximate metro regions, Los Angeles and San Diego. These results suggest that even with a common set of state-level conditions, local policy plays a large role in production cost differences. San Diego's cost advantages over Los Angeles are particularly noteworthy in light of the region's remarkably high impact and development fees. Among large metro areas, San Diego should be studied to identify potential housing policy reforms—one example is the 2019 elimination of minimum parking requirements for new housing (Mantle and Denkmann, 2019)—for other California jurisdictions to consider.

[19] There is economic theory that posits a link between paying higher wages and observing higher productivity, the *efficiency wage* hypothesis, but we are unaware of credible empirical evidence exploring this possibility in the construction industry. And any productivity gains might be offset by reduced competition to bid these jobs, as many contractors appear to lack the capabilities or the desire to take on the substantial compliance costs associated with these requirements, leaving those willing to do so able to charge a premium for taking on these financial and logistical costs (a very basic prediction of economic theory). The often-substantial monitoring costs associated with prevailing wage requirements (the average in our data was $153,000 per project in 2019 dollars, or around $1,000 per unit for an average-sized LIHTC project) are an additional source of higher soft costs.

[20] Author calculations from pooled 2018–2019 American Community Survey data from IPUMS (Ruggles et al., 2024).

The San Francisco Bay area's outlier high costs across nearly all analyses in this study suggest that it may have the greatest capacity for positive reform, though many question the political will of the city (and other local jurisdictions in the region) to lower housing production costs. San Francisco abounds with denials of infill multifamily housing even, for example, when a project is proposed on an existing parking lot and complies with requirements to provide shares of income-restricted affordable units as high as 20 to 25 percent (Kukura, 2021; Wright, 2022). The city's housing system has been called "rotten to the core" by California State Senator Scott Weiner, a resident of San Francisco and a former city councilmember. Weiner has urged California to sue the city to force compliance with state housing goals (Gaus, 2022).

Although our analysis indicates that market-rate housing production costs in Colorado are more expensive than those in Texas, they are lower than any region in California, and Colorado appears to excel at producing low-cost LIHTC housing even relative to Texas. Colorado does appear to have taken a serious stance as a state on lowering housing costs. Current governor Jared Polis recently led efforts to pass a notable package of state-level housing policy reforms, but the costs we consider here predate these reforms, suggesting that there may be longer-standing regulatory or structural economic factors in the state worth studying (Brey, 2024).

The results of this research suggest multiple reforms that could contribute to lowering housing production costs and increasing affordability in high-cost states such as California:

- Adopt large-scale upzoning to lower per unit land prices and increase overall production. Recent large-scale reforms in both the United States and abroad have shown the effectiveness of this approach (Büchler and Lutz, 2024; Greenaway-McGrevy and Phillips, 2023), even when the magnitude of the reforms is modest, such as allowing duplexes or fourplexes where only SFHs were previously allowed (Hamilton, 2024; Staveski and Horowitz, 2023). The recently adopted Citywide Housing Incentive Program in Los Angeles is a prime example of a missed opportunity in this regard, as policymakers opted to exempt more than 70 percent of residential land from upzoning, a decision that appears likely to assure that the city does not meet its ambitious state target for housing production set under California's 6th cycle Regional Housing Needs Assessment (Barrall and Phillips, 2024).
- Policymakers should focus substantial effort on reducing approval and permitting times, reducing waiting periods for inspections, and adopting common sense reforms such as scheduling coordinated rather than sequential inspections wherever possible. The recent wildfire disaster in the Los Angeles region has led California Governor Gavin Newsom to waive multiple discretionary approval processes to facilitate the region's recovery from the destruction of more than 10,000 homes and buildings as of mid-January 2025 (Office of Governor Gavin Newsom, 2025). This can provide an important test case to take a hard look at whether these requirements should be relaxed or waived more broadly to help the state meet critical housing goals.
- Policymakers can directly lower costs by seeking alternatives to high impact fees; these fees serve as an implicit tax on housing and are nearly always inversely related to housing affordability—i.e., they are largest where housing is the least affordable. In San Diego, for example, impact fees are nearly 13 percent of total costs, and San Diego is the lowest-cost region we studied. This suggests that there is meaningful latitude to directly lower production

costs in the region. Where there is no clear alternative, impact fees should be carefully scrutinized to ensure that they are appropriate for the very specific impacts that they are meant to address. Relatedly, a recent Supreme Court ruling on California impact fees suggests that the common approach of relying on these fees to fund a broad array of infrastructure investment may face additional scrutiny in the future (Robinson and Golub, 2024).

- LIHTC projects are persistently more expensive than even high-end market-rate projects in California. Although some of these differences may be attributable to poor incentives for developers to manage costs, they are likely driven in large part by highly prescriptive requirements from state, local, and regional funding programs (see Appendix C of the supplementary annex of this report), though these programs are typically providing much smaller shares of total project costs. State and local lawmakers should undertake a thorough review of such requirements, particularly requirements related to aesthetics, basic building needs, and life safety, so that scarce public dollars can produce more of this critically needed housing at reasonable costs.
- More broadly, in the current period of state and local budget shortfalls, the attention of legislators and other policymakers may be best directed at sensible, actionable reforms to policy that can increase housing production without requiring increases in public spending. Examples of how simple regulatory reforms can spur large changes abound (Christopher, 2024). There are also examples of expensive regulatory requirements that support costly, cumbersome changes such as requiring the piecemeal widening of roads in front of new developments that appear to provide little value (Times Editorial Board, 2024). Many small reforms can add up to large reductions in production costs and related large increases in affordability.

Abbreviations

CBSA	core-based statistical area
COLI	cost-of-living index
COVID-19	coronavirus disease 2019
LAHD	Los Angeles Housing Department
LIHTC	Low Income Housing Tax Credit Program
NRSF	net rentable square foot
SFH	single-family home
TDC	total development cost
WRLURI	Wharton Residential Land Use Regulatory Index

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