

## **Zoning change: Upzonings, downzonings, and their impacts on residential construction, housing costs, and neighborhood demographics**

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### **Abstract**

Many policymakers concerned about high housing costs argue that easing development through altered land-use regulations can increase building, thereby boosting affordability and reducing segregation. I develop a framework to explain links—sometimes contradictory—between upzonings and construction, prices, and demographics. I evaluate scholarship and compare findings with research on downzonings impeding development. Evidence indicates that upzonings offer mixed success in terms of housing production, reduced costs, and social integration in impacted neighborhoods; outcomes depend on market demand, local context, housing types, and timing. Research on regional upzoning impacts is nascent but outcomes appear positive. Downzonings limit construction and worsen affordability.

## Introduction

The decline in housing affordability throughout much of the wealthy world (Wetzstein 2021), combined with metropolitan segregation (Musterd 2020), have encouraged a burgeoning interest in identifying strategies to reduce living costs while ensuring access to quality public services. Some emphasize the need to expand affordable housing subsidies. Others highlight incentives-based programs like inclusionary zoning mandates requiring a minimum level of affordability in new market-rate housing construction (Hamilton 2021).

Reforms of land-use regulations—usually managed by local governments—also generate excitement among those hoping to address housing affordability, particularly in the United States. Those advocating for change argue that restrictive zoning codes, like those limiting construction to single-family homes, are widespread and were introduced partly to enforce racial segregation (Goetz 2021). They emphasize that comparative analyses demonstrate correlations between such restrictions and less construction, higher costs, and less integration (Glaeser & Ward 2006). As such, they call for regulatory liberalization. They have succeeded in rezoning cities like Minneapolis and states like California (Pendall et al. 2022; Wegmann 2020).

Despite this interest in leveraging zoning reforms to spur construction and increase affordability, until recently there has been little research on these changes' effects. While a large cohort of studies compares static land-use regulations across regions and within cities, this line of research does not evaluate outcomes following *changes* in such regulations. Many rezonings occur following developer requests related to a project. But proactive efforts that public officials use to spur real-estate market responses—those efforts on which I focus here—are those most relevant to policymakers seeking to intervene through planning.

Fortunately, a budding realm of research explores regulatory changes—both those that increase and reduce allowed density—and their effects. Understanding variations in how reforms

produce outcomes makes all the difference in determining policy effectiveness. In this review, I examine studies that have teased out downstream effects of proactive zoning. Though rezonings evaluated vary in form and areas impacted (e.g., in terms of housing types allowed and local real-estate markets), this research nevertheless represents a substantial and cohesive body of work. These studies provide new information about zoning’s impacts, beyond the comparisons of static zoning policies that previously constituted most such research.

I conducted this review by examining all peer-reviewed empirical English-language research on housing-related land-use regulatory *change* that I could identify, as of spring 2023 (Appendix A summarizes each study). I used keyword searches<sup>1</sup> to create a database of articles and working papers, then examined references to fill gaps. I classified studies based on areas of study (effects on construction, costs, and demographics) and analyzed based on context (location, real-estate market, and rezoning scale). I included all with relevant findings here.

These studies generally use quantitative methods, though some use qualitative approaches. Most explore “upzoning”—increasing allowed development and reducing “restrictiveness,” such as by authorizing larger buildings—with a few examining “downzoning,” the opposite. For perspective, I describe a selection of highly referenced articles exploring static zoning comparisons. I develop a framework for theorizing how rezonings influence housing-related outcomes, showing the multiple possible, and sometimes contradictory, avenues for reforms to influence housing markets. While these studies vary in the degree to which they disentangle rezoning’s effects from *why* certain areas were selected for changes (e.g., neighborhood support or economic development potential)—they nonetheless provide key data on how land-use rules influence the built environment.

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<sup>1</sup> I searched for the following terms on Google Scholar: Upzoning, downzoning, zoning change, zoning reform, land-use reform.

Overall, this review shows that upzoned areas may or may not experience increased housing construction over the short-term but likely experience small increases over the long-term, compared to areas without such changes. Researchers largely conclude that reducing development constraints increases property values, particularly for parcels ripe for development. Downzoning policies are largely associated with reduced construction and less affordability. I identify mixed evidence for rezoning's impacts on demographic composition of impacted communities. Effects are market-dependent and vary by reform scale. Early data suggests that upzonings generate positive effects on regional construction and affordability, but more research is needed.

### **The rise of land-use reform**

Many economists and planning scholars argue that exclusionary zoning should be eliminated or weakened, building on the rising consciousness of the racism and classism that justified these regulations' implementation, plus their negative impacts on housing availability (Manville et al. 2020). Planners and elected officials across the United States used zoning at the outset of the 20<sup>th</sup> century to enforce segregation by income and race (Whittemore 2021). Wealthy communities have historically used strict land-use rules to maximize property values and minimize tax burdens, while inhibiting non-white people from moving in (Trounstein 2020). Zoning policies limiting construction to large-lot single-family homes are widespread and help explain low housing production in many in-demand municipalities (Murray & Schuetz 2019).

Worries over affordability, too, have fueled interest in upzoning, driven by the premise that allowing building could reduce inequality, partly by enabling affordable housing developers to circumvent restrictions (Wegmann 2020). Upzoning could also allow new market-rate development, enabling existing housing to “filter” down to moderate- and low-income families,

increasing overall affordability.<sup>2</sup> These reforms could encourage infill development—though they do not ban construction elsewhere, unlike growth controls, which downzone affected areas (Ewing et al. 2022).

Despite these arguments for altering land-use regulations, proactive rezonings are likely uncommon (Stacy et al. 2023). Instead, rezonings are generally initiated by developers looking to build in ways not otherwise allowed “by-right” (Gabbe 2019b) or leveraged by localities to extract public benefits (Kim 2020).<sup>3</sup> Developer-initiated rezonings do not reflect the broader interest in using land-use regulations to increase affordability and reduce inequality. Such larger, ideologically driven efforts require proactive action by governments leading the market, not following it.

When localities engage in land-use regulation, they have multiple motivations for maintaining rules or altering them. Rural areas may seek to prevent development to avoid future service costs. Urban areas may desire building to support the economy (Rothwell & Massey 2009). *Within* an individual community, Gabbe (2018: 289) finds municipalities rezone pragmatically, where “the path of development opportunity” (underbuilt communities) “combine[s] with least political resistance” (communities with fewer homeowners and poorer-performing schools). Single-family-home neighborhoods are rarely touched (Gabbe 2019a). Been et al. (2014) argue that a “homevoter” theory of change dominates in rezoning: Residents seek to preserve home values by convincing officials to limit change. When changes do occur, though, what are their consequences?

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<sup>2</sup> Some argue that zoning reforms reproduce current inequitable distributions of wealth and access to opportunity (Wetzstein 2022); land-use reform becomes a state-fueled gentrification process designed to build local tax bases in the context of declining intergovernmental transfers.

<sup>3</sup> In examining changes in survey results on municipal zoning from 2006-18, Gyourko et al. (2021: 11) note, “the first truly noteworthy feature apparent from comparing results across the two surveys is not a change at all, but the absence of change.” But Pendall et al. (2022) find that about half of localities that responded to survey questions in 2003 and 2019 altered maximum allowed densities; rezonings may be more frequent than generally acknowledged.

## **What differentiates the study of zoning *change*?**

I focus on work investigating the *effects of zoning changes* on housing construction, residential costs, and demographics. While indicative of what zoning changes might produce, studying zoning as if it were static—such as by associating zoning today with changes in community demographics—is nevertheless inadequate. First, localities alter zoning policies. Second, conditions like demographics and buildings reflect *past* zoning policies that have been “grandfathered in.” Third, given that many projects are approved through flexibility measures, even the by-right zoning code may not be completely relevant to current projects.

Studying static comparisons between zoning regulations and outcomes also suffers from major concerns about endogeneity. This is to say, we do not know if zoning regulations produce measured outcomes or, rather, if measured outcomes encourage political actors to develop zoning approaches. Even if we examined the long-term effects of unchanging zoning patterns, we may reflect outcomes from other circumstances, such as non-zoning policies or real-estate market conditions.

Studying rezonings, however, is a useful mechanism to assess the impacts of land-use rules because we can directly connect changes in public policy with changes in outcomes—while holding baseline conditions, like the political or economic environment, constant. Though rezonings may often be implemented for endogenous reasons (e.g., in response to affordability problems), several recent studies attempt to disentangle that endogeneity using causal methods. The primary mode of zoning change studied is upzoning, changes in regulations allowing more construction than previously permitted, such as increasing allowed floor area, heights, and

densities, or eliminating single-family-only zoning to allow multi-family housing.<sup>4</sup> Fewer studies examine downzonings, changes in regulations *reducing* what developers can build.

The reforms reviewed were proactive in form, undertaken by localities interested in shaping development (Denoon-Stevens & Nel 2020). The focus on proactive planning is important, first, because it addresses the contemporary interest in increasing housing affordability. Second, proactive rezoning offers an opportunity to shape the future, while developer-initiated rezoning is largely reactive. I concentrate on housing policy, so I minimize consideration of rezoning's impacts related to purposes such as commercial or industrial uses.

Studying zoning change is different from studying the impact of *increasing housing supply*. Phillips et al. (2021) examine several econometric working papers generally showing that additional market-rate housing reduces costs nearby. The breadth of evidence shows that adding supply moderates price increases, though it is insufficient to achieve affordability for low- or moderate-income families (Been et al. 2019). Zoning changes, meanwhile, can influence housing availability, but also alter prices by changing what can be developed on a parcel while influencing what amenities investors anticipate in the surrounding neighborhood.

### **Dimensions of proactive zoning change**

Proactive zoning change can be undertaken to pursue varying goals. Postwar, many U.S. cities downzoned for neighborhood “protection” or segregation (Morrow 2013). And zoning reforms can be undertaken not only to alter allowed density, but also to mandate design requirements or include amenities. I focus on research on rezonings designed to increase or decrease allowed housing density.

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<sup>4</sup> Parking minimum reductions may also be defined as a form of upzoning, since they may allow more building on a lot of the same size, but I do not examine their impacts in detail here.

Table 1 is a typology of housing-related, proactive rezonings with examples of recent studies testing their impacts. Several implementation avenues are possible. One is altering the zoning map, changing one or more parcel’s underlying zoning district; upzoning might redesignate a neighborhood from single-family-home-only R-1 to D-12, allowing 500-foot-tall, mixed-use buildings. Another is altering the zoning text, amending it to allow 500-foot-tall buildings in R-1 districts. A third approach is creating overlay districts, allowing towers in transit-adjacent R-1 zones.

Table 1. Typology of housing-related proactive zoning changes

<b>Concept</b>	<b>Type</b>	<b>Recent study example</b>
Implementation avenue	Zoning map change	Gabbe et al. (2021)
	Zoning text change	Zhou et al. (2008)
	Overlay district	Atkinson-Palombo (2010)
Geography affected	Spot rezoning	Kim (2020)
	Neighborhood/area rezoning	Been et al. (2016)
	Citywide rezoning	Lo et al. (2020)
	State-level rezoning	Limb & Murray (2022)
Building district affected	Single-family homes	Kuhlmann (2021)
	Multi-family homes	Freemark (2020)
	Accessory dwelling units	Gerecke et al. (2022)
	All housing	Greenaway-McGrevy et al. (2021)

*Source: The author, based on a review of the scholarship.*

Zoning changes occur across a variety of geographies. “Spot” changes target specific parcels, typically responding to developer interest. Map changes may affect parcels or neighborhoods; overlays can be implemented in certain neighborhoods (e.g., historic districts) or citywide (e.g., transit areas). Finally, text changes can be implemented citywide (e.g., R-1 districts).



Rezoning impact different sorts of neighborhoods. Some only involve single-family-home districts (e.g., allowing three-unit buildings); others only affect housing in multi-family districts (e.g., highway-adjacent apartments). Others target construction of accessory dwelling units (ADUs), small-scale residences located within or adjacent to existing homes. This variety in rezoning types—and the possibility that they can be implemented differently in each community—makes studying their impacts and comparing changes challenging.

*Zoning impacts*

Zoning reforms affect real-estate markets and neighborhoods in a variety of ways (Table 2). If a change allows more housing, developers could redevelop at higher densities. The type of construction could vary; allowing bigger buildings could mean more units—or replacing small single-family homes with large ones.

Table 2. Potential housing-related zoning change impacts

<b>Indicator (in areas rezoned or overall)</b>	<b>Recent study example</b>
Construction level change	Dong (2021)
Types of construction change	Greenaway-McGrevy & Phillips (2022)
Property value change	Kuhlmann (2021)
Rent change	Anagol et al. (2022)
Demographics change	Davis (2021)

*Source: The author, based on a review of the scholarship.*

Rezoning could alter property values; investors may alter their willingness to pay for land based on what they can develop (this is their option value). Changes in property values may also reflect anticipated future amenity effects. A neighborhood with mixed-use zoning could become more valuable as landowners conceive of future nearby retail. Value changes could influence

affordability, in terms of rents and per-unit housing prices. This indirect impact would reflect increased land costs absorbed by landlords upon purchase, in paying property taxes, or in assuming amenity effects.

Finally, reforms could impact demographics. A change that reduces costs could produce more neighborhood diversity neighborhood. One encouraging building could displace existing residents of low-quality homes ripe for demolition—or offer opportunities for affordable housing construction.

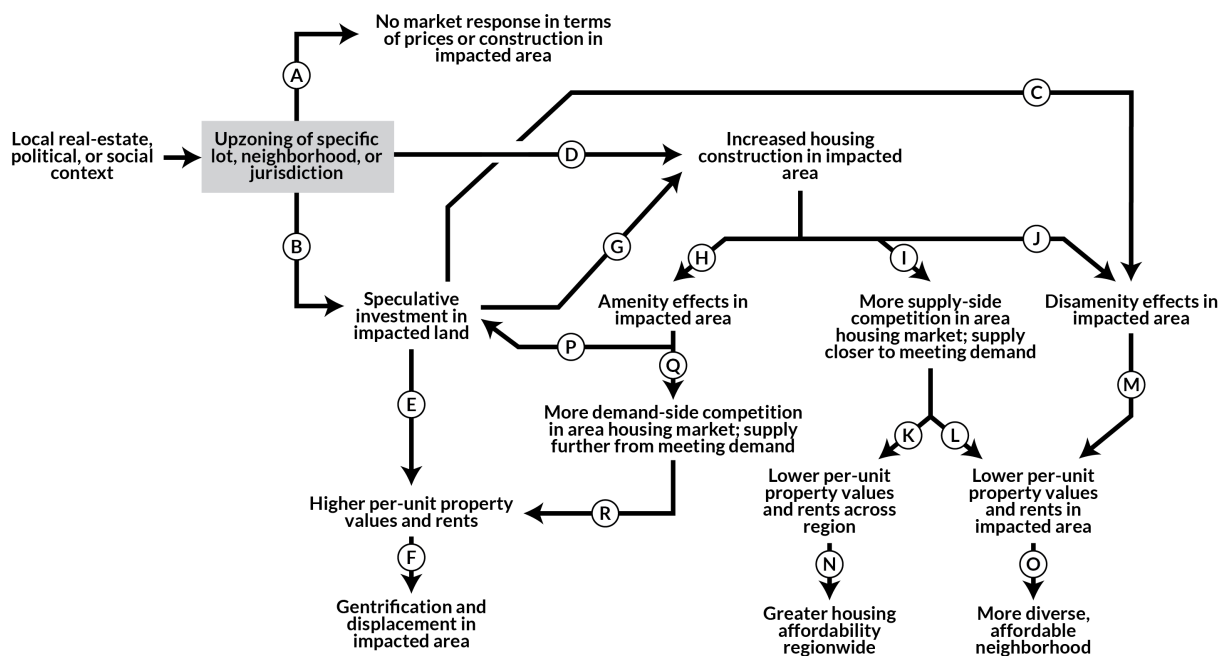
Reform effects may depend on the characteristics of the places where they are implemented (Zhu et al. 2021). Reforms in communities with high demand, limited supply, and tight preexisting regulations, for instance, could produce building sprees. Similar reforms in economically depressed communities could result in no construction. Each indicator can also be measured temporally. Interested property buyers must acquire knowledge about the change, whose announcement may come months or years before implementation. Selecting an architect, filing for building permits, hiring contractors, and construction can take years. Demographic change takes longer.

The indicators presented above influence one another. For example, upzoning may affect housing availability. Changes in housing supply may, in turn, impact costs, and thus affordability. This makes it difficult to separate reform outcomes from one another—especially over extended periods and when other changes are implemented simultaneously. And upzoning is likely produced by a community’s real-estate, political, and social contexts (e.g., Gabbe 2018); given the example of recent debates over such policies as Minneapolis’, it may take an extraordinary local environment to upzone. As such, effects may be endogenous to development

demand and raise measurement difficulties; in designing research to examine rezonings, then, scholars must be carefully ensure that comparisons account for these concerns.

I illustrate a simplified array of possible causal chains set off by an upzoning (Figure 1). Inspired by research reviewed below, I show potential causal paths, highlighting outcomes related to construction, costs, and neighborhood demographics. These non-mutually exclusive paths could be followed simultaneously—or occur at different points of time and in different geographies. Some outcomes relate to the specific neighborhoods rezoned and others to regional housing markets. Which effect dominates depends on policy and real-estate environments. The figure is not all-encompassing; there could be other outcomes—or connections not shown.

Figure 1. After upzoning: Potential scenarios



Source: The author, based on a review of the scholarship.

Upzonings can have varied implications for the neighborhoods impacted (Figure 1). One possibility is no market response (A), reflecting an underlying lack of development interest in affected areas (the option value of for properties is unchanged because there is no market for construction). Other possibilities are speculative investment in impacted neighborhoods (B) and/or increased construction (D). Upzoning-induced speculation may produce disamenity effects, such as though developers choosing to purchase land and then letting it remain vacant and unattended as they wait for the market to catch up with potential future development (C).<sup>5</sup> Alternatively, such speculation could produce increased construction (G) and/or mean higher per-unit property values and rents (E), eventually resulting in gentrification and displacement in impacted areas (F).

Construction, in turn, could have multiple effects: First, it could increase quality of life (H), which could encourage investment (P) or more demand (Q), which could then mean higher property values and rents (R). Second, construction could produce supply-side competition (I), reducing housing costs regionwide (K) and (N), and/or in the impacted area (L), ultimately producing a more diverse, affordable neighborhood (O). Third, construction could drive disamenity effects (J), lowering housing costs (M).

This multiplicity of causal flows is hypothetical; there is inadequate research to fully identify the degree to which any effect outweighs another, particularly over different time periods. Recent scholarship described below offers clues, but sorting out effects—regulatory outcomes from demand-side pressures, market preferences, and demographic changes—is

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<sup>5</sup> Some landowners leave land vacant because of high taxes on buildings and low taxes on vacant land, waiting for a future when development is worth more. See Konrad Putzier (2022), “Housing Shortage Reflects the Cheap Cost of Holding Vacant Land,” *The Wall Street Journal*, November 22.

admittedly a challenging task. As such, I acknowledge the limitations both in this simplified mapping of zoning reform's potential consequences and of any research attempting to assess it.

*What kinds of changes might we expect from upzonings and downzonings?*

Economic theory posits that limiting allowed construction (downzoning) reduces building, while loosening controls (upzoning) encourages it. Consider the following examples. In the 2000s and 2010s, New York City upzoned communities such as the East River waterfront to allow for massive residential development and downzoned elsewhere (generally neighborhoods with more white inhabitants) (Armstrong et al. 2010). Kober (2020) finds that construction quickly followed upzoning. Schuetz (2020) examines the concentration of recent building in Washington, D.C. 80 percent of housing permitted was in 10 percent of tracts, many in communities where upzoning had occurred, such as Navy Yard. Gray & Millsap (2020) explore changes following Houston's reduction in minimum lot area rules; they find projects leveraging this change, especially in relatively underbuilt middle-income neighborhoods. Freemark (2021) identifies similar connections in the Paris region, which doubled housing production between 2015 and 2017, coinciding with new national zoning rules eliminating floor-area ratio maximums. These findings suggest that upzoning expands housing production. But they do not use causal analysis, nor isolate rezonings from other independent variables or clarify how quickly a zoning change has impacts. Thus the need to specifically consider research that undertakes such assessments.

*What do we know from static comparisons of land-use regulations?*

Another set of studies delve into static comparisons of zoning policies, which do not evaluate zoning *change* so much as outcome differences between neighborhoods or municipalities. These types of studies, as noted, suffer from concerns about the endogenous

relationship between land-use policy and outcomes, but they nevertheless have until recently constituted most relevant scholarship, What do they say about links between zoning and housing construction, costs, and demographics?

The balance of evidence shows that stricter regulations are associated with less construction and higher housing prices. Glaeser & Ward (2006) find that higher single-family-home lot size requirements correlate with less building. Mayer & Somerville (2000) find that metropolitan areas with more restrictive regulations have less production, though they do not investigate differences between municipalities, where land-use regulations are generally written (Fratantoni et al. 2021). Filling this gap between metropolitan and municipal conditions, Pendall (2000) examines 1,000 U.S. localities, finding again that low-density zoning is associated with less building. Chakraborty et al. (2010) find stricter zoning limits construction below market demand. Dong (2021) finds that underdeveloped parcels in higher-density zones are more likely to be developed, at higher densities, compared to similar parcels in lower-density zones.

Researchers have also associated regulatory constraints with prices. Showing that higher housing costs result from high land costs, Glaeser & Gyourko (2018) argue that zoning regulations constitute a tax that increases prices. Glaeser & Ward (2006) find that other regulatory barriers, such as septic rules, are associated with higher costs. Several studies demonstrate higher housing and land prices in communities with stricter regulations (Kok et al. 2014; Quigley & Rosenthal 2005; Wassmer & Williams 2021).

Dong & Hansz (2019) emphasize that the link between land-use regulation, development, and sales prices is market- and demand-dependent. Home purchasers pay a premium in communities with higher-density zoning because of nearby amenities. Higher-density zoning also sometimes allows home builders to construct larger homes on smaller lots, which does not

reduce prices. Landis & Reina (2021) show that stricter regulations correlate with higher rents—though they have little impact in metropolitan areas with low incomes and job loss. Strict regulations are not associated with faster cost *increases*, which are more closely related to local economic conditions.

Several scholars probe the demographic implications of land-use regulations. Pendall (2000) describes a “chain of exclusion” that links low-density zoning with lower rental housing availability, and ultimately fewer people of color. Rothwell & Massey (2009) show that low-density zoning limits the quantity of affordable housing and increases Black residential segregation. Yang (2021) finds that metropolitan areas with more restrictive land-use rules are less likely to attract Black workers in response to labor demand. Lens & Monkkonen (2016) find that land-use regulation is associated with wealthy and middle-income people self-segregating, a form of hoarding by wealthy communities (Freemark et al. 2020). Chakraborty et al. (2010) emphasize that communities with more white residents decades ago have stricter zoning today, suggesting a multi-generational link between zoning and neighborhood composition.

Most of the scholarship in this strand of literature fails to establish a causal link between zoning and outcomes, to a large degree because of the endogenous relationship between community characteristics and choices about regulating housing (Quigley & Rosenthal 2005). Note Chakraborty et al. (2010: 438), “studies showing that land use regulations increase land or housing values cannot identify whether regulations cause prices to rise as a result of amenity creation or artificial supply constraints.” People may be willing to pay more to live in communities with stricter regulations.

That said, several recent static zoning comparisons use causal methods, such as boundary discontinuity designs (Kulka et al. 2022) and effect decomposition (Severen & Plantinga 2018).

These may produce high-quality estimates, but I do not examine them further as I focus on zoning *changes*. Given the paucity of research on the long-term effects of rezonings, we do not yet have the information to evaluate whether such research would produce similar results as such static comparisons of zoning policies.

### **Estimates of zoning change impacts**

I thus now turn to evaluating the research on proactive zoning change. What do we know about its effects? I seek to answer three questions derived from Table 2's indicators. First, to what degree do reforms increasing allowed construction influence housing production? Second, how do they alter property values, sales prices, and rents? And third, how do they influence demographics, given concerns that exclusionary zoning has historically produced segregation? Most research focuses on upzoning, but I describe results of the small number of downzoning studies when relevant, as well.

For each question, I seek to underscore what we know about how quickly such changes come into effect and how different types of housing markets react to similar reforms. When possible, I point to how research has differentiated between impacts at the regional level and on specific neighborhoods with zoning changes. I also note differences in approaches studies take to evaluating rezoning impacts (for more detail, see Appendix A).

#### *Outcomes: Construction levels*

Evidence on the impact of zoning changes on housing construction is mixed. An upzoning could, as illustrated in Figure 1, produce no change in building (A), increase construction in the impacted area (D), and/or induce speculative investment in impacted land (B), which could potentially lead to further construction (G). I find several studies that indicate few impacts of upzoning on construction. Others identify significant housing production generated through



reduced regulatory stringency—particularly for ADUs. But building may take years, is likely to be limited to underdeveloped parcels, and may only impact communities with stronger housing markets.

Consider first Gabbe et al.'s (2021) difference-in-difference assessment of San Jose's urban villages strategy. They explore the higher-density neighborhood designations—not exactly through upzonings, but by beginning a process to reduce barriers to future rezonings and development entitlements—and compare them with synthetic control areas elsewhere. They find no distinction in construction between village and control areas from 2012-19.

Freemark's (2020) similarly designed examination of Chicago upzonings in 2013 and 2015 reaches parallel conclusions. Following 17 to 50 percent increases in allowed densities and parking requirement reductions in transit-adjacent, medium-density, mixed-use districts (on about six percent of city land), he finds no significant construction impacts compared to on unaffected control parcels. Recent, non-causal evidence on Minneapolis's 2018 allowances for moderate density on single-family properties citywide is comparable; post-reform, annual permits for triplex and fourplex units increased to only about 50—miniscule compared to overall construction (Blumgart 2022).

Perhaps the aforementioned reforms needed to be bigger to be impactful. Examining a 2016 upzoning in São Paulo, Brazil, Anagol et al. (2022) use a regression discontinuity design to identify a surge in dwelling permits on affected parcels, compared to unchanged parcels nearby, after a major increase in allowed floor-area ratios on a large share of city land. Importantly, permitting growth was pronounced in neighborhoods with larger upzonings. This increase occurred rapidly—after just one year (three years after the reform was announced). And Buechler & Lutz (2021) use a variety of methods, including propensity-score-weighted

regressions and difference-in-difference models, to show that upzonings of 20 percent or more in Zurich, Switzerland were associated with up to 15 percent increases in housing supply.

Auckland, New Zealand's large 2016 upzoning tripled allowed construction levels in much of the city. Greenaway-McGrevy & Phillips (2022) use a difference-in-difference model to show a rapid increase in housing permits following rezoning. Using a set of counterfactuals as a control, they estimate that the changes produced roughly 20,000 additional permits over four years. Liao (2022) uses a difference-in-difference approach to compare upzoned areas in New York with blocks within 1,000 feet; a larger change in allowed construction was associated with more building. Each finding is consistent with the hypothesis that a reform's size is relevant.

Likewise, Thorson's (1997) exploration of a *downzoning* through minimum lot size expansion—increasing from 5 to 160 acres—shows that, after a lagged period, permitting declined substantially compared with unaffected areas. Been et al.'s (2016) difference-in-difference study of New York's historic districts, which alterations to the building stock, also shows construction in affected areas declined by 21 percent of a standard deviation compared to control neighborhoods. But they do not determine whether building shifted to communities *surrounding* historic districts, raising questions as to localized versus regional effects.

The above evidence speaks to the effects of rezonings on areas targeted for reform. Whether upzoning dramatically changes housing availability regionwide—not just on affected parcels—is another question. Anagol et al. (2022) identify a 1.4 percent increase in the city's overall housing growth due to the policy change; Buechler & Lutz (2021) show a 1.2 percent increase regionwide after a 10 percent increase in zoning allowances. Greenaway-McGrevy & Phillips

(2022) find a 3.8 percent increase. All results are much smaller than the upzonings themselves.<sup>6</sup> Yet neighborhood context matters. The Auckland study found upzoning was more likely to spur attached-dwelling construction in core urbanized areas than detached housing further out.

It may also be that the *types* of housing targeted by rezoning influence policy effectiveness. Several U.S. cities and states have recently allowed ADU construction in previously single-family-only neighborhoods. In Los Angeles, Gerecke et al. (2022) use descriptive statistics to show that city and state reforms beginning in 2017 were associated with a rapid increase in ADU completions, from 93 in 2016 to 3,100 in 2020; these units were evenly distributed citywide. Similar changes in Portland, Oregon beginning in 2010 and documented descriptively by Lo et al. (2020) increased ADU permits from fewer than 50 annually from 1995-2009 to 500 or more from 2015-18. Though a similarly timed ADU reform in Washington, DC also increased permitting, far fewer were built, even though in Washington *overall* housing permitting dramatically increased. This difference may be due to a rezoning design that did not function well for the city's denser lots, which may be less apt to accommodate ADUs.<sup>7</sup>

What explains the contrasting findings in the above results? Studies showing little change in construction may underestimate upzoning's impacts because of limited study periods following regulatory change. Multi-family structures take years to be built. Dong (2021) finds that average project completion took almost eight years after upzoning; in Auckland and São Paulo, years of planning predated actual zoning changes, perhaps giving developers time to catch up in ways

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<sup>6</sup> Stacy et al. (2023) find a significant increase in citywide housing supply in the medium-term post-reform (specifically for units affordable to people with middle incomes or higher), but they do not assess how that change compares with the areas affected by, or the magnitude of, individual reforms.

<sup>7</sup> Neither ADU study compares ADU construction with overall housing-unit growth; ADUs may have substituted for other types of housing.

infeasible in Chicago or San Jose. This problem does not seem to affect ADUs, but these are intentionally less complicated to build.

Another possibility is that some upzoned communities already had accommodating-enough regulations; in other words, previous rules were not a binding construction constraint and other issues (such as local residents' ability to purchase new homes) stood in the way (Freemark 2022). Some reforms may have reaffirmed what was already occurring, transforming development processes from requiring flexibility measures to being allowed by-right. Another possibility is that upzonings only tackled one of the many interconnected elements of land-use policy, such as allowing height increases but not reductions in minimum lot sizes, thus preventing density increases (Kulka et al. 2022). Or it is possible that upzonings allowed increased density—but not enough to justify increased costs associated with larger buildings on infill sites, since construction costs do not increase linearly with height and infill construction is more challenging than greenfield building (Eriksen & Orlando 2021; Orlando & Redfearn 2022).

Longer-time-horizon studies offer more insight on this matter. Dong (2021) examines 15 years of post-upzoning building in Portland by assembling a synthetic control group using propensity-score matching. He concludes that upzoning from low to moderate densities increased the probability of development and the scale of construction on impacted parcels. For example, development on upzoned sites occurred at 7.1 units per acre, 65 percent higher than on control sites.

But Dong's (2021) results raise questions, at least in U.S. cities, as to the viability of upzoning in producing construction rapidly. He finds only 5.1 percent of upzoned parcels had *any* development over a decade and a half, producing a total of 240 units. Though this increase

was larger than on control parcels (2.6 percent and 80 units, respectively), impacts were muted compared to those of the ADU reform and overall city growth.

Limb & Murray (2022) make a related demonstration. Contrary to claims that the housing market will respond quickly when greater construction is allowed, they find that developers in Brisbane, Australia, left most new zoned capacity unused. Upzoned sites experienced faster housing growth than previously, but the difference between upzoned areas and the region was limited, and construction did not occur on most parcels affected. Only 22 percent of sites rezoned in 1996 were redeveloped in the 20 years following.

Likewise, researchers examining *downzonings* have identified small effects on regional housing growth. Newburn & Ferris (2016) use a difference-in-difference model to examine a 1970s-era Maryland growth boundary that downzoned rural areas, exploring whether the policy reduced building, as we might expect. Newburn and Ferris show no significant difference in the probability of lot development (though construction densities declined). Dempsey & Plantinga (2013) use a similar approach to compare parcels close to growth boundaries in Oregon. They found a shift in *where* construction occurred; developers expanded infill development and reduced construction outside the boundaries. Thus downzoning had a localized effect on housing availability—but not a regional one.

Overall, evidence from research attempting to parse out housing production impacts of land-use reform presents a mixed bag. At the neighborhood scale—where rezoning changes are implemented—in terms of short-term effects, some scholars identify construction upticks, especially in the context of ADUs. Others identify none. Over the long term, studies generally agree that localized housing development increases after upzoning and declines after downzoning, as we would expect based on economic theory. But, regionally, scholars generally

find that the level of construction that occurs in upzoned areas does not match the scale of regulatory change, since many affected parcels do not experience investment. Though preliminary data show that housing construction in upzoned areas does not simply replace construction elsewhere, more research is necessary to determine whether upzoning reallocates housing growth from non-upzoned parts of a region to those that are upzoned.

*Outcomes: Housing costs in terms of property values, sales prices, and rents*

Simplified economic theory contends that by increasing allowed construction, upzoning should produce a supply that better meets demand, less competition for housing stock, and lower housing costs. The reverse should occur after downzoning. Yet if the evidence for upzoning's construction impacts is mixed and time-sensitive, so is the evidence for its effects on the prices investors pay to buy land or homes, and the cost people pay to rent, and thus general housing affordability.

The mechanisms by which reforms impact housing costs are indirect. Figure 1 shows upzonings could increase construction (D), meaning more supply-side competition (I), thus lowering property values and rents both in impacted areas (L) and the region (K). These changes could produce greater housing affordability both in impacted areas (O) and the region (N). According to Favilukis et al.'s (2019) model of the New York real-estate market, a 10 percent upzoning of Manhattan would reduce rents on the island and in the surrounding region.<sup>8</sup> But such consequences are theoretical; alternatively, upzoning could induce speculation (B), especially in the short term, and such investment could increase costs of existing housing (E). An upzoning could have no effect on prices (A), or, in contrast, ultimately produce disamenity effects that

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<sup>8</sup> They find that housing affordability declines overall, because reduced Manhattan rents would encourage people to move there and pay higher rents than they would have had they lived elsewhere. But their transportation costs would decline as they move closer to jobs.

lower prices (M). In this section, I show that evidence assembled thus far confirms such uncertainties stemming from zoning changes.

Some researchers find little evidence for zoning-related housing cost outcomes—at least in the relatively short term, before the effects of additional housing supply are likely to have set in. Gabbe et al. (2021) identify no impact of village-based reform on assessor property valuations in San Jose. Indeed, they find that multi-family parcels had a lower value increase than those in comparable synthetic control villages—though this finding lacks statistical significance. In examining property values in Ogden, Utah through a difference-in-difference model, Gnagey et al. (2022) show that properties upzoned to allow ADU construction maintained parallel trends with those without such changes.

Still, many others demonstrate that land-use reforms are associated with changes in property values in the impacted areas, including quickly after regulations are passed—in contrast to the construction delays I described above. These outcomes may result from changing option value of development (e.g., an upzoning allowing more future development) or anticipatory effects of changing nearby amenities (e.g., a future with more local retail). Zhou et al.’s (2008) study of a 1957 Chicago zoning change that separated allowed land uses between residential and non-residential in much of the city is a useful example. Harnessing a comparison of matched parcels, they show that non-residential parcels saw a one-time, rapid value jump by 1958 (with no change in residential-zone values). They hypothesize that commercial and industrial landowners valued the “insurance” use separation provided against the difficulties of dealing with adjacent residents (a sort of disamenity).

Another example of this finding is Kuhlmann’s (2021) study of Minneapolis’ 2018 decision to allow up to three residential units on parcels previously zoned only for single-family homes.

Kuhlmann uses a difference-in-difference model to compare parcels in Minneapolis with those along its boundaries in other municipalities without upzonings. He shows that upzoned properties had rapid housing sales price increases of three to five percent. This suggests that parcels quickly incorporated future development opportunities into their values, though average value increases were lower than increases in allowed development.

Freemark's (2020) evaluation of Chicago, too, finds significant increases in upzoned property values (even as he does not identify new housing construction, as noted above). Parcels with about a 20 percent boost in allowed density had a 15 to 23.3 percent increase in sales prices, with the increase capitalized between six months and two years after rezoning. Property owners received a windfall from the reform, and buyers were willing to pay more for potential future development rights. Liao (2022), too, finds a 7 to 10 percent increase in per-unit housing costs within upzoned New York neighborhoods, though with limited statistical significance.

The design of reforms influences these outcomes, and rezoning impacts are neighborhood- and market-dependent. Freemark's (2020) study finds significant effects among parcels upzoned in 2015 in high-income areas, but not low-income neighborhoods. Kuhlmann (2021), on the other hand, finds the opposite effect: Homes in less-expensive communities became more expensive compared to those in more expensive areas. This contrast may result from policy variation. Chicago upzonings impacted mixed-use projects on arterial streets in a small portion of the city; the Minneapolis reform impacted single-family home districts citywide. The former policy may incentivize large projects with pricier apartments more marketable in just a few well-off communities, whereas the latter may encourage more modest three-flat units.

Housing sales costs are partly dependent on neighborhood physical features, too. Atkinson-Palombo (2010) uses a regression model with hedonic indicators to show that condominiums



within easy walking access of Phoenix light-rail stations increased in sales price after upzoning. On the other hand, single-family homes and condominiums near stations that were mostly accessible by car declined in value. (These effects were independent of the accessibility offered by light rail, which also provoked a price increase; note that she does not account for the potential impact of new construction in impacting prices.) Upzonings may be more likely to encourage future development in areas where new construction would be walkable.

Another factor influencing the housing cost outcomes of regulatory change, per recent studies, are the pre-existing built conditions among relevant parcels (as we saw in the ADU comparison between Portland and Washington). Upzonings are likely to be more effective in communities and among properties where construction is more feasible, and where there is market demand. Freemark (2020) finds that there were large value increases for vacant land after a Chicago reform, and that bigger upzonings produced bigger price increases. Based on Auckland's large-scale upzoning, Greenaway-McGrevy et al. (2021) find that upzoning in Auckland produced property value price appreciation proportional to increases in permitted site development among vacant or underdeveloped properties. Those properties that were already built up experienced declining values. Kuhlmann (2021) finds that comparatively underbuilt houses on upzoned parcels had larger increases in sales prices than nearby, larger homes: the least-developed land prior to upzoning saw the largest upswing in values.

The above studies examine regulatory effects over relatively short time periods on properties directly impacted by zoning change. Other research explores longer-term consequences. Consider Limb & Murray's (2022) study, which finds that upzoning failed to combat rising regional prices, as would have been expected in economic theory. Rather, they find that prices increased *more* dramatically than elsewhere in the country even in the context of

small construction increases. This may or may not reflect persistent option values for future development.

By studying historic designations, Been et al. (2016) offer insight into *downzoning's* long-term impacts on prices. First, properties outside of historic districts, particularly the most aesthetically appealing ones, increased in value; limitations on construction may have heightened the amenity effects of investing *near* historic buildings for aesthetic reasons and because of the difficulty of building within historic areas. Second, properties *within* historic districts had increased sales prices—but only outside of Manhattan; perhaps the investment value of such districts had already been capitalized therein. Using a fixed-effect regression model, Kahn et al. (2010), too, show that per-unit home prices increased more over several decades in coastal California areas that were subject to increased development restrictions, compared to nearby areas.

In short, while upzoning can encourage price inflation, so can downzoning—especially if it reinforces the appeal of real estate in certain neighborhoods. Stacy et al.'s (2023) random-trend fixed-effect study supports that conclusion. Nationally, they find that communities where zoning became more restrictive had increasing median rents over time compared to those where land-use rules remained static or allowed more development.

The above evidence speaks mostly to the neighborhood-level effects of zoning changes. But what impacts might upzoning have on housing costs in metropolitan areas overall? Anagol et al. (2022) develop a citywide equilibrium model to argue that São Paulo's large upzoning added supply, which went on to produce a citywide 0.5 percent reduction in housing costs. Buechler & Lutz (2021) find that even though rents did not significantly change in upzoned areas in Zurich,

the regional effect of upzonings is to reduce rents regionwide. These are promising findings that necessitate further research to substantiate.

Research on the housing cost impacts of zoning reform, then, points to several conclusions. First, most upzonings have been associated with increased property values and sales prices on affected parcels, particularly on those that are more easily developable—though this increase may be tempered by eventual construction occurring post-reform. This could mean that even if property values increase, per-unit costs decline and thus affordability improves, though we do not have adequate evidence yet to demonstrate that phenomenon. There is mixed evidence on impacts on already developed parcels. Second, price increases are market-dependent and associated with reform scale; an upzoning that encourages development near transit, for example, will likely incentivize value growth on parcels in walkable areas that have room for more construction. Recent research suggests that upzonings may *reduce* housing costs regionwide, however, potentially making it more affordable for more people. Third, downzoning may *also* increase property values in impacted areas, potentially because they increase the amenity value of neighborhoods where people value a historical aesthetic.

#### *Outcomes: Demographics*

Economic theory suggests that the ultimate impact of reduced land-use restrictiveness should be increased affordability overall following construction producing more housing. In concept, such affordability could allow more people of different incomes to afford living in the neighborhoods they desire, which might induce broadened social and racial integration. In Favilukis et al.'s (2019) New York model, they project that an increase in buildable capacity would allow more middle-income residents to afford Manhattan, now the most expensive part of the region.

Yet this is the area of research with the least currently available empirical evidence, and where the links between reform and outcomes are most indirect. Figure 1 illustrates that an upzoning could provoke gentrification in impacted communities (F)—or it could produce more diverse, affordable neighborhoods (O). Even more distantly, perhaps, upzoning could result in more affordable regions due to less competition for housing stock, which could mean more opportunities for more residents of varied backgrounds (N). These connections are far removed from one another, and dependent on housing construction and market conditions. Assessing the downstream impacts of rezoning on demographic change is difficult given these intervening factors. Moreover, such research, again, faces considerable concerns about endogeneity. Whittemore’s (2017) study of Durham, North Carolina emphasizes, for example, that the neighborhoods selected for rezonings differed by racial composition, with changes varying over time as political power shifted from white leadership to an environmental justice-focused, mixed-race coalition. The demographic impacts of reform reflect unequal power dynamics.

Despite the empirical roadblocks, scholars have attempted to address this issue. Using qualitative methods, Wolf-Powers (2005) explores two New York reforms. She argues that, at the neighborhood level, upzonings increased real-estate speculation and replaced industrial firms with residential construction. This ultimately produced more upscale neighborhoods. That said, she did not use quantitative methods to further substantiate this assertion.

More recently, Davis (2021) uses regressions to evaluate changes in New York neighborhood demographics, comparing upzoned versus non-upzoned areas. She finds that rezonings increase the likelihood of neighborhoods increasing their share of residents who are non-Hispanic white. The higher the share of a community that was upzoned and the longer the upzoning policy was in place, the greater share white the tract was likely to become. These

trends may result from increased speculation or expensive new construction. But her analysis considers only short-term effects; the changes she profiles may not persist. Nor does she evaluate regional outcomes.

Liao (2022) evaluates the same New York upzonings but integrates panel data on residential histories to examine peoples' living patterns over time. Her results raise concerning results: Incumbent residents in upzoned areas are more likely to move—particularly if they are Black. And in-migrants to upzoned areas are more likely to move from higher-income neighborhoods. That said, this result raises another possibility: That upzoning provides an outlet for gentrification, absorbing demand from higher-income residents for new homes and potentially relieving other parts of the housing market, as Mast (2021) suggests.

If upzoning fails to quickly integrate neighborhoods or prevent displacement, over the long-term it may be more useful. Trounstein (2020) leverages federal Fair Housing Act lawsuits to identify cities that between 1970 and 2011 faced court orders to reform land-use policies to, for example, allow more apartments. Using fixed-effect regressions, she finds differences between cities based on this legal experience, though she is unable to identify whether jurisdictions followed through with actually meaningful zoning changes. On average, cities she examines were 94 percent white in 1970. By 2011, those facing lawsuits became 68 percent white, versus 73 percent white for those without them. Here she establishes a long-term link between land-use regulations and racial demographics, though more specific research is needed.

Other research indicates that *downzoning* may result in more deleterious long-term outcomes from the perspective of the affected communities' demographics. Kahn et al. (2010) examine demographic change following the 1976 establishment of a restrictive California coastal development zone. They find that, among affected communities, gentrification increased with

expanded household incomes, compared to outside areas. These income increases coincided with a boost in housing prices.

Despite the limited evidence produced thus far on the demographic effects of zoning change, several conclusions stand out. Over the short term, there is some reason to believe that upzoning real-estate may increase the share of non-Hispanic white people in affected communities. Over the long term, however, these affects seem to disappear; communities that plan for new housing construction may become more diverse over time—though the transition takes decades. Downzoning policies may produce the opposite outcomes over the long term, such as by being associated with increased incomes in the impacted areas.

### **Policy implications and discussion**

Promoting increased housing construction and affordability through alterations in zoning regulations takes varying paths, depending on the context and the rule change itself. The preponderance of upzonings studied identified mixed impacts on housing production, combined with increased land values within neighborhoods affected (Table 3).

Table 3. Summary of recent research on upzoning impacts

Indicator	Summary of recent research findings	Recent study examples
Levels of housing production	<p><i>Short-term:</i> Contrasting evidence.</p> <ul style="list-style-type: none"> <li>Some find no uptick in construction in upzoned areas; others show significant increases, especially among units for higher-income residents.</li> <li>ADU construction responds quickly in the right conditions.</li> </ul> <p><i>Long-term:</i> Increase in housing construction in upzoned areas.</p> <ul style="list-style-type: none"> <li>Magnitude limited compared to regional demand.</li> <li>Construction increase is parcel-dependent; based on potential value increase.</li> <li>Some evidence that construction in upzoned areas does not substitute for construction elsewhere.</li> <li>Downzoning reduces housing production and density.</li> </ul>	<ul style="list-style-type: none"> <li>Anagol et al. 2022; Freemark 2020; Gabbe et al. 2021; Gerecke et al. 2022; Greenaway-McGrevy &amp; Phillips 2022; Liao 2022; Lo et al. 2020; Stacy et al. 2023.</li> <li>Anagol et al. 2022; Buechler and Lutz 2021; Dong 2021; Liao 2022; Limb &amp; Murray 2022; Newburn &amp; Ferris 2016; Thorson 1997.</li> </ul>
Housing prices	<p><i>Short-term:</i> Most find increased housing costs that parallel increased construction allowances.</p> <ul style="list-style-type: none"> <li>Minority find no change or price decreases.</li> <li>Underdeveloped properties more likely to increase in value; dependent on type of housing allowed.</li> <li>Effects may depend on neighborhood demographics and walkability.</li> </ul> <p><i>Long-term:</i> Upzoned parcels likely retain higher values, responding to increased development rights. Rents may decline regionwide.</p> <ul style="list-style-type: none"> <li>Some evidence that increased values are associated with more units and lower rents at the upzoned, municipal, and regional scales, but more research needed to substantiate this claim.</li> <li>Downzoning may increase housing prices.</li> </ul>	<ul style="list-style-type: none"> <li>Anagol et al. 2022; Atkinson-Palombo 2010; Freemark 2020; Gabbe et al. 2021; Greenaway-McGrevy et al. 2021; Kuhlmann 2021.</li> <li>Been et al. 2016; Buechler and Lutz 2021; Limb &amp; Murray 2022; Stacy et al. 2023.</li> </ul>
Neighborhood demographics	<p><i>Short-term:</i> Preliminary evidence that upzoning reduces racial integration, but causal chain is difficult to establish.</p> <ul style="list-style-type: none"> <li>Speculation on upzoned real estate may increase the share of non-Hispanic white people in a community.</li> <li>Some evidence that upzoning associated with higher moving rates, especially among people of color.</li> </ul> <p><i>Long-term:</i> Some evidence that communities that upzone become more racially diverse.</p> <ul style="list-style-type: none"> <li>Demographic transition can take decades.</li> <li>Downzoning may provoke the opposite reaction, reduce population densities, and increase incomes in impacted areas.</li> </ul>	<ul style="list-style-type: none"> <li>Davis 2021; Liao 2022; Wolf-Powers 2005.</li> <li>Kahn et al. 2010; Trounstone 2020.</li> </ul>

Source: The author, based on a review of the scholarship.

Some of this evidence indicates that reforms could spur building specifically in upzoned areas, though getting the reform right—and in the right places—is important. Upzonings in

places with already-accommodating zoning codes may result in little change; those rezonings that are not large enough may not compensate landowners adequately to justify the cost of larger buildings. Construction that *does* occur following rezonings is likely inadequate at the *regional scale* for policymakers to rely on such regulatory reforms *alone* to provoke filtering of existing units into affordability. Effects vary based on parcel conditions (underdeveloped parcels are more likely to be developed), reform types (ADU allowances have often been effective), and reform scale (larger upzonings produce more development). Given this variation, it is likely unrealistic to develop a universal theory explaining outcomes of altered land-use regulations.

If reforms increase property values enough, they may at least temporarily displace vulnerable residents from impacted neighborhoods, whether because of increased rents or because of the appeal of selling to buyers interested in redevelopment. Upzonings do not systematically expand investment in low-income communities, where construction often occurs at levels already below zoning allowances; land-use policy is not the binding constraint here.

Nevertheless, increases in transaction prices indicate upzoning-generated boosts in long-term construction and immediate increases in wealth for incumbent property owners. Though some increases may be attributable to perceptions that rezoning will improve neighborhood amenities, some surely reflect that upzonings ease building and expand option values. Increases in sales values, however, are generally not as large as increases in allowed development; if more housing is built, land costs *per unit* will decline compared to pre-reform.

It remains uncertain whether such cost growth has negative impacts on affected neighborhoods. Transaction price increases recorded in some studies are relatively small, minimizing the likelihood that upzonings significantly affect housing affordability. Moreover, other research suggests little reason to fear increased rents or cascading gentrification in



communities with new market-rate housing. As such, if upzoning generates construction, it may have few negative long-term impacts, since higher property values could be associated with more units per parcel and thus lower per-unit costs.

Keeping land-use policies as they are today—or, more problematically, implementing downzonings—could reinforce inequalities. Research on downzoning shows that it, too, can increase housing costs by limiting construction in the most desirable neighborhoods. Widening access to opportunity to more people requires expanding access to affordable apartments in the most restrictive cities. In many cases, construction of such units is only feasible in the context of regulatory change.

Thus governments should continue to experiment with land-use reforms to get the formula right. Localities hoping to increase construction likely need to make room for denser projects by upzoning. But they must also pursue other strategies, like leveraging public land for projects or coordinating transportation and development policy. Municipalities may find that focusing proactively on new development areas where many units can be planned simultaneously is most productive (Kim 2020).

Cities and towns hoping to increase affordability for low- and moderate-income residents at risk of displacement must make provisions for housing that guarantees long-term affordability. Parcel-by-parcel developments will not produce filtering adequate to lower costs dramatically regionally and especially not locally. Wealthy communities that have excluded low-income residents for decades must be required by higher-level governments to identify how they will desegregate, opening their resources to a broader group of prospective residents.

## **Directions for future research**

The budding research on the consequences of zoning reform has been catalyzed by policymaker interest in leveraging land-use regulations to increase housing affordability and reduce segregation. There is plenty to learn from this scholarship when it comes to such reforms' impacts on housing construction, costs, and neighborhood demographics. But there is more to investigate. It is hard to visit Washington's Navy Yard and not conclude that the right combination of market demand and zoning reform can produce powerful results—but scholars cannot yet definitively answer which specific elements of the market or zoning code produce which outcomes.

Though recent research leverages convincing causal methods to make claims about the impacts of zoning change, there still may be unmeasured, endogenous conditions leading to rezonings that influence results; better understanding those conditions is key to future research. We do not know just how externally valid, for example, the findings are from a study examining the impacts experienced in one city that makes a zoning change. Moreover, we need considerably more evidence about the magnitude of reform impacts not just within upzoned neighborhoods but also regionally. Recent scholarship is making key strides in this direction, but there is more work to be done.

One barrier to undertaking research on zoning is understanding the reforms themselves. The lack of comparable zoning data handicaps researchers' ability to identify which communities have which types of rules in place. The usefulness of surveys as a tool for comparison is limited (Lewis & Marantz 2019), though new machine-learning and hand-coding techniques, such as the National Zoning Atlas project, may fill the gap (Bronin 2023). Further analysis requires multi-community, detailed data that extends to information about when and where reforms occur. Key to this is better identifying why communities choose to undertake reforms to avoid an “intent to

treat” problem in analysis—that outcomes do not result from upzonings themselves but rather broader, community-level factors that interplay with upzoning policy. Ultimately, it may be possible to compare magnitudes of impact across different types of zoning changes. From this research, we may also be able to better compare the findings in the scholarship on static zoning comparisons with those in the research on zoning change.

Assuming additional data become available, there is a dire need to explain how reforms impact communities variously over space. Research has only begun on this front, but officials intent on introducing useful policy must understand how different choices can produce different results. Researchers must be particularly careful to examine neighborhood versus regional impacts on housing cost; a reform increasing metropolitan affordability through filtering may simultaneously reduce affordability in neighborhoods undergoing gentrification.

Moreover, researchers need to emphasize the temporal elements of zoning change. What do developers know about land-use rules, and when? Why are investors willing to pay more for upzoned parcels—but then often wait to develop? We need to understand how different reform types have varying effects over time. Investigating this issue may allow us to evaluate whether long-term effects captured in the rezoning scholarship are much different from those identified by static comparisons. Finally, additional research is necessary to identify the downstream demographic impacts of zoning change, on which research has barely begun.

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Appendix A. Summary of scholarship examining zoning changes

Study	Reform studied			Study parameters	
	Scale	Intensity	Effects	Design	Years examined
<i>e.g.</i>	<i>Neighborhood or citywide</i>	<i>Percentage increase in allowed density</i>	<i>Percentage increase in resulting housing construction</i>	<i>Difference-in-difference</i>	<i>2010–12</i>
Anagol et al. (2022)	Block-level upzoning through increased floor-area ratios (FAR) in São Paulo, Brazil.	Average increase of 36% FAR on blocks in city, though significant variations (45% of blocks had a much larger increase).	66% increase in permitting per unit of FAR. No effect on single-family permits, but larger increases in some neighborhoods with large FAR increases. Translated into 1.9% increase in citywide housing stock. 0.5% reduction in citywide prices in resulting equilibrium model.	Block-level regression discontinuity design, incorporated into equilibrium model of housing supply and demand, using neighborhood price data. Compares blocks with treated upzoning with nearby blocks with steady or declining FAR.	Reform occurred in 2016, following master plan passed in 2014. Permitting data through 2020.
Armstrong et al. (2010)	76 neighborhood-level rezonings in New York, New York.	Some lots downzoned, some upzoned, some had little change in residential building rights.	Shows where residential capacity was added or subtracted throughout the city but does not estimate effects on housing production, costs, or neighborhood demographics.	Descriptive, property-level analysis of change in zoning envelope for residential construction due to rezoning.	Rezoning occurred between 2003–07, but no before/after effects measured.
Atkinson-Palombo (2010)	Upzoning overlay in station areas in association with new light rail line in Phoenix, Arizona.	Ordinance allowed transit-oriented, mixed uses in areas near stations. Specific allowable densities and uses left vague.	Overlay increases condo costs in mixed-use neighborhoods by 37 percent. In residential neighborhoods, single-family homes, condos lost value by 11–12 percent; single-family homes in mixed-use neighborhoods had no change.	Hedonic model captures impact of zoning reform on transaction values of single-family homes and condos, comparing impacts by neighborhood.	Compares period before reform (1995–99) with period after overlay zoning and station selection (2001–07).
Been et al. (2016)	120 neighborhoods designated as historic districts in New York, New York.	Historic preservation districts make redevelopment of existing buildings more difficult, but magnitude varies based on district.	Designation reduced construction by 21 percent of a standard deviation. Increased prices by 17 percent compared to out-of-district, which rose by 12 percent (results insignificant when allowed to vary over time). Effects on prices only occurred outside of Manhattan, but were insignificant with time-varying impacts; study suggests	Difference-in-difference regression model with hedonic indicators at the property level comparing property transaction values and new residential construction before and after district designation, and in and out of district area (surrounding 250-foot buffer area).	Compares periods before and after introduction of each historic district in years between 1974–2009.

Study	Reform studied			Study parameters	
	Scale	Intensity	Effects	Design	Years examined
			that positive price effects did not occur in areas with high FAR allowances.		
Buechler & Lutz (2021)	Numerous neighborhood-level upzonings in the Canton of Zurich, Switzerland.	Identifies a zoning change as an upzoning if it increases zoning envelope in a 100x100 meter zone by at least 20 percent in one year.	10 percent increase in zoning allowances produces a 1.2 percent increase in Canton-wide housing supply over five years. Upzoning of 20 percent or more is associated with a 9.6–15.5 increase in supply on treated parcels versus non-treated ones. No significant differences in rents in upzoned versus other areas, but Canton-wide impact is lower rents.	Staggered changes-on-changes regressions; propensity-score weighted regressions; and difference-in-difference, geographically weighted regressions with hedonic indicators, combined with spatial equilibrium framework in monocentric-city model.	Examines data between 1995–2020, estimating outcomes five years after changes both in-neighborhood and intra-Canton.
Davis (2021)	Series of neighborhood-scale upzonings in New York, New York.	Identifies an upzoning as increasing a lot's maximum residential development capacity by at least 10 percent between 2002–09.	Upzoning positively and significantly associated with odds that tract has a higher share white inhabitants. One percentage point increase in area upzoned associated with 28 percent increase in odds tract becomes whiter. Each additional year since upzoning is associated with 2 percent increase in odds that tract becomes whiter.	Beta regression model with dependent variable being share non-Hispanic white per tract as a function of share of tract that was upzoned. Includes neighborhoods without upzoning in model.	Examines changes in non-Hispanic white population by tract from 2000–10 following upzonings that occurred 2002–09.
Dempsey & Plantinga (2013)	Urban growth boundaries around Oregon cities; study examines conditions around 19 small-to-medium cities in Willamette Valley (outside of Portland).	Urban growth boundaries are meant to contain urban growth to areas within them, but some development still allowed based on previous zoning and variances.	Growth boundaries increased development in some cities compared to outside boundaries (e.g., 9.2–12.7 percentage point increase in development probability in McMinnville's boundary); all cities pooled had 7.3 percentage point increase in development probability within boundaries. No effect in other cities. In most cities, impact was small.	Difference-in-difference regression examines parcels within 1 kilometer of the edge of urban growth boundaries, comparing impacts before and after implementation and between impacted and non-impacted parcels.	Urban growth boundaries were implemented between 1973–83; study examines land cover in 1973 and 2000 as comparison.
Dong (2021)	Upzoning in Portland, Oregon, mostly impacting	Most upzonings were between low- and medium-density single-family	Upzoning led to greater development probabilities, about twice as high as on non-upzoned parcels (5.1 versus 2.6 percent) over 15 years. Only 240 units	Uses propensity score matching (nearest neighbor) based on parcel and neighborhood data to identify control parcels, then uses Kaplan–	Explores changes following upzonings in 2001–02 during

Study	Reform studied			Study parameters	
	Scale	Intensity	Effects	Design	Years examined
	Southwest neighborhood.	residential zones (0.5–4.4 units/acre to 6.2–8.7 units/acre).	were created on 2,197 parcels upzoned. Development density was higher as well: 7.1 versus 4.3 units per acre.	Meier survival analysis to estimate upzoning impacts.	subsequent 2003–17 period.
Freemark (2020)	Two citywide upzonings around transit stations in Chicago, Illinois, representing a total of 6 percent of city land area.	Density upzonings increase FAR, dwelling units, and building heights by 17–50 percent, depending on the change. Parking requirement reduction potentially allowed for reduced development costs.	Density upzoning led to 15–23.3 increase in transaction values compared to non-upzoned parcels in two years following 2013 reform (16.8 percent increase following 2015 reform). Parking reduction had no effect citywide in 2013 (though it did have effect in 2015), but prices increased significantly downtown (+18.5 percent) and for residential condos (+9–10 percent). Vacant land had high increase but less confidence in results. No significant impact of upzonings on housing permits.	Difference-in-difference regression model with hedonic indicators at the property level comparing property transaction values and new residential construction before and after two separate upzonings, and among treated and comparable non-treated parcels.	Explores changes following upzonings in 2013 and 2015, considering property transactions and building permits from 2010–15 (for the 2013 upzoning) and 2018 (for the 2015 upzoning).
Gabbe et al. (2021)	Introduction of urban villages policy in San Jose, California. Urban villages designated throughout city.	Urban villages allowed different zoning frameworks to be applied to certain areas, but there was no standard upzoning.	Finds no significant treatment effects on permits, transactions, and assessed values.	Difference-in-difference regression model comparing changes in parcels within designated villages with other comparable control parcels identified through approved future urban villages; synthetic controls; and other planning areas.	Following general plan in 2011, upzonings in many villages between 2012–20, most developer-initiated. Years studied 2005–19.
Gerecke et al. (2022)	Changing rules allowing accessory dwelling units (ADUs) in city of Los Angeles, California.	State laws have expanded the ability to build ADUs by right, reduced design review, and reduced or eliminated associated parking requirements.	Annual ADU completions in the city increased from an average of 210 in 2016–17 to more than 2,500 in 2018–21. ADUs have been most popular in majority-minority neighborhoods, though they are also being completed in majority-white neighborhoods.	Descriptive data, combined with geospatial analysis. No control provided.	Explores changes 2017–22 following state regulations reducing stringency of ADU requirements in 2017.
Gnagey et al. (2022)	ADU ordinance, citywide in Ogden, Utah in	Municipal law allowed use of ADUs as rental properties, in essence	No impact of allowing ADUs on property values in areas affected by change versus other neighborhoods.	Difference-in-difference regression model incorporating hedonic price indicators,	Law legalized ADU rentals in 2016; examines changes in

Study	Reform studied			Study parameters	
	Scale	Intensity	Effects	Design	Years examined
	most but not all single-family neighborhoods.	allowing additional density on individual lots, but increase was property dependent.	Maintained parallel trend with untreated areas.	comparing affected versus non-affected neighborhoods. Some models with repeat sales only.	property values before and after with data from 1999–2019.
Gray & Millsap (2020)	Changing subdivision rules in the city of Houston, Texas; affected the urban core of the city first, then the entire city.	Reduced minimum lot sizes (from 5,000 to 1,400–3,500 square feet by right) and setbacks (some front setbacks from 25 to 5 feet) for urban core parcels. Neighbors can petition for higher minimum lot sizes.	Significant expansion in development on small parcels. Small parcel development became more common in less-dense, middle-income neighborhoods. Overall, population densities increased in affected areas, but no causal relationship identified.	Regression model estimates percentage of developed lots by Census tract that are small before and after reform and incorporates local demographic data. Does not incorporate comparative element.	Reform occurred in 1998 and expanded to the entire city in 2013. Compares 1998 to 2016 data.
Greenaway-McGrevy et al. (2021)	Upzoning throughout much of inner-suburban land in Auckland, New Zealand.	Rezonings, which affected 3/4 of land area, increased overall development capacity by 300 percent. Eliminated single-family zoning.	Increases property value of upzoned parcels by 1.5–4.2 percent depending on the model and area. Underdeveloped properties see larger price appreciation than already-developed properties, which decrease in value. Overall, upzoning's effects are moderated by existing site conditions.	Difference-in-difference regression model of repeat sales using hedonic price indicators, incorporating intensity measure of existing site development (ratio of built value to land value). Compares upzoned treated areas with single-house control areas.	Series of plans and rules beginning in 2010 leading to upzoning in much of the city in 2016. Examines property sales from 2010–12 versus 2016–17 (Greenaway-McGrevy et al. 2021) and permits from 2010–21 (Greenaway-McGrevy & Phillips 2022).
Greenaway-McGrevy & Phillips (2022)	Upzoning throughout much of inner-suburban land in Auckland, New Zealand.	Rezonings were depending on underlying residential planning zone.	Model identifies increasing of housing production of about 27,000 over five years post-upzoning, equivalent to 5 percent of the regional dwelling stock. Overall, building permit approvals increased from 3,000 per year in 2016 to about 14,500 in 2021.	Difference-in-difference regression model that uses pre-treatment trends on control (non-upzoned) to extrapolate counterfactual outcomes for building permits. Accounts for potential shifts in construction from non-upzoned to upzoned areas.	
Kahn et al. (2010)	Construction limits with more strict building regulations	Coastal boundary zone requires special development permits. Fines on landowners	Gentrification within coastal zone. Average household income increased 19 percent more in zone tracts between 1970–2000 than elsewhere in same city.	Compares demographics and housing outcomes inside and outside coastal zone using a fixed-effect regression model (including	Coastal zone implemented in 1976. Study examines change in

Study	Reform studied			Study parameters	
	Scale	Intensity	Effects	Design	Years examined
	statewide along Pacific Ocean in the California coastal boundary zone.	who violate its requirements.	Home prices increased by 25 percent more. Population density change 20 percent lower. Gentrification did not occur similarly outside of zone. Similar findings for Los Angeles County.	place, time, and place/time fixed effects). Study does not examine tracts in San Francisco metropolitan area.	demographics at Census tract level from 1970–2000.
Kuhlmann (2021)	Minneapolis, Minnesota comprehensive plan eliminated single-family restrictions throughout city, allowed up to 3 units per parcel.	Allows for up to three times the housing unit density on each single-family lot, but does not include additional setback and bulk changes (that came later).	Plan change associated with a 3–5 percent increase in price of properties. Price increases larger in inexpensive neighborhoods and underdeveloped properties (smaller homes compared to surroundings). Larger when studying smaller buffer around boundary.	Difference-in-differences regression model incorporating hedonic indicators examining sales prices along the 1-, 2-, and 3-kilometer buffer around Minneapolis city boundary, comparing outcomes within city (upzoned) and in surrounding suburbs (not affected).	Comprehensive plan passed in December 2018; zoning updates occurred in November 2019. Compares data in year before and year after December 2018 approval.
Liao (2022)	Neighborhood-level upzonings in New York, New York.	Various rezonings had differing effects on allowed residential densities. Paper defines upzonings as increasing residential capacity of area by at least 20 percent.	New housing units increase by 1.2 percent 0–3 years after upzoning; grows to 4.1 percent 4–7 years after upzoning (no significant change in units in control). Effect correlated with degree to which each treated parcel has increase in allowed construction. 7–10 percent increased housing prices with upzone, but low statistical significance. Incumbent residents in upzoned areas 7.3 percent more likely to move than control; Black residents more likely to move than white or Hispanic residents. But they are not more likely to move to lower-income areas. In-migrants to upzoned areas come from 4.4 percent higher-income neighborhoods.	Difference-in-difference regression model using parcel-level data and microdata on individual residential history comparing upzoned and adjacent non-upzoned areas within 1,000 feet.	Rezoning occurred between 2004–13. Examines building data 2000–18, and housing price data for 2000–19. Incumbent residents defined as those who lived in the treatment or control areas five years before upzoning.
Limb & Murray (2022)	19 planned densification areas in Brisbane, Australia.	Zoned capacity doubled over the 20-year study period, allowing	2 percent of zoned capacity used each five-year period. 78 percent of sites with zoned capacity at beginning of period remained undeveloped by period end. 1	Examines about 26,000 parcels across 19 activity centers. Uses lagged zoned capacity data to link	Period studied from 1996–2016, with three intermediary analysis points.

Study	Reform studied			Study parameters	
	Scale	Intensity	Effects	Design	Years examined
	Upzones occurred repeatedly in those areas.	significantly more housing to be built.	percent increase in capacity associated with a 0.003 percent decrease in price five years later (though study finds limited statistical significance); however, additional housing supply is associated with higher prices of about 2 percent.	to housing supply and prices in regression model.	
Lo et al. (2020)	Introduction of laws allowing ADUs in Washington, DC, and waiving impact fees for ADUs in Portland, Oregon.	Washington allowed one ADU per single-family parcel, reducing minimum required lot area from 4,000 to 1,200–2,000 square feet, and allowing rentals (retained owner-occupancy requirement). Portland waived impact fees for ADU construction.	Washington reform increased annual ADU permits from 2 or less per year from 2010–15 to 7–30 per year from 2016–19. Portland reform increased annual permits from less than 40 per year from 1995–2009 to more than 600 per year from 2016–18 (after a steady rise). No correlation between ADU location and local demographics.	Collects descriptive data on ADU permits issued in two case-study cities before and after regulatory changes.	2010–2019 in Washington (reform implemented in 2016). 1995–2019 in Portland (2010 reform waiving fees as a pilot; 2018 made change permanent).
Newburn & Ferris (2016)	Downzoning policy in Baltimore County, Maryland involving creation of resource conservation zones.	Limited development to 25-acre minimum lot sizes (later limited to 50) in agricultural zones; limited it to 2- and 5-acre minimum lot sizes in other areas (rural residential and watershed protection zones, respectively); all were increases from 1-acre minimum lot sizes in previous period.	No statistical impact on the probability of development. Development densities decline by 54–60 percent, depending on the type of zoning protections implemented (e.g., 0.24 lots per acre for agricultural zoning, compared to 0.52 lots per acre in counterfactual).	Difference-in-difference regression model with a two-stage Heckman selection model designed to estimate landowner decisions to develop and the choice of residential density. Compares downzoned areas with unaffected areas.	Policy was adopted in 1976. Study examines subdivision conversions annually between 1967–86, comparing pre- and post-periods, and treated zones with areas that retained urban residential zoning throughout period.
Stacy et al. (2023)	180 upzoning and downzoning policies implemented in a	Reforms examined vary, from allowing ADUs to increasing allowed FAR, to	Reforms loosening restrictions associated with a significant, 0.8 percent increase in citywide housing supply at least 3 years post-reform; increase was	Random-trend, fixed-effects model incorporating local demographic data testing the impacts of reforms on municipal-	Examines reforms implemented between 2005–18. Compares pre- and



Study	Reform studied			Study parameters	
	Scale	Intensity	Effects	Design	Years examined
	sample of more than 1,000 municipalities in eight U.S. metropolitan regions.	reducing height limits. No standard intensity, but reforms are classified in terms of whether they increase or reduce zoning restrictiveness.	significant only for units affordable for people with middle incomes or higher. Reforms increasing restrictions associated with a significant, \$50 increase in citywide median rent.	scale count of addresses and housing rents, compared with outcomes in municipalities that did not experience reform.	post-periods (3 to 9 years) for each municipality, depending on year of passage of each reform.
Thorson (1997)	Downzoning in McHenry County, Illinois that impacted agricultural land.	Reform increased minimum lot size from 5 acres to 160 acres.	In the short term (within 4 years), there was no significant impact on building permits. For period 5 to 15 years post-reform, the count of building permits fell by 94 percent per year.	Stock-flow econometric framework assumes demand for housing is equal to supply in equilibrium. Uses regression model to evaluate relationship using a simplified difference-in-difference method comparing downzoned areas with unaffected areas.	Reform occurred in 1979. Data analyzed from 1971–94.
Trounstine (2020)	Municipalities nationwide, with those undergoing Fair Housing Act lawsuits assumed to be undertaking a zoning reform equivalent to an upzoning.	Reforms are not described; study assumes that municipalities respond to Fair Housing Act lawsuits by altering their land-use regulations.	Cities without lawsuits were 73 percent white on average in 2011, compared with 68 percent among those with lawsuits.	Examines lawsuits in comparison with Wharton land-use survey data by municipality through a linear regression including municipal and year fixed effects. Assumes that lawsuits corresponded to municipal zoning changes (similar to upzonings); compares cities with and without lawsuits.	Examines change in demographics from 1968–2011, using lawsuits based on Fair Housing Act that occurred from 1968–2010.
Wolf-Powers (2005)	Upzonings in two neighborhoods in New York, New York	Various reforms to transform neighborhoods from industrial use to mixed-use and central business district uses.	Interviewees noted that rents have increased in anticipation of future development. Speculation was driving neighborhood transformations in the context of zoning changes.	Interpretive description based on notes from meetings and hearing; review of documents; interviews with neighborhood and local officials.	Rezoning plans announced in 2001, 2003, following decade of economic change in affected areas.
Zhou et al. (2008)	Enactment of comprehensive zoning change to the Chicago,	Ordinance differentiated zones by use, required removal of non-conforming uses	Commercial and manufacturing zones saw a one-time jump in value growth, but there was no significant change in residential areas.	Matches residential and non-residential parcels based on similarity, which were in the same zoning district pre-1957 but were	Zoning ordinance passed in 1957. Property values

Study	Reform studied			Study parameters	
	Scale	Intensity	Effects	Design	Years examined
Illinois zoning ordinance.		within 8 years (residential districts) or 15 years (non-residential).		separated. Assesses average land value change for the two groups through a difference-in-means test.	compared between 1955–58.

*Source: The author, based on a review of the scholarship. Note: Many studies include additional analyses, such as of the impacts of higher-density districts; I do not describe these results herein, however. This table only examines studies incorporating examinations of zoning changes.*