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Dollars for Duplexes: Assessing the Fiscal Impact of Regulatory Processes in Austin, Texas

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Report

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Abstract

Dollars for Duplexes: Assessing the Fiscal Impact of Regulatory Processes in Austin, Texas

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By testing the relationships between regulations and unit costs of duplexes in Austin, Texas, this master's report seeks to offer a new quantitative basis to which future plans and policies on missing middle housing can refer. Across the country, housing development has become increasingly focused on the poles of the density spectrum: single-family detached units and mid-rise apartment blocks. This is evident in Austin, Texas, where missing middle housing has becoming a topic of fierce debate among neighborhood groups, housing advocates, and planners. A common claim is that regulatory processes add financial burdens to developers of missing middle housing, which are then passed down to consumers. This report gathers data from building permits and Zillow to compare the size, count, and cost of units affected and unaffected by various regulatory procedures to determine whether this assumption is true in Austin.

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Introduction:

Affordable housing in Austin is scarce. The capitol of Texas has been among the fastest growing metros in America for over a decade. This has placed significant pressure on housing supply, and intense competition for space in the city has driven land and rent prices higher than anywhere else in the state. Federal and state funding for affordable housing is limited and the state legislature has made it impossible for the city to force developers to set aside apartments for low-income families through measures like inclusive zoning which have proved somewhat successful elsewhere in the country. Austin's hands are not completely tied, recently voters approved a \$250 million affordable housing bond and City Council approved a rule to relax zoning restrictions for affordable and mixed-income developments.

But these creative solutions do not solve the root of the issue; people are moving to Austin at a faster rate than housing is being built. A major piece of this supply restriction is due to outdated land use regulations dating back to when Austin was a fraction of its current size. The land use code in use today was written in 1984 (Berg 2016). While the zoning map of today looks different than that of 1984, most changes have been on commercial corridors. Neighborhood interiors, even some within a half mile of downtown appear quite similar to how they did in the 1980s despite rule changes like the one to allow accessory apartments on sizeable SF-3 lots.

While the age of Austin's zoning code may be unique among the top 20 metros in the US, its use of single family residential as the default setting for all neighborhoods is common across the country. In fact, it was only in 2019 that Minneapolis made headlines as the first US city to remove the single-family zone entirely from its code. In 2012, Austin approved a new comprehensive plan, Imagine Austin which called for a new land use code to be written. The

City hired Opticos Design to serve as primary consultants for the new code writing process. The firm's principal Daniel Parolek is famous for coining the term "Missing-Middle" housing, which has become common parlance amongst urban planners. On his website, Parolek defines missing middle as "House-scale buildings with multiple units in walkable neighborhoods" (Parolek 2019). With Parolek, the code rewrite or "CodeNext" would propose increasing the entitlements of neighborhood residential lots to a middle density scale. Subsequent drafts reduced these proposed changes. However, each draft was met with strong opposition from neighborhood associations. The last draft was watered down to the point of only proposing significant up-zonings along commercial corridors. However, by then the opposing coalition had grown to include not only wealthy homeowners but low-income tenants fearing displacement and a majority of the City Council. In 2018, the entire process was scrapped. Austin has yet to introduce a new land-use code and speculations on when this would happen vary.

For a brief moment voters and elected officials were presented with an option to ease the housing crisis through the introduction of new housing types. Their refusal has not barred these buildings from being constructed. In fact, missing middle has never been entirely missing from Austin. Housing of 2-10 units per parcel have sprouted through cracks in the zoning code since its inception. But these regulations, which I will discuss in this Professional Report in great detail, affect the quality as well as the quantity of these developments. Housing and planning literature generally holds that land-use restrictions increase the cost of housing; the more hoops a developer has to jump through the more money the buyer or renter will have to pay to make up for this time and effort spent on review and compliance.

The aim of this study is to test the assumption that land use regulations increase the cost of housing. The first drafts of CodeNext were built on a two-part premise that 'missing-middle'

housing was the best solution to the city's housing supply shortage and that the existing code severely restricts its development. This study measures the impact on the price of new duplexes in Austin of seven regulatory bodies, processes, loopholes. If projects that faced any of the four reviews were on average more expensive than the mean new duplex, or if projects that had used any of the loopholes were less expensive, then that would be considered evidence of the validity of a positive relationship between regulations and prices.

This Professional Report proceeds as follows. First, a literature review will cover the basics of zoning's history and how academics have assessed its impact on housing production. In this section I will also discuss the current state of missing middle housing and how different cities and states have tried to make it a more common housing option in residential areas. The next section explains the methodology by which the analyses in this report were conducted. Following that will be the results and discussions for the eight analyses. Each analysis attempts to quantify the impact on price that results from a project undergoing a review, regulation, or loophole. Each analysis will be discussed individually first by introducing the particular regulatory element, showing on a map where effected projects are located, comparing projects that experienced the regulatory element with those that hadn't in a table showing property count, average lot size, unit size, value per square foot, average rent, and average home value, and then a discussion of how these results might be explained. Finally, the report closes with a summary of key takeaways and an argument for the importance of monitoring activities like these for forward thinking planning agencies.

Literature Review

Regulations for city form have existed for centuries, but zoning codes have only been around since the early 20th century. They partially stem from the movement to create health and safety regulations for urban housing in the late 19th century following decades of industrialization and urbanization that had resulted in overcrowded tenements located near polluting factories (Schill 2005, 6). Buying a house in this era of rapid industrialization was risky for those working in the city. There were hardly any guarantees that the lot next door would not be developed for a use harmful to the health of one's family. While this argument for zoning for health and safety has been used often, recently the origins of zoning have been reexamined. Zoning was first legally upheld nationwide in 1926 in the Supreme Court case of *Euclid v. Ambler Realty*. *Ambler Realty* was stopped from developing a parcel in the Village of Euclid for industrial uses because of the town's zoning code. While the language of the decision mentions the health of residents, several Supreme Court justices also mention the detrimental effect of multifamily development in single-family residential areas. In his majority opinion for *Euclid v. Ambler*, Supreme Court Justice George Sutherland compared apartments to "a mere parasite, constructed in order to take advantage of the open-spaces and attractive surroundings of the district" (272 US at 394). The decision held that zoning "was a constitutional exercise of police power... on the ground that zoning would prevent nuisances" (Schill 2005, 6).

Following *Euclid v. Ambler*, zoning was frequently promoted by real estate firms and developers (Fischel 2004, 9). Homeowners could now use zoning as insurance against "future intrusions of conflicting commercial uses" (Boyer 1983, 63). The 1940s and '50s were a golden age of homeownership in America. This was the era of the GI Bill, the FHA, and cheap mortgages. Zoning worked in tandem with these federal programs as a tool used by suburban

developers to incentivize families to relocate and purchase their first homes. Zoning insured homeowners against any nearby use commonly seen as a disamenity, including multifamily housing. Although it's impossible to prove, Fischel claims that without zoning, homeownership would not have become the norm for middle class families because so many would be reluctant to "invest their savings in a large undiversified asset" (Fischel 2004, 13). Not only has single-family zoning succeeded in protecting mid-century suburbs from development in subsequent decades, its geographic footprint has stretched to cover the much of the land in cities like Austin as new and old neighborhood seek to enjoy the same security of their investment.

Many believe that not only do zoning regulations decrease the number of buildable units, but also that the price of new units will increase as regulations become stricter (Furman 2015, Fischel 2004, Ihlanfeldt 2007, Dain 2019). Between 2010 and 2013, housing prices rose to a point that the average housing unit was 56% more expensive than the cost to build the unit. This is 23 percentage points higher than the difference between final cost and construction cost in the 1990s (Furman 2015, 3). One possible explanation for this alarming trend is that current zoning codes do not allow for the construction of unsubsidized moderately priced housing. This would explain why researchers in Massachusetts consistently found that "Increases in minimum lot sizes were followed by significant increases in prices" (Dain 2019, 27). Another zoning-related explanation for the increase in housing prices is that by capping the potential supply of housing, bidding wars inevitably start when demand outpaces the supply of existing units (Gyourko & Molloy, 2017, 3).

While this is a popular theory, it is hard to prove through evidence because as Gyourko and Molloy point out, "Heterogeneity in land use regulations across localities is so extensive that it is almost impossible to describe the full complexity of the regulatory environment" (Gyourko

& Molloy, 2017, 3). With so many elements in a zoning code, as well as other types of regulations apart from zoning that affect development, it becomes difficult to isolate one factor's causal relationship with housing prices. Ihlanfeldt argues that the overall lack of evidence to prove an exogenous relationship between zoning and prices is not for a lack of influence on the part of the zoning code, but because the relationship is not one sided (Ihlanfeldt 2007, 421). Exogenous and Endogenous are important classifications that will be discussed at the end of this paper. An analyst might be surprised to find a positive relationship between zoning restrictiveness and unit size. The analyst wrongly assumed that the zoning variable is exogenous, meaning that it is only influenced by variables outside the model. On the contrary, zoning was affected by unit size in that owners of large single-family homes were more likely to support restrictive zoning than other homeowners. In the latter situation, zoning restrictiveness is an endogenous variable, meaning that other variables in the model exert some influence over it. Ihlanfeldt points out that, in analyses of the relationship between zoning and price, studies that treat zoning as endogenous produce "effects that are substantially larger in absolute magnitude" (Ihlanfeldt, 2007, 422). This does not mean that those studies rearranged the variables so that zoning was the dependent variable and price was independent. Rather, they incorporated an additional layer of complexity to their analyses while still treating zoning as independent and price as dependent.

2018 saw historic lows in the development of residential properties between two and nine units in the US. However, at the same time there was a record high in the development of buildings with more than 50 units (Fox, 2019). The former of these two categories is termed 'missing middle', and for good reason. Middle density housing, anything that has less units than mid-rise apartment blocks and more units than a detached single-family house, is becoming more

and more of a rarity in developer portfolios. Figure 1 shows that since the mid 1980s the development of such projects has been on a steady decline. While the golden age of missing middle development dates somewhere between 1870 and 1940, as recently as 1980 20 percent of newly-built single family homes were attached to other units (Hurley 2016).

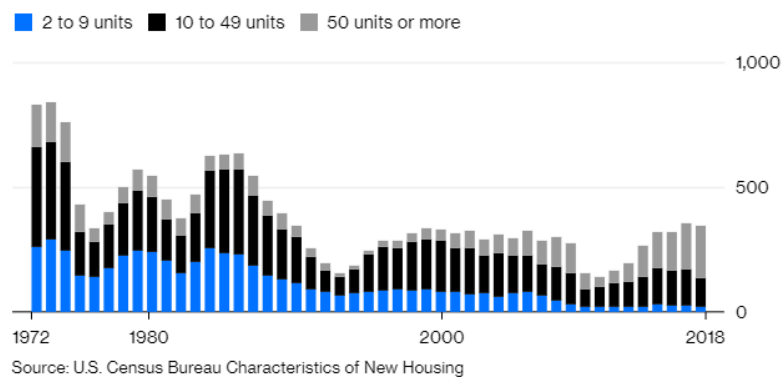


Figure 1: Multifamily construction in the US grouped by number of units. Source: Fox. 2019

Missing Middle housing has become popular among urbanists in recent years. The term itself was coined in the mid-aughts by urban designer Daniel Parolek of Opticos Design. His arguments for the value of this building type have been widely circulated and echoed in online publications like CityLab, StrongTowns, Curbed, and NextCity (Hurley 2016). The ideas of the New Urbanism movement have by this time become somewhat mainstream, at least among planners. Missing middle, although a category identified by the group previously, fits conveniently within New Urbanist transect designs for traditional neighborhoods. Other researchers have lauded the low cost per unit of building middle density housing. In fact because of low appraisals and high density, some scholars suspect that city officials don't want this type of housing because it would increase demand on schools without adding much in additional tax revenue. (Schill 2005, 7). Missing middle housing also has the potential to reduce car dependency and pollution by increasing the viability of transit in many neighborhoods.

Standing in the way of middle density housing are zoning codes that in most large US cities ban everything except single family detached dwellings in neighborhoods and leave corridors as high density catch all areas for retail, office, and multifamily development. These corridors become so crucial to satisfying housing demand that it would be impossible for developers to do anything but max out entitlements and thus returns on such lots. Some cities are taking steps to reduce restrictions in single-family neighborhoods. In 2018, Minneapolis became the first city to remove all single-family zoning districts from its code. Now these areas still protect neighborhood character and scale but allow duplexes and triplexes where before only detached single family homes were allowed (Herriges 2018). In 2019, the Oregon Legislature passed a bill that would require that all cities larger than 10,000 people to allow duplexes on all residential lots. The bill also loosens restrictions of triplexes and fourplexes in cities larger than 25,000 people (Andersen 2019). Seattle is also making moves to ease restrictions on missing middle housing. The City now allows two accessory dwelling units on all lots where previously only one had been allowed. Furthermore, parking requirements have been removed for ADUs (Lloyd 2019).

Methodology

This report communicates the results of a simple yet broad quantitative analysis of recent duplex development in Austin, Texas. The goal of this study is not to determine the exact impact of certain regulatory barriers on the development of missing middle housing. Instead this study provides interpretations of data that has heretofore been left unexamined. Ihlanfeldt's claim that housing price's relationship with regulation is endogenous is evidenced by logic and hard data. With that, it is inappropriate to argue the existence of a simple causal relationship. Housing prices in Austin are influenced by a myriad of factors, and in turn those prices influence the policy and planning landscape that influences many of those factors. This report looks at seven regulatory elements that influence missing middle development in Austin, and compares properties affected by each regulation with those that weren't.

The parcels analyzed in this study were selected from building permit data downloaded from Austin's Open Data Portal. The Data Portal includes every construction-related permit issued in Austin between 1977 and July 2019. The only properties of interest were new missing middle developments built in the current regulatory environment. In order to pare down the data to relevant parcels I applied a set of filters using the online user interface. The dataset includes electrical, plumbing, demolition, and other non-building permits. The first filter was to only select building permits. Building permits in the dataset include not only new buildings, but alterations to existing buildings. Older permits were filtered out because land use regulations have changed in Austin over time, and this is a study of current regulations not historic conditions. Only permits issued in 2016 and 2017 were examined. This is because these are probably the most recent years where almost all the projects have by now finished construction. Finally, only properties between two and ten units were collected. As it turns out, when these

filters are applied, only permits for properties with two units return. Whether or not there are actually no quadruplexes with permits issued in this timeframe is uncertain. These filters were applied through the user interface at Austin's Open Data Portal, and it's possible that there was either a user or computer error. Regardless, the properties analyzed in this report are all two units per lot.

The permit data includes necessary fields like Travis County Appraisal District ID numbers, lot size, building size and number of floors, and street addresses. Using the street addresses, I manually pulled data from Zillow a real estate website that not only shows listed properties, but unlisted properties with their estimated value. These estimates are called Zestimates, and they offer Rent Zestimates as well. Zestimates and Rent Zestimates provide the basis for the price numbers reported in this study. I pulled these numbers from every unit on every street address listed in the permit data. In addition, I also recorded building square footage because I found errors in the permit data's numbers. There are problems with using estimates in housing analyses, but sales value of property are not publicly disclosed in Texas. Thus the only other two options for price data were to remove all properties not currently on the market and take the list price of those on the market or rely on county appraisal district data which is arguably more unreliable than Zillow because so many people successfully appeal their property tax assessments.

According to Zillow's website *Zestimates* are calculated using, "millions of statistical and machine learning models that can examine hundreds of data points for each individual home" (Zillow). While the algorithm for creating Zestimates is not public knowledge, Zillow does offer a short list of variables in the algorithm including home characteristics, prior sales, tax assessment, comparable homes, and unique features and amenities. The accuracy of the

Zestimate is stronger in areas like Austin with a lot of comparable houses for sale. Rent Zestimates are not derived from home value Zestimates. They use parallel pattern recognition algorithms to create Rent Zestimate but whereas Zestimates use previous transactions and tax appraisals as their basis, Rent Zestimates rely on previous rents. For this reason, two properties that are identical besides the fact that one has carpet and one has hardwood floors might have the exact same Rent Zestimates but the hardwood floor property might have a higher homevalue Zestimate because the algorithm detects a stronger positive relationship between floor material and home price than it does with rent price.

Using Zillow and permit data, I created six fields for each property; lot size in square feet, building size in square feet, estimated value per square foot, Zestimate, and Rent Zestimate. I grouped these records to create property counts and averages for developments affected by different factors in the land use code. These properties were not at all developed in a uniform manner. Depending on their location and other factors, different parcels underwent different land use reviews and utilized different options offered by the city and neighborhoods to make development easier. The regulatory elements examined in this study are a property's base zoning, zoning review, site plan review, subdivision review, board of adjustment review, future land use designation, and use of the secondary apartment infill tool. For each of these factors all properties affected by them were pooled together and averaged to see how these properties fared in comparison to the average of duplexes permitted in that time frame. In addition to the averages, a T-Test will be performed for each field to determine the significance of the differences between those properties that experienced a condition and those that didn't. Differences between means with T-Statistics below .05 will be identified as significant. The

table below shows the seven regulatory conditions, a brief description, and my hypothesized results

Zoning	Zoning Review	Subdivision Review	Site Plan Review	Board of Adjustment Review	Future Land Use in Neighborhood Plans	Secondary Apartment Infill Tool
Some parcels are not zoned for duplexes	Developers who want to change the zoning of their lot have to submit to the zoning commission	Many lots that are divided into smaller parcels have to be reviewed for subdivision compliance	Developers of certain projects have to undergo additional review of site plans	Developers who want to be granted a variance under their zoning designation have to go the BOA	Neighborhood Plans include Future Land Use Maps that advise commissioners on neighborhood preferences for development	Neighborhood Plans can choose to offer infill development options like allowing secondary apartments on all residential lots of a certain size.
These duplex units should be larger and less expensive	These duplex units should be smaller and more expensive	These duplex units should be smaller and more expensive	These duplex units should be smaller and more expensive	These units should be smaller and more expensive	Parcels planned for single family should have small and expensive units	These duplex units should be less expensive

Table 1: Regulations, descriptions, and hypotheses

Zoning

For the most part, zoning regulations for duplexes do not vary across zoning districts. Section 25-2-7333 of the Austin Code of Ordinances states that “For a duplex residential use, the base zoning district regulations are superseded by the requirements of this section”. This is interpreted to mean that when duplex is a stated allowable use within a zoning district, duplexes built within that zone all follow the regulations that are laid out in this section. Duplexes are allowed in the following districts: Single Family-3 (SF-3), SF-5, SF-6, MF-1 through 6 (Multifamily), Central Business District (CBD), and Downtown Mixed Use (DMU). The regulations are that the lot be no smaller than 7,000 square feet and no less wide than 50 feet. The building is to cover no more than 40 percent of the lot area, with impervious cover no more than 45 percent. The height may not be more than 30 feet. The code defines height as “the vertical distance from the average ground level to certain roof features. If the house has a flat roof, this level is the highest point of the coping, on a mansard roof it is the deck line, on a pitched or hip roof it is the average height of the highest gable, and for other roof styles it is the highest point of the building (ACO § 25-1-21). Only one parking space is allowed to be directly behind another. Both units must share a common wall and be under the same roof. Finally, there must be at least one front porch with an entrance facing the street, and if the lot is on a street corner, then there must be two front porches/entrances – one for each street (Austin Code of Ordinances § 25-2-773). Duplexes must include four parking spaces (ACO § 25-6-8 Appendix A).

Some of the parcels in this study might have been built not as duplexes, but as two-family residential. These are differentiated in the zoning code, and two family residential is regulated by its own section superseding base requirements in the same way as duplexes, however the

former is limited to the standard lot size of the base zone whereas duplexes are not. Two family residential use follows the same lot coverage rules as duplexes. This use describes something very similar to a detached accessory dwelling unit in that there is a principal structure and a secondary dwelling that must be set back at least 10 feet to the rear or above a detached garage. The secondary unit may not be taller than 30 feet and may not have more than 1,100 total square feet. The code also requires that if lots are developed as two family residential usage, then they may not be used as a short-term rental for more than 30 days a year if the unit was built after October 1, 2015 (Austin Code of Ordinances § 25-2-774). The principal unit must accommodate two parking spaces and the secondary needs to have at least one if the parcel is further than a quarter mile from an ‘Activity Corridor’ as defined by Imagine Austin. If the parcel is within a quarter mile then the secondary unit does not need to have any parking ACO § 25-6-8 Appendix A).

What is missing from the land use code is guidance on how non-residential lots can be developed with housing units. 35 of the units in the query are on lots not zoned for residences or mixed use. They have been confirmed to contain completed residential units on Zillow. It’s possible that these lots were built using variances. It is important to examine these units because they fall outside the purview of the basic regulations controlling most of the parcels in this study. If these units are much more affordable or take up more space on a lot, it could highlight the relative restrictiveness of the basic regulations for duplexes and two-family residences. Figure 1 shows the locations of all units within this analysis and differentiates those on residential lots from those on non-residential lots.

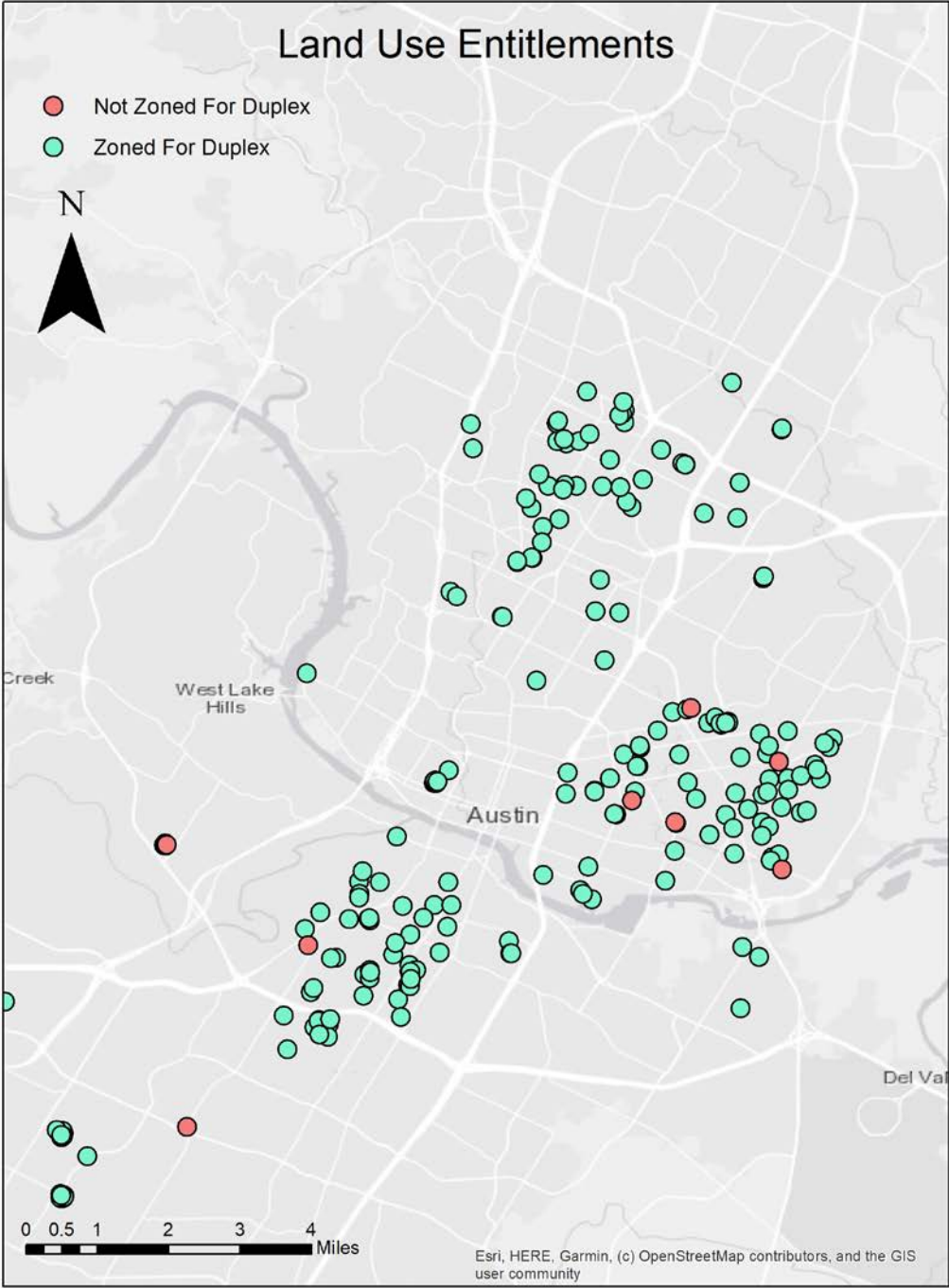


Figure 2: Location of duplex units with the duplex entitlements and those without those entitlements

	Count	Lot Size (Sq Ft)	Unit Size (Sq Ft)	Value /Sq Ft	Zestimate	Rent Zestimate	Rent /Sq Ft
Zoned for Duplex	364	9352	1847	\$318	\$553,957	\$2,562	1.4700
Not Zoned for Duplex	35	8543	1910	\$276	\$508,267	\$2,463	1.3603
T-Statistic		1.2858E-10*	.546397	.026064*	.20096	.510988	.184659

Table 2: Comparison of means between duplexes with duplex entitlements and those without those entitlements across different fields with accompanying T-Statistics

(*--Significant)

The table above shows the averages and counts of units, not properties. While a small fraction of the total, thirty-five units built outside of residential zones is quite noteworthy. Considering all sites, there appears to be three loose clusters of duplexes; one north central, one just south of Lady Bird Lake, and the third east of downtown. Most of the units on non-residential lots are in the southwest of the city or scattered in the central east area. Southwest Austin is particularly fast-growing as the urban core, the suburbs, and small towns of southern Travis County and northern Hays County have bled together in to a seamless fabric along commercial corridors and highways. Perhaps the sites in the southwest are zoned the way they are in part because the area is changing so fast and commissioners are lenient as to land use because the zoning maps do not reflect the current physical reality. In East Austin, which has been within the urban fold much longer than the southwest fringe, it's more likely that small single-family residences have been replaced by larger single-family residences and in fewer cases missing middle housing. Also, on the east side there have been a number of cases of former industrial lots replaced with mixed use or large multifamily.

These non-residential zoned lots also contain larger units on smaller lots. Furthermore, by all measures their units are more affordable than those on residentially zoned lots. Thus, it

could be said that non-residential zones outperform residential zones in the attributes most normally valued in missing middle housing. This could indicate that the requirements of duplexes in the land use code are not effective in guiding development as intended. However, perhaps it is futile to guess the intention behind an element of a complex document like the zoning code, even if the intention ascribed is one as widely supported as creating affordable units at a small neighborhood scale.

Zoning Commission Review

Regulation from the City begins at the permit application. Any builder or property owner that wants to do any construction on a lot--whether it be a deck, a shed, or a duplex--has to submit an application for a building permit. Attached to the application, one must include lot plans, floor plans, elevations, structural drawings, and foundation plans. These will be reviewed according to a checklist immediately, and then the Development Services Department staff member will move the application to the review phase. The application will be reviewed for compliance with the building code (International Residential Code) and Austin's Land Development Code. Within 15 days, the applicant will either be approved or receive a set of comments. The comments will either be requests for clarification or requests to change elements of the plan.

At this stage, the application will be reviewed according to the existing zoning of the parcel. If the applicant wants to change the zoning of the lot in order to build something that is not allowed in the existing zoning, they will have to submit their request either to the zoning and platting commission or the planning commission. Most of the parcels in this analysis would have been reviewed by the planning commission because that body is responsible for parcels within the boundaries of neighborhood plans, which most of these lots are. The land use review process can be long and difficult. Commissioners will evaluate the application according to the city's comprehensive plan and all neighborhood and small area plans whose boundaries the parcel falls within. The applicant will have the opportunity to argue their case, but neighbors and other stakeholders will also be able to weigh in during public hearings. Even if an applicant is successful in changing their zoning, it is very likely that the project will be changed to satisfy the commission and/or stakeholders. It is also possible that the project will become more costly

because of the delay in development. Figure 2 shows the locations of parcels that underwent land use review.

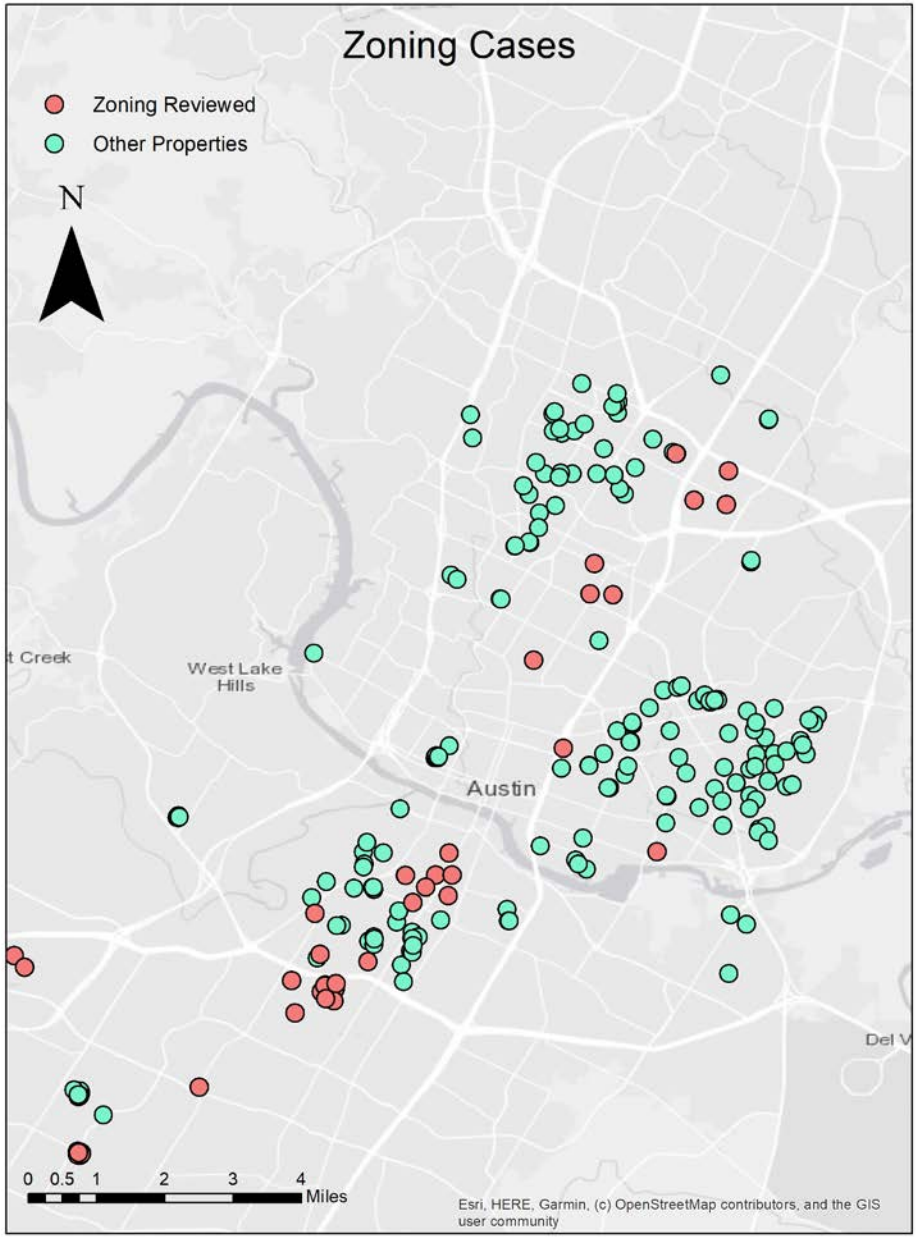


Figure 3: The location of duplex units that went before Zoning Commission review and those that did not

	Count	Lot Size (Sq Ft)	Unit Size (Sq Ft)	Value /Sq Ft	Zestimate	Rent Zestimate	Rent /Sq Ft
Not Zoning Reviewed	302	9252	1885	\$316	\$566,119	\$2,658	1.4913
Zoning Reviewed	98	9744	1753	\$311	\$500,199	\$2,230	1.3656
T-Statistic		5.03E-06*	.034653*	.850147	.082627	4.36E-08*	.047722*

Table 3: Comparison of means between duplexes that underwent zoning review and those that didn't across different fields with accompanying T-Statistics

A quarter of all sites applied for zoning changes. Most of these cases fall within two categories: those that switch from Rural Residential (RR) to Townhome/Condo (SF-6) and those in which developers appeal to amend or expand the neighborhood planning overlay in which their properties are located. Most of these parcels are due south and north of downtown. Relatively few are east of downtown. This could be because as a historically poorer area, that part of the city might have smaller lot sizes and thus most of the residential zoning there is SF-3 which not only allows smaller lot sizes but also allows duplexes which RR, SF-1, and SF-2 do not. Thus these areas did not need to rezone their lots in order to build duplexes and two family residential. There is nearly a 500 square foot difference between the average lot size of zoning reviewed sites and sites that were not zoning reviewed. This is a significant difference, and it was probably due to the number of large RR lots in the south that were converted to SF-6. The units were more 100 square feet larger in properties that did not undergo zoning review, which could suggest that building size decreases under the added scrutiny of commission review.

Larger units do not translate into higher prices. In fact, across all measures, properties that underwent zoning review were less expensive than the average. This suggests that the delay in development is not so high with these projects that the added costs need to be passed down to the buyer in order to make satisfactory returns. There is also the possibility of other linked

factors at play like geography. Most of the sites with zoning review are in more suburban areas where land is cheaper. There is significant difference between rental prices and this is probably due to these units being located in less in-demand areas than those closer to downtown and the University of Texas campus. In a hot market like Central Austin, land prices are high and thus if there are price differences between two clusters of properties, it might be more likely that this has more to do with land prices than regulatory conditions of development

Subdivisions

Subdivision requests are required whenever a property owner or developer of lot within city limits or the extra territorial jurisdiction wants it broken down into multiple parcels. Depending on the location of the parcel the subdivision will be reviewed by either the planning commission or the zoning and platting commission. There are strict time limits on subdivision review. Following application submittal, the Commission must make a decision within 30 days. Because of that time limit, any major cost increases from delays would stem from a series of appeals made by the application, not because of slow processing on the part of the commission. However, appeals can also be made by interested third parties so possible delays could arise from that (ACO § 25-4-32). While rezoning requests are separate from subdivision reviews, the lot sizes within the subdivision are subject to minimum dimensions laid out in the zoning code. Furthermore, there are very specific requirements for streets, rights of way, utilities, and drainage that come under review for subdivision plans that would not be considered in most permit applications or site plans.

The development services department can exempt a project for subdivision review if the project meets all of the following criteria: it is less than five acres, the existing lot has the same dimensions as it did in 1995, the lot is already serviced by utilities, the lot is located on an existing street, and the project complies with the requirements of roadway frontage (ACO § 25-4-2). In other words, most infill projects aren't required to undergo subdivision review. Considering the locations of duplex projects that underwent subdivision review shown in the map below, it is noteworthy that not all these projects are on the urban fringe. As with projects that underwent site plan review, the relationship between regulation, project, and price is

probably very endogenous because only certain projects trigger subdivision review and those project types might be more or less expensive than the typical duplex development.

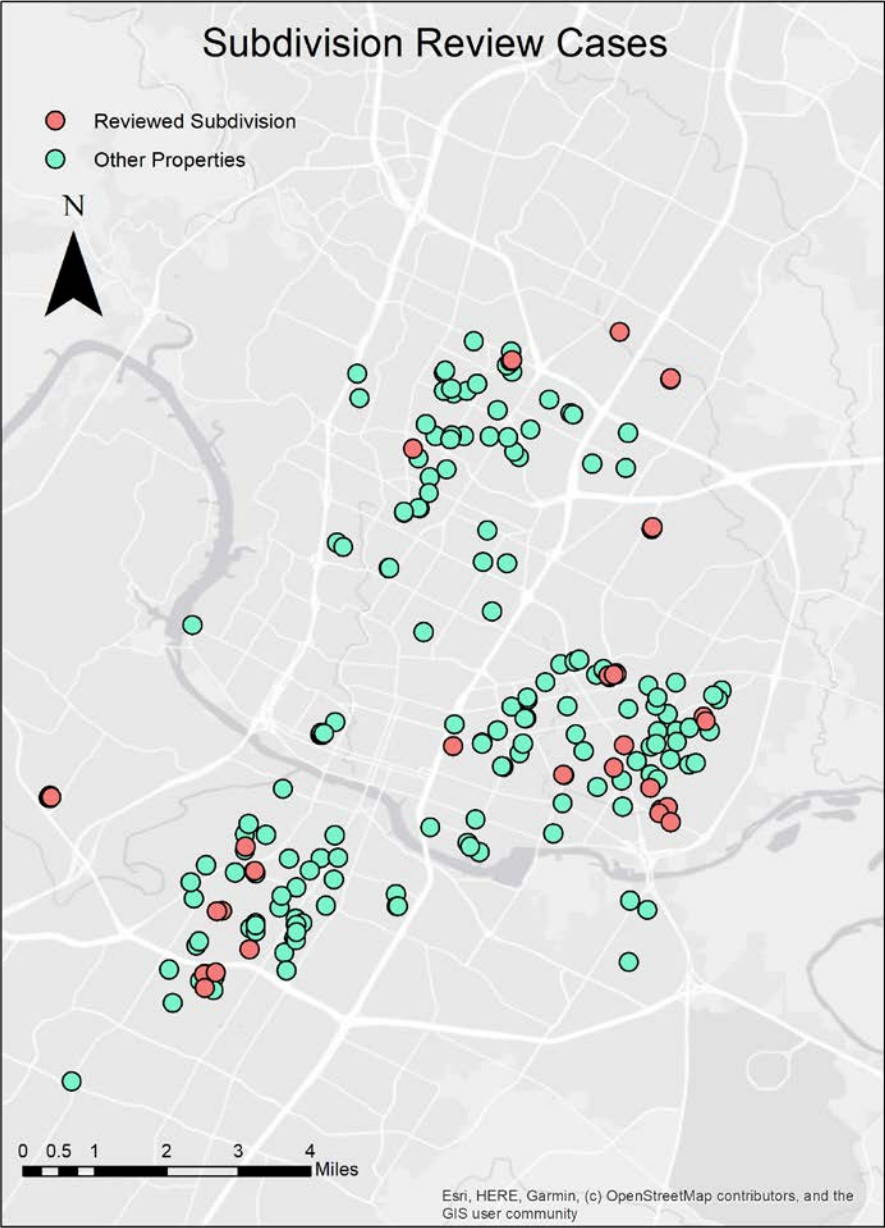


Figure 4: Locations of duplex units that went before subdivision review and those that did not

	Count	Lot Size (Sq Ft)	Unit Size (Sq Ft)	Value /Sq Ft	Zestimate	Rent Zestimate	Rent /Sq Ft
Not Subdivision Reviewed	312	9303	1844	\$324	\$560,756	\$2,586	1.4932
Subdivision Reviewed	86	9426	1883	\$280	\$511,225	\$2,435	1.3425
T-Statistic		.209266	.536184	.000423*	.022713*	.100957	.011457*

Table 4: Comparison of means between duplex units that underwent subdivision review and those that didn't across different fields with accompanying T-Statistics

The 86 sites in this analysis that underwent subdivision review are not geographically clustered and they are located in both suburban and urban areas. The average lot and building sizes reflect this. Neither field shows significant differences between the two groups. This is surprising given that many of the lots in these areas are probably too small to subdivide. Furthermore, if these projects underwent review they did not meet the criteria for exemption, and those criteria cast a broad net. For example, it's unlikely that a lot with existing utility service would need to undergo subdivision review. Utility hook-up fees are expensive, and yet given the large number of duplex units in subdivided lots, this does not seem to hinder development.

Likewise, the cost of delays does not seem to be passed down in costs to the consumer. Value per square foot is lower among subdivision reviewed sites. This is partly due to the larger square footage of subdivision units, as the larger denominator will reduce the statistic. However, this is probably more the result of the larger Zestimate among subdivision units. The difference between Zestimate averages is sizeable. In fact, all cost fields except for Rent Zestimate show significant differences. This might be attributable to geography as there are many subdivision units in the eastern edge of the urban area which historically has been an area of concentrated poverty, thus cheaper land values. This is aided by the strict time limits on subdivision review

which reduce the likelihood that a project could accrue additional cost by being delayed, as compared to projects that went before different commissions.

Variations

Another option for an applicant with a project that is not compliant with base zoning is to make a request for a variance. The Board of Adjustment decides on variance cases. These variations are decisions that allow the applicant to do things otherwise not allowed in the code, neighborhood plan, or neighborhood conservation combining district. A typical variance would be to make a building taller than is normally allowed or to provide fewer parking spaces than is required. In this dataset, 33 projects applied for variations. Standard land use law and Austin's code do not allow variations to be used for granting a property special benefits that are not enjoyed by other properties in the base-zone. On the contrary, variations are strictly awarded to properties that because of special circumstances and unique hardships, are unable to function according to the entitled uses laid out in the base-zone. Thus, it is extremely unlikely that a variance granted to one of these applicants would allow a second unit where it normally would not be allowed.

The Land Use Code lists the required findings for a variance. For variations from parking requirements, the Board must determine that the traffic generated by the use "does not reasonably require strict compliance with... the requirement" (ACO § 25-2-474). Furthermore the use may not rely on street parking to satisfy demand or result in a safety hazard. All other variations will be granted only if a certain requirement makes an entitled use impossible and creates a unique hardship. Variations will not be allowed if the project alters the character of the area, interferes with the usage of adjacent properties, or violates the purposes of the regulation that variance is being applied to. Logic holds that projects submitted to the Board of Adjustment will be smaller and more expensive because they have unique conditions that hindered their

development and they have been delayed in the construction timeline. The map below shows the locations of projects that were submitted to the Board of Adjustment for variance review.

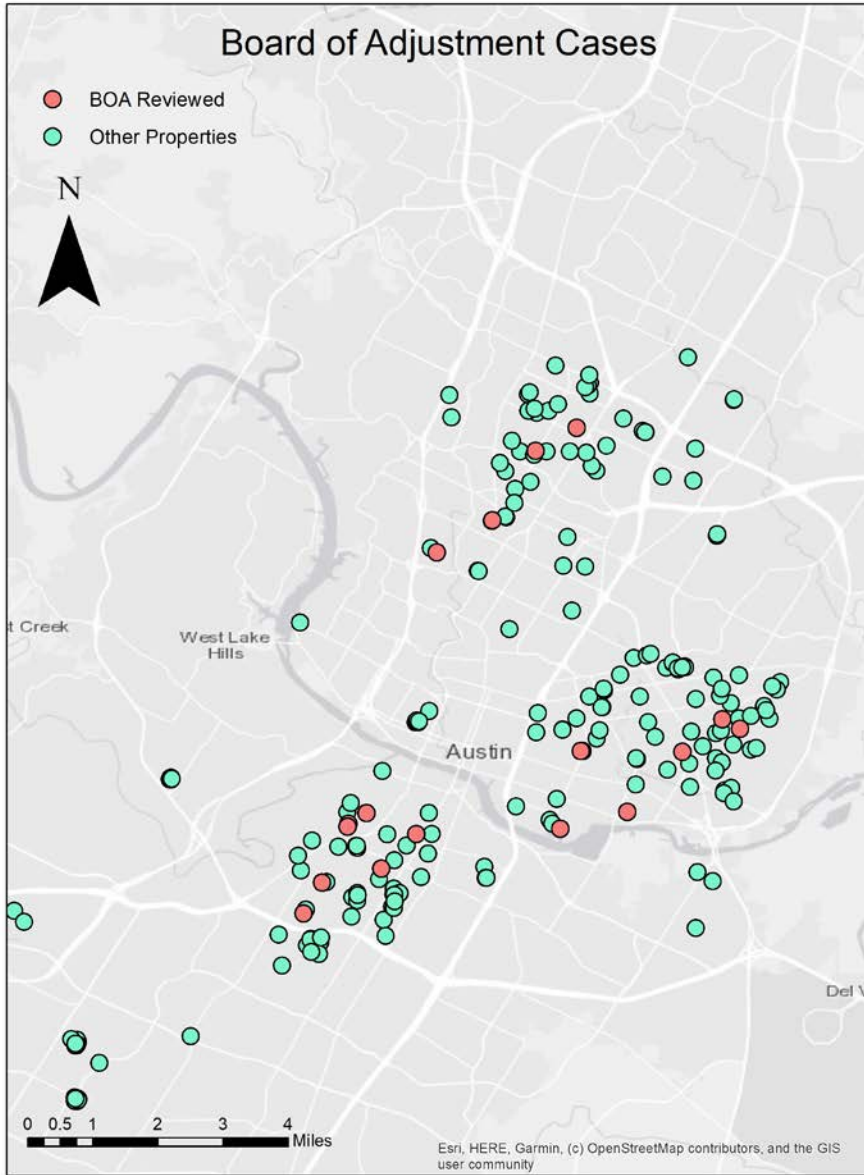


Figure 5: Locations of duplex units that went before the Board of Adjustments and those that did not

	Count	Lot Size (Sq Ft)	Unit Size (Sq Ft)	Value /Sq Ft	Zestimate	Rent Zestimate	Rent/ Sq Ft
Not BOA Reviewed	365	9301	1861	\$311	\$545,211	\$2,527	1.4447
BOA Reviewed	33	9595	1758	\$348	\$603,613	\$2,848	1.6370
T-Statistic		.001265*	.305865	.052694	.173576	.122043	.012192*

Table 5: Comparison of means between duplex units that went before the Board of Adjustment and those that did not across different fields with accompanying T-Statistics

Across the variables tested, Board of Adjustment cases had the highest value per square foot. While the T-Statistics for home values is not quite low enough to warrant a determination of significance they do indicate a cost somewhere in the development process that is not experienced in other projects. The rent per square foot difference is significant and thus at least one field indicates a financial burden. Value per square foot is calculated here by dividing the Zestimate by the unit size. A large Zestimate or a small unit size could create a large value per square foot. The average duplex that went through the Board of Adjustment has both a large Zestimate and a small unit size in comparison to the average of all duplexes created in this time frame.

While the Board of Adjustment cases do not have the lowest mean unit size, they are still on average smaller than the mean of all units. One would be tempted to presume that this is in response to smaller lot sizes. A small lot size definitely fits within the category of unique hardship, which would make a variance and/or small building an appropriate solution if that were a problem. However, the mean lot size is actually significantly larger among Board of Adjustment sites as compared to all sites. Perhaps the better explanation is that including larger than average units in a variance application would be a hard sell as a developer argues for unique hardships to the Board.

The rents per square foot are quite high among BOA properties. This is not due to a clustering in an expensive neighborhood as Board of Adjustment properties are scattered evenly throughout the city. The most likely reason for the high Rent Zestimates is that BOA leads to long delays whose cost is passed down to the consumer. This could be because proving unique hardship is difficult and could lead to disagreements between developers and neighborhood associations over a longer period of time. A possible explanation for the significance of the rent differential and not the home value is that it is easier for property owners to add amenities like washing machines, driers, and gas stoves in order to justify high rents, whereas these amenities would either not be provided by the developer or make a small difference in the asking price for a homebuyer.

Site Plan Review

Generally, site plans are required when there is a change in the use of a property, when a property is developed, and before a project can receive a building permit. However, there are many exceptions to this rule. In fact, site plans are not required for duplexes, secondary apartments, or two family residential as long as there is only one principal structure on the lot and it will be outside the 100-year flood plain. This first requirement is not that there can only be one structure per lot, but that if there is a second, it should set back from the principal dwelling. Besides those two cases, a site plan would also be necessary for a new duplex if the project would involve removing trees larger than eight inches in diameter, and if the project will include code non-compliant elements (ACO § 25-5-2).

Site plans are reviewed by the Planning Commission. Each site plan is required to include basic elements like “land use, site design, and layout (building height, setbacks, density, and parking)” (Harrington 2016). Site plans are possible regulatory barriers because they create delays and force some projects to undergo land use review even when the applicant has not made a zoning change request. The other reason for studying site plan review is because only certain types of properties trigger them. In the case of two-unit residential properties, the only projects that would not be exempt would be detached buildings of similar size and setback so that neither one could be deemed primary or secondary. Perhaps inadvertently, the Land Use Code favors one duplex design over another by making one easier to develop. If it knew that duplexes types that trigger site plans are usually significantly less expensive, then perhaps the City would remove this requirement so that these projects were easier to develop. Likewise, if projects that do not undergo site plan review are significantly cheaper, then site plan requirements should be

examined for how much these requirements delay projects which in turn adds cost to the consumer.

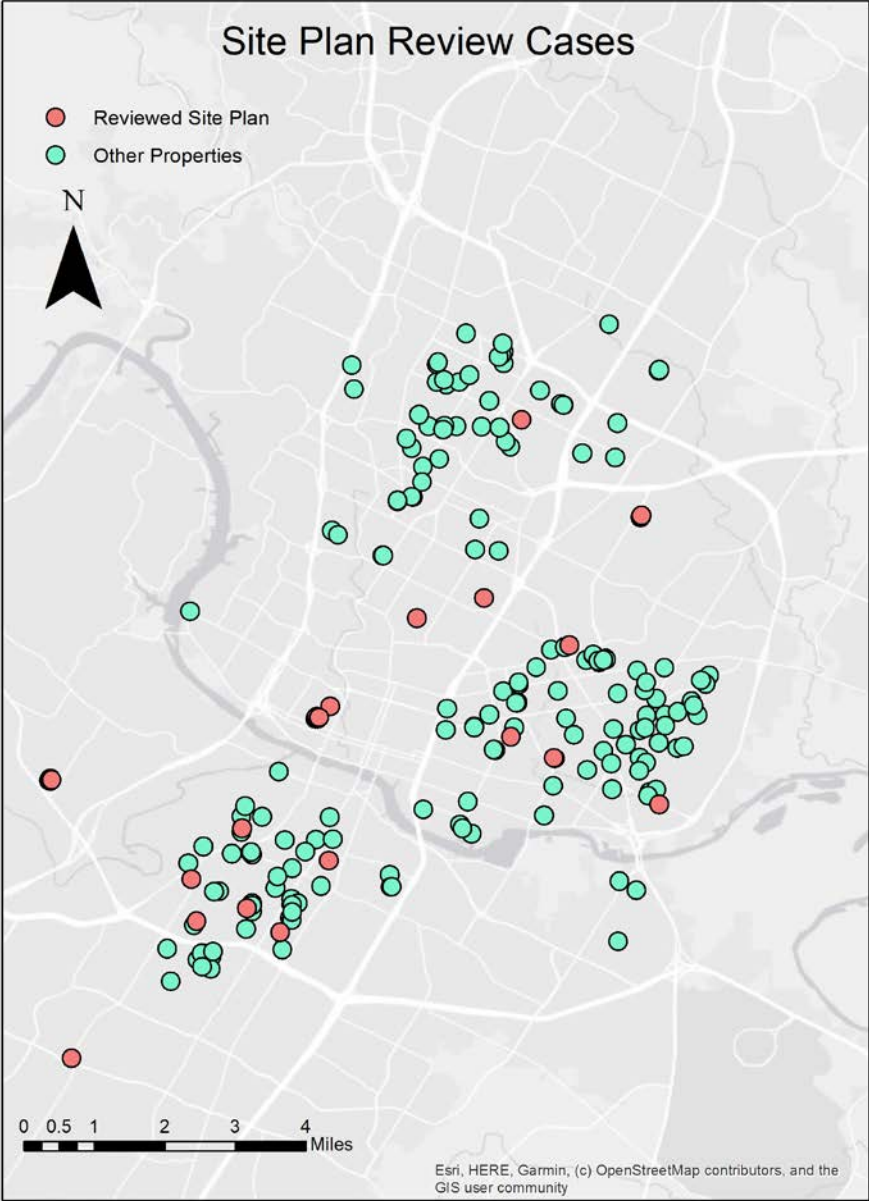


Figure 6: Locations of duplex units that underwent site plan review and those that did not

	Count	Lot Size (Sq Ft)	Unit Size (Sq Ft)	Value /Sq Ft	Zestimate	Rent Zestimate	Rent /Sq Ft
Not Site Plan Reviewed	299	9305	1790	\$325	\$545,839	\$2,540	1.5142
Site Plan Reviewed	99	9857	2041	\$283	\$562,783	\$2,041	1.2987
T-Statistic		6.20E-38*	.003153*	.036746*	.679847	.656745	8.72E-06*

Table 6: Comparison of means between duplex units that underwent site plan review and those that did not across different fields with accompanying T-Statistics

Two things are likely to trigger site plan review; having two detached units of the same size or not being code compliant. Since much of the code deals with building shape, it is likely that unit size triggered site plan review rather than site plan review forcing developers to build bigger. Unit size also can create environmental issues that trigger the need for site plans. In the code there is specific language that states that if a site creates issues related to impervious cover, drainage, and proximity to flood plains then a site plan is required. The role of endogeneity should not be underestimated in its power to shape results of a quantitative test like this. If site plan review were to have a one-way causal relationship to unit size it would be to shrink unit size to decrease its impact on the land and ensure neighborhood compatibility. The only plausible reason for mandating that unit sizes be larger would be to ensure that new housing is decent, safe, and sanitary, however that would not force developers to go above and beyond the mean.

The site plan results represent something opposite to what was discussed with the subdivision cases where rent value was not reacting to a certain regulatory factor in the same way that home value was. Here, there is a very significant correlation between site plan review and low rent per square foot, while there is not with home value per square foot. This indicates that the projects that have undergone site plan review are valued less by renters than by homebuyers. The cases in this study that would likely trigger site plan review would be detached

units of equal size on one lot. Perhaps this arrangement is connected with higher home-values but there is less connection to higher rents. It is possible that because new, and thus expensive, rentals are usually in large multifamily buildings, Zillow's algorithm does not detect a strong connection between detached units and high rents. Furthermore, not having enough parking spaces would trigger site plan review. It could be that some of these sites lacked parking or another amenity that is seen as crucial to rent value, but not as vital to homebuyers.

Future Land Use Maps

Through the creation of Small Area Plans, residents within a neighborhood have the opportunity to shape the course of future development in their community. Neighborhood planning starts with the creation of a plan through a partnership between area residents and city planners. When the plan nears adoption, a group of residents and stakeholders form a contact team that will be responsible for seeing the plan through implementation. While completed plans are generally lengthy documents that include a myriad of details, most of the power of the plan derives from the required Future Land Use Map (FLUM). FLUMs do not automatically change the zoning, but all future changes must be in accordance with the FLUM. Otherwise, the neighborhood plan must be amended before the rezoning is approved. Thus, while small area plans are viewed as attachments to the comprehensive plan, this might understate their importance because within a given neighborhood both documents must be followed for future rezoning. The problem with this is that many small area plans were completed before the passage of Imagine Austin, and the new comprehensive plan did not require that these other plans be updated. Therefore, Imagine Austin and the small area plan are in disagreement in many areas; this dynamic has helped fuel much of the controversy surrounding CodeNext.

Many residents argue that small area plans are a necessary defense against top-down planning from the city. By allowing neighbors to come together and decide the future of their community, a neighborhood is protected from city planning, which is too often influenced by citywide politics, special interests, and business. However, questions remain whether neighborhood planning is actually the participatory democracy that this vision suggests. According to a recent audit of Austin's neighborhood plans, only 13 of the 30 neighborhood plans were voted on by more than 1 percent of the area population, and in many

cases there was no evidence of a vote count (City Auditor 2016). With no hard requirement for participation, many plans are passed without the input of a majority of residents.

This analysis organizes the units into three categories: those not within neighborhood plan boundaries, those on parcels identified for single family (low density) use in neighborhood plans, and those identified for other uses (high density) in neighborhood plans. My hypothesis is that duplexes outside of neighborhood plan boundaries will have larger unit sizes and lower rents and values than those within neighborhood boundaries. I also estimate that units on lots planned for low density will be more expensive than those in the other two groups, and that units on lots planned for high density in neighborhood plans will fall in between the other two categories in price and unit size. I believe that these higher prices and smaller units will be due to delays and appeals caused by organized neighborhood opposition. All commissioners must consider neighborhood plans when making decisions, so this opposition could exert influence during any point of the review process.

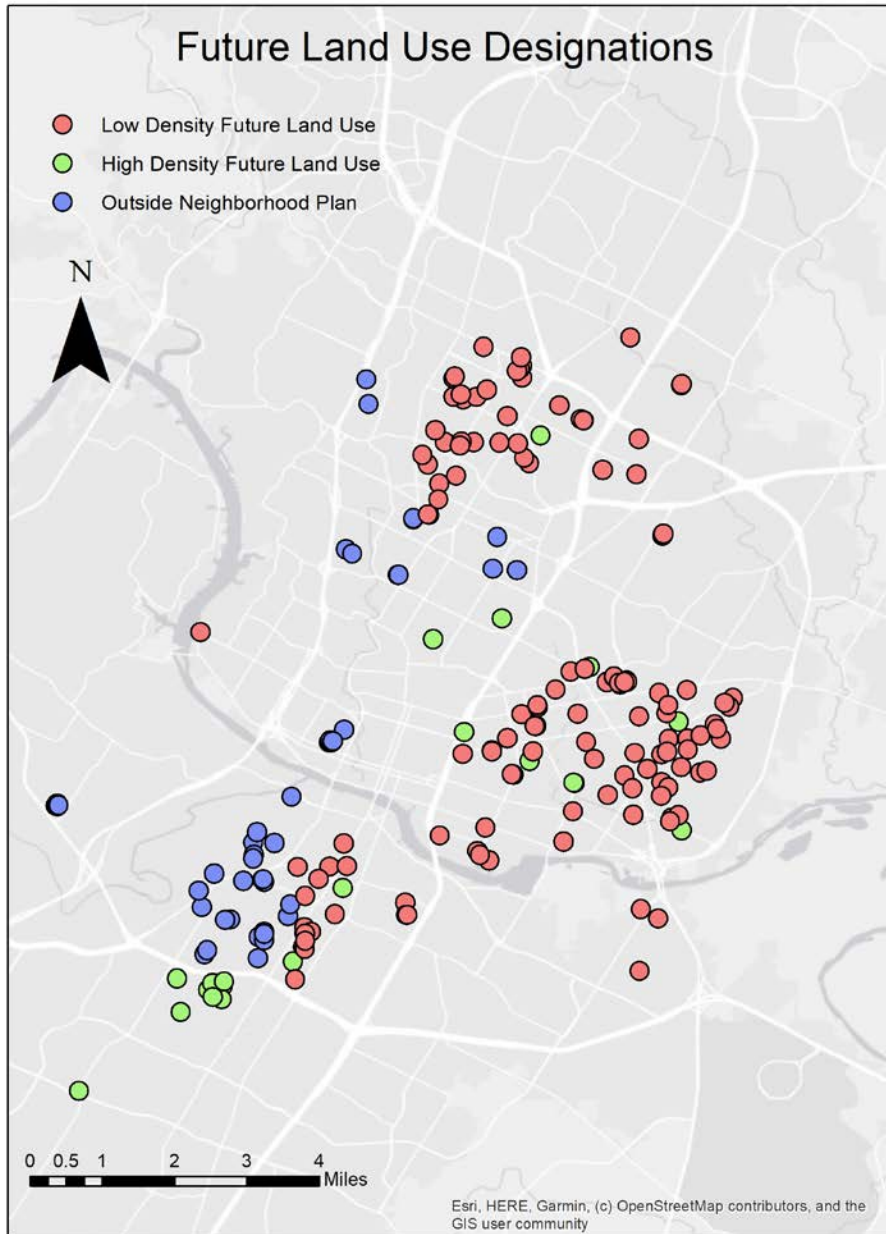


Figure 7: Locations of duplex units on lots designated as high density and low density in neighborhood plan future land use maps, and those outside the boundaries of neighborhood plans

	Count	Lot Size (Sq Ft)	Unit Size (Sq Ft)	Value /Sq Ft	Zestimate	Rent Zestimate	Rent /Sq Ft
Not in Neighborhood Planned Area	142	9557	2090	\$294	\$598,843	\$2,757	1.3635
Low Density Future Land Use	214	9133	1723	\$324	\$523,412	\$2,472	1.5233
High Density Future Land Use	42	10654	1709	\$336	\$520,844	\$2,279	1.4699
ANOVA Significance		yes	yes	no	yes	yes	yes

Table 7: Comparison of means between duplex units on lots designated for future high density land use and low density land use in neighborhood plans, and those outside of neighborhood plan boundaries, across different fields with accompanying T-Statistics

Instead of using a T-Test to determine significance, this analysis utilizes the ANOVA method. ANOVA is short for analysis of variance and it is used for comparing the means of three or more groups, whereas T-Tests can only compare two groups. ANOVA tests do not offer a clean single score like a T-Statistic. Instead it gives among other values, an F-value and an F-Critical value. Difference of means is significant when the F-value is greater than the F-critical value.

The findings of many studies and reports on land use regulation tell us that the more regulation there is the higher the prices will be. One would expect that units built within neighborhood planning boundaries would be more expensive according to this logic. Neighborhood plans stack another set of (usually status-quo preserving) guidelines on top of the requirements laid out in the Land Use Code. Furthermore, in order for a plan to be created there must be an organized neighborhood group which would indicate that incompatible building types would face strong opposition thus delaying permit approval. The results of this analysis do not support this presumption. Home value Zestimates and Rent Zestimates are significantly lower in

both high density lots and low density lots in NP areas. However, this does not necessarily mean that neighborhood planning has a negative effect on home values. What is more likely is that the regulatory factor is not entirely exogenous; it is not immune to the influence of housing prices. It is quite likely that areas in Austin with higher home values are more likely to pursue neighborhood planning, because they want to secure their investment.

Value per square foot is higher in NP areas, but the difference is not significant, and is primarily due to a very small mean unit size. In fact, there is a 12 percent difference between the average unit size of parcels outside neighborhood plan boundaries and the average size of parcels mapped for high density in neighborhood plans. This statistic is not as surprising. It indicates that neighborhoods designate only their largest lots to multifamily (thus the high average lot size) and push for the development on those lots to keep within the neighborhood scale. In other words, it is likely that these neighborhoods push for small buildings that are compatible with the surrounding single-family buildings.

Secondary Apartment Infill Tool

Regarding infill housing, small area plans carry a lot of sway. During the planning process, neighborhoods can choose to designate allowable infill development options. This infill options are selected from a standard list created by the city in 2003. The options include secondary apartments, corner stores, cottage lots, small lot amnesties, and urban homes. Neighborhoods submitting neighborhood plans for ordinance must include what if any infill tools they want to allow in the neighborhood plan boundary. These infill tools are special uses that do not fit easily within the zoning code but that are often sought after as elements of traditional neighborhoods and complete streets. The City has a list of available options that the neighborhood can pick from. These include cottage lots, corner stores, neighborhood mixed-use, and secondary apartments among others. These building types are then written into the land use code for the area as a single overlay for the entire district to be applied as entitlements for qualified parcels. Once on the books, these uses can be implemented regardless of base zoning as long as a development plan is approved by the Planning Commission. Infill is allowed in all residential zoning districts except rural residential, SF-1, and SF-2. Some of the special uses have to be mapped to the parcel in the ordinance. Others can be made available across the entire neighborhood or in a designated area depending on what the neighborhood wants. The infill tools that concern duplexes are of the area wide variety.

The secondary apartment tool refers to the development of an additional dwelling unit on the same lot as an existing single-family home. This tool reduces the minimum lot size to 2,500 square feet and minimum lot width to 25 feet. Lots smaller than 4,000 square feet can increase their impervious coverage to 65 percent (ACO § 25-2-1406). Secondary apartments are allowed in all residential zoning districts except for rural residential (RR). Secondary apartments as

developed through the infill tool follow the same regulations as secondary units built in two family residential use previously described. Secondary Apartments can be built on smaller lots than duplexes and two family residential. Logic holds that units in areas with the secondary apartment tool might be on smaller lots, be less expensive and have a higher count because they are allowed on smaller lots than other two family residences. The map below shows areas that allow the tool and areas that don't and the location of duplexes.

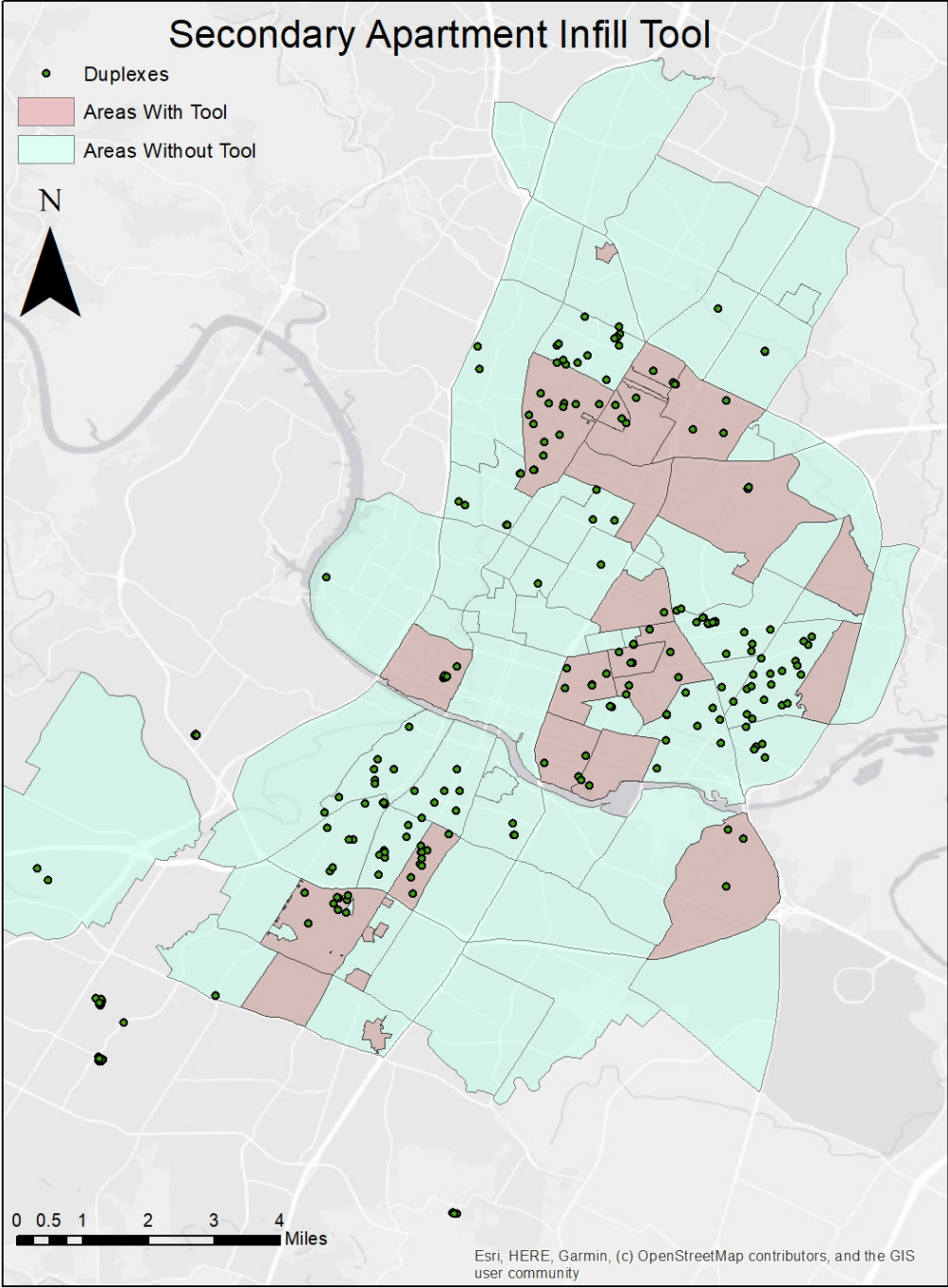


Figure 8: Locations of duplex units in areas that allow the use of the secondary apartment infill tool and those in areas that do not.

	Count	Lot Size (Sq Ft)	Unit Size (Sq Ft)	Value /Sq Ft	Zestimate	Rent Zestimate	Rent /Sq Ft
SA Tool Unavailable	284	9408	1804	\$312	\$536,046	\$2,478	1.4933
SA Tool Available	114	9172	1974	\$320	\$584,947	\$2,740	1.4475
T-Statistic		.005167*	.038692*	.638605	.063075	.011935*	.3966

Table 8: Comparison of means between duplex units in areas that allow secondary apartments and those that do not across different fields with accompanying T-Statistics

Without having seen the results from the Future Land Use Map analysis, one would be tempted to conclude from the Secondary Apartment results that building within neighborhood plan jurisdictions is such an onerous process that not even infill development incentives can make building missing middle housing in these areas less expensive. However, that analysis covered every new duplex in NP areas whereas this analysis covers only those areas that have adopted this tool. With a smaller sample size, the SA Tool results do not change the conclusion that neighborhood planning has little effect on two-unit residential values. Large differences between affected and unaffected could indicate the impact of a tool. However, most of cost differences here are too small to be significant. Rent Zestimates are significantly higher, but that could be due to the endogenous regulatory variable described in the last section.

It's unfortunate that the building permits do not list whether or not an infill tool was utilized. The sites selected for this test are parcels in neighborhoods that allow the tool. This represents a looser regulatory environment than in other neighborhood plan jurisdictions. It also presents an opportunity for easier ADU development that doesn't exist elsewhere in Austin. The average building size is larger in this group than the total average of all sites. It's unclear whether that reflects the influence of this tool or whether there is another factor at play.

One possible explanation is that this group of neighborhoods includes several very expensive areas close to downtown. These areas like Clarksville, East Cesar Chavez, and

Rosewood have very high land appraisals and thus in order to get sufficient returns developers have to build large luxury units that they can sell at a higher price. Luxury duplexes are becoming popular in Austin, and perhaps even with density incentives, developers are going to build these types of units when the market calls for it in a certain area.

Conclusion

Despite its limitations there is undeniable value in conducting these analyses. Many city planning decisions are based on best practices from somewhere else. Undoubtedly, following Minneapolis's ban on single-family zoning, other cities will consider whether or not they should do the same. Logic holds that if single family zoning didn't exist in Austin more duplexes would be built and they'd be cheaper than before. This data doesn't disprove that claim but it does put in question many basic assumptions about regulatory delay and housing prices. A quarter of the units in this study were built after the property was rezoned to allow duplexes, and on average those units were valued almost \$66 thousand less than properties that did not go through zoning review. While that does not mean that zoning is not a barrier to development, it does call into question the practice of conflating supply side economics and housing prices.

This report looks at eight regulatory elements that influence missing middle development in Austin, and compares properties affected by these regulations with those permitted in the same timeframe but unaffected by these regulations. The goal of this study was to use housing price as a reflection of how difficult it was to develop a parcel. Of course, this simplifies a complex issue. The price of a duplex unit is not just a reflection of the regulatory hurdles that lead to its construction, but also the result of geography, market characteristics, and most of all the decisions of the developer. However, if the analyses in this report produced consistent results where projects that underwent design and land use review were more expensive than duplexes developed without such reviews, then that would be sufficiently indicative of a positive relationship between regulations and high prices.

However, in most cases the results proved contrary to commonly held assumptions about regulations and prices. Projects that were reviewed by the zoning commission, and those

reviewed for subdivision and site plan compliance had on average significantly lower rents per square foot than those that did not go through these reviews. Meanwhile, units zoned for duplexes, those on lots planned for multifamily by the neighborhood, and those in areas where secondary apartments were allowed all were significantly more expensive than those that did not have these advantages. Most of the literature on this topic points to findings with the opposite results where additional reviews cause price increases. Austin's regulatory reviews and barriers, while an inconvenience do not seem to add great cost to the construction of duplexes. Projects that did apply for variances, however did have the expected result of being more expensive than the total average. As to why that is the case, this report can only provide interpretations based on prior studies. Most of the literature concludes that adding reviews that delay construction add to cost and that cost will be passed down to the developer. Why only the Board of Adjustment data supports this conclusion probably has something to do with appeals from the opposition related to the contention and debate that arises when a developer asks for special treatment outside of what is normally allowed.

Developments within the boundaries of neighborhood plans did have a higher value per square foot than those outside neighborhood planning boundaries, even though the average rent and home values were lower. Neighborhood plans do not add an extra review to the development process but they do offer extra guidelines as to how a property should be rezoned and provides another document that commissioners can refer to when making a decision on a case. More often than not these documents do not support the multifamily infill within neighborhood interiors. When these projects do make it through the review process they are often smaller sized than similar projects outside of neighborhood plan jurisdiction. This suggests a link between concerns for neighborhood scale and compatibility and unit size. That smaller

unit size is driving up the value per square foot of those units. In fact, of all the measures tracked here, unit size seems to be the most affected by differences in the regulatory environment. Units that went either through zoning review, Board of Adjustments, were in neighborhood planning districts, or were zoned residential had lower unit square footages than those that didn't.

Commissioners cannot request that a building be sold for or rented for less money, but they can request that a building be smaller. In this there is a direct line between regulation and building characteristic.

This report is limited by its narrow methods. To really examine the influence of these land use regulations more qualitative data would be required. Specifically, much insight could be gleaned by sharing these results with various missing middle developers and asking for their interpretations. Do developers find the subdivision review process onerous? Do they avoid developing in neighborhoods where there is organized opposition to this kind of development? Do they think that the benefits of being granted a variance outweigh the delays associated with the Board of Adjustment? Another method would be to find the application materials of all these projects before and after each review. Are there commonalities among variance cases? Are site plans altered in similar ways after being reviewed? With that information, one would be better equipped to state whether or not a regulation has a common effect on projects of this scale.

Austin's affordability crisis is not going to be solved by duplexes alone. There are a myriad of factors that have driven housing prices beyond the reach of low to moderate income families. One of them is lack of supply; a problem that missing middle housing could address. But there are other issues at play as well. Austin is unable under state law to mandate that developers include affordable units in their new multifamily projects. The funding for public housing is only enough for Austin's properties to remain occupied, not enough to expand. The

amount of Section 8 housing vouchers available for Austin residents is too low considering the long waitlist. In 2017, when these duplexes were permitted, the backlog of waitlisted housing voucher applicants was so long that it had been closed for two years (Hasan 2017). Projects funded through Low Income Housing Tax Credit alone cannot not address the needs of extremely low-income individuals and households. In order to help those with the most need it is necessary for projects to combine multiple funding sources. All of this is not to say that alleviating the current shortage of housing supply is not important. But any solution to the larger problem of affordability will require a two-pronged approach. The supply of all housing types must be increased, but so to must funding for affordable units be increased. Without subsidies, there is no guarantee that a greater variety of housing types will reflect a variety of housing prices.

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