

DEREGULATION OF ACCESSORY DWELLING UNITS:
A POLICY ANALYSIS OF AUSTIN'S ADU ORDINANCE

by

Joshua Solge

A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Master of Arts in Urban Affairs and Public Policy

Summer 2021

© 2021 Joshua Solge

All Rights Reserved

DEREGULATION OF ACCESSORY DWELLING UNITS:
A POLICY ANALYSIS OF AUSTIN'S ADU ORDINANCE

by

Joshua Solge

Approved:

Nina David, Ph.D.
Professor in charge of thesis on behalf of the Advisory Committee

Approved:

Danilo Yanich, Ph.D.
Director, M.A. Urban Affairs & Public Policy

Approved:

Maria P. Aristigueta, D.P.A.
Dean of the Joseph R. Biden School of Public Policy and Administration

Approved:

Louis F. Rossi, Ph.D.
Vice Provost for Graduate and Professional Education and
Dean of the Graduate College

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my thesis advisor, Dr. Nina David and the members of my advisory committee, Dr. Jonathan Justice and Dr. Katie Fitzpatrick. Their knowledge, technical support and encouragement were invaluable to this endeavor. I would also like to thank Dr. Stephen Metraux and the staff and faculty at the Center for Community Research and Service for the assistantship opportunity that supported my studies at the Biden School of Public Policy, University of Delaware. The experience was invaluable. I am indebted to the Gilman Family for the award of the Marvin S. Gilman Scholarship. Finally, I must thank my wife, Anna. Without her love, support, and inspiration, I would never have done this.

TABLE OF CONTENTS

LIST OF FIGURES	VII
LIST OF TABLES	VIII
ABSTRACT	IX

Chapter

1	INTRODUCTION	1
	Austin’s ADU Ordinance.....	3
	Land Development Issues in Austin	6
	Why Examine Austin?	8
	The Urban Housing Crisis	9
	The Issue of Zoning	10
2	LITERATURE REVIEW	12
	Lack of Affordable Development	12
	Zoning and Density Restrictions in the Housing Market	13
	Demographic and Preferential Shifts.....	14
	Supply Constrained Markets.....	15
	Practical Consequences of Low Density Zoning.....	17
	Zoning in Austin	18
	They build ADUs Anyway	19
	ADU Affordability	21
	Aging In Place	23
	Why ADUs?	24
3	METHODOLOGY	26
	Data.....	27
	Variables of Interest.....	30

	Analysis	32
4	RESULTS	34
	Housing Production.....	34
	Home Prices	36
	Property Values.....	38
	Geography of ADU Construction	41
	Summary of Findings.....	45
5	POLICY RECOMMENDATIONS	47
	Expand ADU Development Rights.....	47
	Support and Incentivize ADU Development	49
	Assess the Implications of Current Development Patterns for ADUs	49
6	CONCLUSION.....	51
	Future Research	51
	Parking and “Poison Pills”	52
	Implications of the Size and Value of ADUs.....	52
	Further Exploration of Property Values and ADUs	53
	Perceptions and Experiences of ADUs.....	54
	REFERENCES	56

LIST OF FIGURES

Figure 1	Map of Single Family Zoned Lots in Austin, TX.....	6
Figure 2	Population Growth Trends, city of austin, 1960-2018	8
Figure 3	Causal Map for Analysis.....	27
Figure 4	ADU Construction From 2010 to 2019	34
Figure 5	Single-Family Home Construction from 2010 to 2019	35
Figure 6	Geographic Distribution of New ADUs	41
Figure 7	Geographic Distribution of New SFHs Without ADUs	42
Figure 8	Permitted ADUs Over Percent Change in Median owner-Home Values.....	43
Figure 9	Permitted ADUs Over Change in Percentage of White, non-Hispanic.....	44
Figure 10	Permitted ADUs Over Percent Change in Median Household Income	45

LIST OF TABLES

Table 1	Development Restrictions of Primary SF Zones	4
Table 2	ADU Development Potential as of 2015	5
Table 3	Housing Unit Production and Population Growth in Austin, TX	9
Table 4	<i>t</i> -test Results, Annual ADU Construction Before and After ADU ordinance ..	36
Table 5	Summary Table of Home Value by Category of Dwelling	36
Table 6	Multiple Regression Models of per unit Home Price	38
Table 7	Summary Table of Property Value by Category of Dwelling	38
Table 8	Multiple Regression Models of Property Values	39
Table 9	Mean Miles to Austin’s Downtown District	42

ABSTRACT

The problem of dramatically rising housing costs in many fast-growing cities around American has become a pressing issue for local policymakers as their cities become increasingly unaffordable and residents are displaced from their neighborhoods by the rising cost of housing. Constraints on the supply of new housing in such cities, most notably through an overapplication of single-family zoning, are blamed for distorting housing markets and inflating the cost of homes in desirable neighborhoods. Zoning changes can prove to be a treacherous topic for local policymakers, and one incremental alternative to wholesale rezoning of single-family properties is to permit the construction of Accessory Dwelling Units on such properties. In 2015, the City of Austin, TX passed an ordinance doing just that. This thesis evaluates the effect of that ordinance on the construction of ADUs within the City and whether the development pattern of single-homes with an ADU results in lower per-unit prices for homes and higher overall property values. While it is difficult to conclude definitively that the ADU Ordinance itself was the cause of increased ADU construction because rates of ADU construction had begun to rise prior to Austin City Council's passing of the ordinance; this thesis finds clear evidence that permitting ADUs results in the development of units with lower per-unit home prices and significantly higher overall property values.

Chapter 1

INTRODUCTION

Over the past decade many major metropolitan areas in the United States have experienced massive population and economic growth soured by rapidly increasing housing costs. Cities like Austin, TX; Nashville, TN; and Denver, CO have experienced rapid population growth coupled with rapidly rising home prices over the past decade or more (Sauter 2019). While cities have become major centers of economic opportunity, population demographics have shifted (Been et al. 2014; Taylor et al. 2010), and lifestyle preferences have changed; city governments have been forced to grapple with the legacy of zoning and land use policies that have historically prioritized large-lot, single-family residential development with a nuclear family and two automobiles at their center. These population pressures and a rising demand for urban homes have outstripped housing supplies constrained by the ubiquity and restrictiveness of single-family zoning.

Policies that loosen or eliminate zoning restrictions on minimum lot sizes or the number of allowable dwelling units on a lot are referred to as “upzoning”. Such efforts to modify or undo the various density restrictions of common single-family residential zones –

minimum lot sizes, density restrictions, and design restrictions – can be extremely contentious (Pendall 1999; Schleicher 2012). Existing homeowners often directly benefit from restrictive zoning policies because they protect, and often inflate, the property values of existing homes (Scheutz 2020). Additional concerns arise around burdens on infrastructure, environmental impacts of new development, nuisances associated with new development, traffic, and burdens on existing transit networks (Pendall 1999; Dear 1992). While some local and state jurisdictions have managed wholesale policy changes to upzone or rezone single-family lots, many times such policy proposals encounter staunch local resistance or are not brought forward in the first place.

A common alternative to such wholesale planning approaches is to make incremental modifications to existing single-family zoning districts. One such change is to allow for the construction of an accessory dwelling unit – commonly referred to as ADUs, granny flats, microunits, garage apartments, or secondary apartments – alongside the primary dwelling on an existing lot. For the purpose of this thesis, all such secondary dwellings will be referred to as ADUs. Such secondary housing units were once commonplace in the United States but the vast shifts in planning practices and development patterns that took place over the course of the 20th century saw them fall out of favor (Brown and Cropper 2001, 404). Many jurisdictions have regulations or zoning districts that explicitly disallow accessory dwellings. In other cases, ADU development is severely restricted or implicitly disallowed by various restrictions including: minimum required lot size for ADU development, parking space requirements, separate driveway

requirements, design restrictions, setback and building spacing requirements, maximum ADU size, and maximum ratio of an ADU's floor space relative to the primary dwelling (Peterson 2018, 135-171).

In the city of Austin, Texas, ADUs are not permitted by right in two of its three primary residential zoning districts: SF-1 and SF-2 (Austin Planning & Zoning Dept. 2017, 14-17). However, ADUs have historically been explicitly permitted in the SF-3 zoning district but subject to such burdensome restrictions – size restrictions, parking requirements, and a separate driveway requirement - that development of ADUs on SF-3 properties was still severely limited. In 2015, Austin passed an ordinance easing many of the restrictions on ADU construction on SF-3 properties in the hopes of promoting development of denser, more diverse and less expensive housing within the existing, highly desirable, but largely single-family neighborhoods surrounding the city's urban core. The goal of this thesis is to evaluate the effect, if any, the ordinance had on the production of new housing units and the home prices and overall property values of the two-unit, single-family home with ADU development pattern.

Austin's ADU Ordinance

On November 19, 2015 the City Council of Austin, Texas passed an ordinance revising the city's Land Development Code to loosen restrictions governing the construction of accessory dwelling units (Austin City Council, 2015). The Land Development Code is the section of the Austin Code of Ordinances that governs land use, zoning, building codes,

and development. Ordinance 20151119-080, referred to as the ADU Ordinance henceforth, reduced the minimum lot size required for an ADU; reduced parking space requirements; eliminated the need for a separate driveway; and eliminated a number of restrictions on the design of an ADU. A complete list of changes follows (Austin City Council 2015):

- Reduced minimum lot area required for an ADU from 7,000 square feet to 5,750 square feet (the minimum lot size of the SF-3 zoning district).
- Reduced minimum distance between second dwelling unit and the primary dwelling from 15 to 10 feet.
- Permitted an ADU to have an entrance within 10 feet of a lot line.
- Eliminated requirement for an ADU to have its own driveway.
- Raised the maximum size of an ADU from 850 total square feet to the smaller of 1100 total square feet or 15% of the lot area (862.5sqft on a 5,750 square foot lot).
- Restricted use as a short-term rental to a maximum 30 days per calendar year if ADU is constructed after October 1, 2015.
- Reduced parking requirement for an ADU from 2 to 1, and from 2 to 0 if it is located within .25 miles from an activity corridor that is served by a bus or transit line.

In addition to the above alterations, residential lots in Austin are still subject to the following restrictions on the size and bulk of dwellings (Austin Planning & Zoning Dept. 2017, 14-17):

Table 1. Development Restrictions of Primary Single-Family Zones in Austin, TX.

	Minimum Lot Size	Maximum Building Coverage	Maximum Impervious Coverage	Gross Floor-to-Area Ratio	Duplex Use	Secondary Apartment
SF-1	10000	35%	40%	40%	N	N
SF-2	5750	40%	45%	40%	N	N
SF-3	5750	40%	40%	40%	Y	Y

Building coverage is the area of the lot that is allowed to be covered by buildings, while impervious cover is the area of the lot that is allowed to be covered by impervious services like buildings, driveways, patios and sidewalks. The Floor-to-Area Ratio (FAR) is the area of gross, enclosed, habitable space that is not subject to some exemption. For a 5750sq.ft. SF-3 lot the allowed building area and FAR are both 2300sq.ft including any secondary dwelling. It should be noted that FAR restrictions only apply to older neighborhoods in Central Austin and not those further from the city's center. By lowering the minimum lot size on which an ADU was allowed, the ADU Ordinance increased the number of lots eligible for ADU development by 8,900 (Austin City Council 2015, SF Lot Comparison). A relative handful of SF-1 and SF-2 lots that were eligible for ADU's through their Neighborhood Planning Area – a sub-jurisdiction of the City of Austin with limited planning authority to opt into design and infill development programs like allowing ADUs – remained unchanged.

Table 2. ADU Development Potential as of 2015

	SF-1	SF-2	SF-3 5750-7000sqft	SF-3 7000+sqft
Eligible Lots before Ordinance	800*	220*	3,840*	42,900
Eligible Lots after Ordinance	800*	220*	12,740	42,900
Ineligible Lots after Ordinance	7,075	62,500	-	-

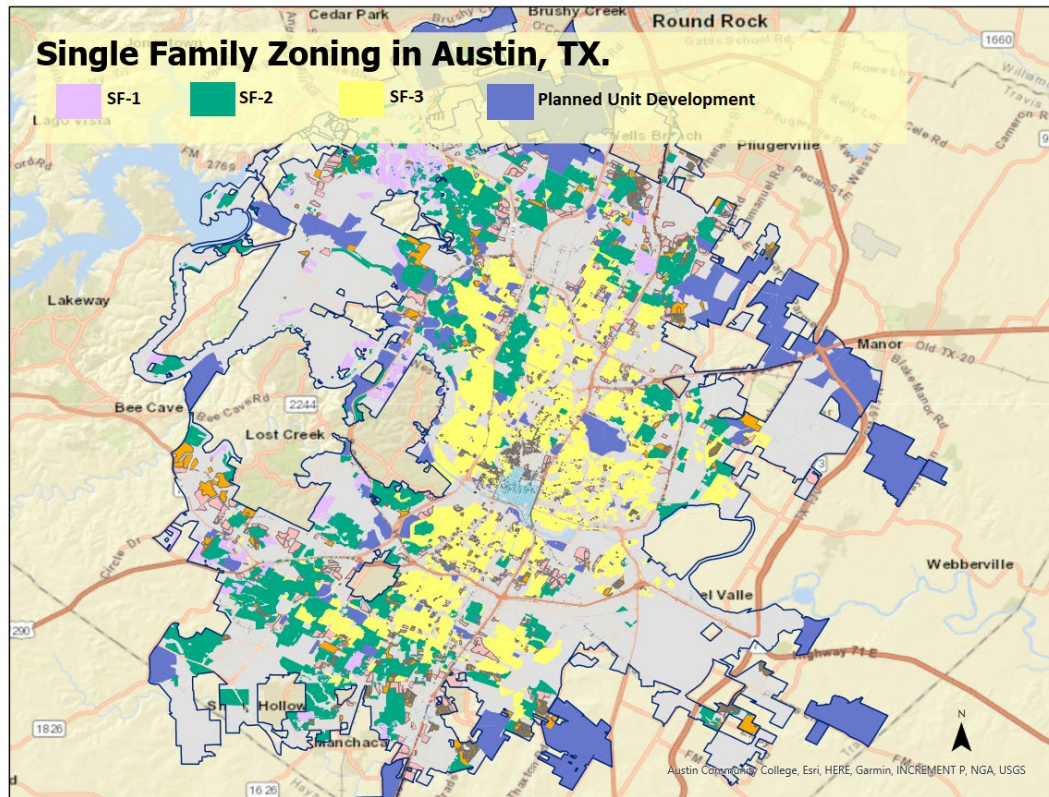
**Eligible through NPA In-fill option (opt-in)*

Source: City of Austin, SF Lot Comparison

Figure 1 shows the geographic distribution of single family lots in Austin.

Properties zoned SF-3 predominate in the central neighborhoods of Austin, while SF-1 and SF-2 lots are generally further from downtown.

Figure 1: Map of Single Family Zoned Lots in Austin, TX.



Land Development Issues in Austin

Controlling the city's sprawl was first raised in Austin's 1980 Austin Tomorrow Comprehensive Plan (*Austin Tomorrow* 1980). Although the primary objective was environmental conservation; traffic and the cost of an extensive network of roads and utilities were also raised as concerns (*Austin Tomorrow* 1980). In 2012, Austin adopted its Imagine Austin Comprehensive Plan (IACP) that also raised sprawl as an issue in

addition to the related problem of housing supply and affordability (*Imagine Austin* 2012). Two “Principles for Action” of *Imagine Austin* were for Austin to focus on redevelopment and in-fill of the city’s already developed areas and provide affordable housing opportunities for all income levels through a combination new development and affordability programs (*Imagine Austin* 2012, 10). Concerns about a perceived housing crisis in Austin were prominent in the IACP with the city seeing increasing percentages of housing cost burdened homeowners and renters. When the comprehensive plan was issued in 2010, 30% of homeowners were paying more than 30% of their income in housing costs and the percentage of renters who were paying more than 30% of their income in housing costs had risen from 42% in 2000 to 53% in 2010 (*Imagine Austin* 2012, 29). While property tax rates have declined in Austin, overall property tax burdens have increased due to rapidly rising home prices. The IACP also acknowledges a problem that many residents, renters and homeowners are being displaced because they are unable to remain in the city’s increasingly expensive interior neighborhoods (*Imagine Austin* 2012, 30).

Historically, Austin’s Land Development Code was amenable to higher density neighborhood development. That began to change in 1984 when the city adopted a new Land Development Code; creating SF-1 and SF-2 zoning districts that disallowed duplexes and ADUs entirely and severely restricting development of ADUs in the SF-3 zoning district (Opticos 2014). Currently, single-family detached housing makes up 46% of Austin’s housing supply (Root Policy Research 2020).

Civic participation is a point of pride in Austin and the city has historically invested considerable power in neighborhood-level control of planning issues – having initiated a Neighborhood Planning Area (NPA) program in 1997 (Mueller, 2010). This has led to focus of city planning efforts on the preservation of neighborhood-level priorities like preserving neighborhood interiors while funneling of development into vertical mixed-use apartments along identified transit corridors (Mueller 2010). NPAs have the power to adopt their own neighborhood plans - similar and acting as amendments to the citywide comprehensive plan - that guide future land use, development, design patterns, and policy priorities within their boundaries; through these plans each NPA can opt in or out of a number of design and infill development options that include expanding access to ADU construction (AustinTexas.gov). City of Austin planning staff perform extensive outreach, conduct regular planning meetings with residents, and hold community forums to develop these neighborhood plans (City of Austin 1999; City of Austin 2002).

Why Examine Austin?

Austin is emblematic of a rapidly developing city in the midst of a housing affordability crisis corresponding with a prolonged period of dramatic population and economic

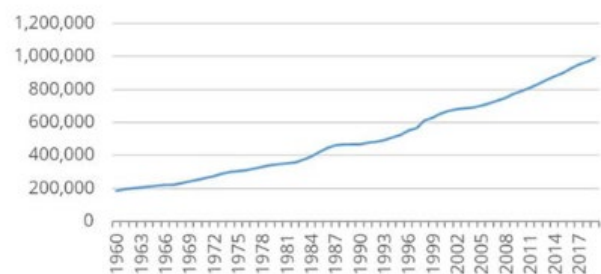


Figure 2: Population Growth Trends, City of Austin, 1960-2018
 – Source: Root Policy Research

growth. The city is grappling with a need for greater housing density and affordability while much of its land-area is currently zoned exclusively for single-family housing. The city has seen its population grow by 177,078 residents between 2010 and 2019 (Figure 2). During that time the price of an average home has risen from \$278,897 in 2011 to \$471,669 in 2019 (Texas Real Estate Research Center 2016). It is estimated that the City of Austin will have needed to add 135,000 new housing units between 2015 and 2025 to accommodate the anticipated growth in the city’s population (*Austin Strategic Housing Blueprint 2017*). Meanwhile, the rate of housing production had actually slowed in Austin between 2010 and 2017, as seen in Figure 3 (Root Policy Research 2020). For the purposes of this thesis, Austin’s ADU ordinance represents an opportunity to examine the effect that ADU authorization and a de facto upzoning of single-family zoning districts can have on housing production and home prices.

The Urban Housing Crisis

The issue of housing affordability in desirable urban markets is a national problem not exclusive to Austin. While historically low interest rates have seen the median monthly

Year	Number of Units	Housing Units*			Population	Population**	
		Numerical Growth per Decade	Percent Growth per Decade	Compound Annual Growth		Percent Growth Per Decade	Compound Annual Growth
1970	85456				251808		
1980	146,503	61,047	71%	5.54%	345890	37%	3.23%
1990	216,939	70,436	48%	4.00%	465622	35%	3.02%
2000	276,611	59,672	28%	2.46%	656562	41%	3.50%
2010	354,211	77,600	28%	2.50%	790390	20%	1.87%
2017	393,616	39,405	11%	1.52%	949587	20%	1.85%

*Source: Root Policy Research 2020, American Community Survey 2017

Table 3: Housing Unit Production and Population Growth in Austin, TX

cost of homeownership fall slightly between 2018 and 2020, growth in median home sales price has outpaced growth in median household income nationally since 2010 (Joint Center for Housing Studies 2020, 24). Low interest rates also only offset monthly housing costs; first time homebuyers still encounter the significant barrier of the up-front costs of down payments and transaction fees when purchasing increasingly more expensive homes (JCHS 2020, 24). For the past several decades, new home construction has favored increasingly larger homes with increasingly more bedrooms despite household size remaining fairly constant (JCHS 2020, 10). Development of new housing units has primarily come in two forms: single-family detached housing and large-scale multi-family apartments (Parolek 2020, 9). This is in contrast with a significant unmet demand for smaller-scale, denser neighborhood-style housing (Parolek 2020, 32-34). Meanwhile, inventories of homes for sale have been on the decline nationally since 2010 (JCHS 2020, 11).

The Issue of Zoning

Zoning regulations that impose minimum lot and home sizes, density restrictions, and limits to the number of dwelling units on a lot are widely considered to contribute to inflated home prices in desirable urban markets. In many cities, like Austin, neighborhoods of single-family dwellings abut dense, vertically developed urban core areas with little graduation in density because such development is not permitted in that jurisdiction (Parolek 2020, 8).

There is currently a movement among a number of major cities in the United States to begin rolling back regulations and zoning restrictions that act as density caps on residential development within their city limits. Minneapolis, MN has done away with single-family zoning entirely by allowing up to three dwellings units on any lot zoned for single-family residential use (Kahlenberg 2019). While the city of Seattle and the State of California have both implemented extensive overhauls of ADU regulations to increase the ability of homeowners and developers to add ADUs to single-family properties (Bertolet and Morales 2019; Gabobe 2019).

Chapter 2

LITERATURE REVIEW

Lack of Affordable Development

National trends in the housing market have been discouraging for low- and moderate-income households as well as affordable housing advocates. While homebuilders have recently begun to acknowledge a real, persistent, and growing demand for lower-cost housing options, the housing market has not been responsive over the past decade (Hermann and Wu 2021). Low-cost rentals in the United States, priced below \$800 in adjusted dollars, fell by 4 million units between 2011 and 2017 and by 1 million units in 2017 alone (JCHS 2019, 4). Developers in the United States have focused on upper-income households for new construction and theoretical market mechanisms of filtering and moving chains have not functioned as expected in practice (Anacker 2019, 4).

Restrictions on the supply of developable units through zoning and other density limits, as well as NIMBY resistance to new development, contribute to development patterns that focus new supply toward higher end, more expensive units (JCHS 2019, 12).

The manifestation of these issues is pronounced in Austin. The homeownership rate is 6 percentage points lower than the national average, likely driven by a combination of a

high property tax rate and rising home costs (Fulton 2020). The number of low-rent housing units in the city declined by more than half from 2011 to 2017 (Fulton 2020). The ratio of home price to income has been steadily increasing for more than a decade (ASHB 2017). In the Austin-Roundrock metropolitan service area nearly a quarter of homeowners and nearly half of all renters spent more than 30% of their net income on housing costs (Fulton 2020).

Zoning and Density Restrictions in the Housing Market

There are those that argue that the preponderance of single-family detached housing is incentivized and enforced by various government policies, such as zoning and land-use regulations, simply because those policies reflect societal preferences (Wallace 1988). However, there is also considerable research indicating that the dominance of single-family detached housing is, at least in part, the outcome of federal, state and local policy since World War II. Even in pro-growth markets, lot size and density restrictions are found to be binding regulations of housing production that distort development patterns (Gray & Furth 2019). The federal government subsidization of homeownership through the home mortgage interest deduction and the federally backed lending institutions Fannie Mae and Freddie Mac has served to push American households away from multi-unit dwellings and toward single-family detached homes (Glaeser 2011, 5-7; Regional Plan Association 2016). Single-family home ownership accounts for 81% of federal loan and loan guarantees (RPA 2016). Local zoning rules that restrict

development of multi-unit and high-density dwellings further contribute to a regulatory bias against smaller units and denser development patterns (Glaeser 2011, 5).

Demographic and Preferential Shifts

Household demographics and consumer preferences seem to be trending away from the traditional, suburban development pattern of predominantly single-family detached homes and towards denser modes of housing that support mixed-income populations and mixed household composition (Parolek 2020). Nuclear families, as a share of participants in the housing market, are on the decline while single adults; adult couples without children; and single parents with children are all on the rise (Peterson 2017, 174). Modern American households are more diverse and more fluid in their composition than they were in the generations following World War II (Been et al. 2014; Taylor et al. 2010). Multigenerational households of parents with adult children at home; adult children with one or more elderly parent living with them; and households comprised of single individuals are both on the rise in the United States (Been et al. 2014; Taylor et al. 2010). Some major residential developers have begun to incorporate flexible floorplans and dwelling options to accommodate multigenerational housing needs in new developments (Brannigan 2013).

In addition to shifting demographics and household composition, the preferences of American consumers have also been changing (Parolek 2020, 38-40). In fact, land use restrictions on housing supply likely mean that there those who would prefer to live in

desirable areas but are unable to express that preference in a housing market where costs are high and supply of certain dwelling types and in certain locations is constrained (Ikeda 2018). Historically, housing production has focused on single-family detached homes on large lots and high-density, large scale multi-family complexes with little offered in between in terms of size and density (Parolek 2020, 8-9). This skew towards the extremes of density is not actually reflective of the preferences of homebuyers and renters who increasingly show a preference for moderately high density, walkable neighborhood lifestyles over both low-density suburban housing and high-density urban apartment housing (Parolek 2020, 38-40). This disconnect between consumer demand and existing supply is so wide that the projected demand for walkable neighborhood homes would not be met even if every new housing unit added between 2020 and 2040 was in a walkable neighborhood (Parolek 2020, 32).

In Austin, 34.5% of households are comprised of a single individual but such households outnumbered the supply of single-bedroom dwellings (Been et al. 2014) This disparity also does not account for the number of single individuals living with roommates but might prefer to live alone or couples without children who prefer a single-bedroom dwelling (Been et al. 2014).

Supply Constrained Markets

Housing markets where zoning and land-use regulations limit the sufficient development of new housing units to accommodate their population's demand for

housing are considered to be “supply constrained” (Glaeser et al. 2003). Rents and home prices are inflated because of tight planning regulations (Jakabovics et al 2014). The “supply response” of the housing market is restricted by regulatory conditions and the result is skyrocketing costs for housing – what can be called a “regulatory tax” (Glaeser et al 2003, 4-8). Many cities are considered to be in the midst of a housing crisis due to a rapid rise in the number or percentage of households experiencing a housing cost burden – in Austin’s case that is more than 10% between 2000 and 2012 (Peterson 2018; Been et al 2014). The rising cost burdens may even be understated in Austin as some cost-burdened households have chosen to leave the city in search of less costly housing (Root Policy Research 2020).

Land use regulations tend to cater to existing homeowners – protecting their interests and enhancing the value of existing homes through artificial scarcity that prevents development of housing in areas where it is most in demand (White 1988). Regulations such as lot-size requirements and density restrictions suppress overall property values to the extent that it likely outweighs benefits of suppressing potential nuisances resulting from more extensive development (Turner 2015). In addition to driving up housing costs, restrictive zoning is linked to gross misallocations of resources – squandering land resources, inflating carbon footprints and transportation costs, pricing poor residents out of wealthier neighborhoods, and warping migration decisions by pricing prospective residents out of desirable locations (Ellickson 2018; Boudreaux 2016).

Practical Consequences of Low Density Zoning

The practice of large-lot zoning is ubiquitous in the United States; is arguably immoral and inequitable; and acts contrary to principals of property rights – the ability of property owners to use their land as they choose – and the goal of housing affordability – the ability of every household to afford decent housing in the area where they work and wish to live (White 1988). For most of the post-World War II period, cities in the United States have accommodated population growth with new housing production in low-density areas of an ever-expanding urban fringe with a rising demand for housing being expressed either through ever-increasing sprawl or ever-rising housing costs (Romem 2016). Essentially the growth of a city can be accommodated in three ways: outward geographic expansion, increasing costs of housing, or infill and densification within its existing footprint (Romem 2016). Given the wastefulness and inefficiency attributed to sprawl and the inequities of inflating housing costs mentioned previously, cities would likely benefit from growth occurring in the form of infill and densification within existing boundaries.

Zoning, land use and density restrictions can also fuel gentrification and promote income segregation in cities. Supply constrained markets experience heightened gentrification resulting from upper-income earners entering low- and moderate-income areas in search of housing opportunities (Goodman et al. 2020). Municipalities that restrict density of residential construction see income segregation that maintains class and racial inequalities in the United States (Rothwell and Massey 2010). This income

segregation may manifest as a concentration of wealthy residents in highly desirable areas rather than a concentration of low-income residents (Lens and Monkkonen 2016). Workers in many cities, particularly low-wage hourly employees, face a “spatial mismatch” between where they can afford to live and where jobs they are able to obtain are located (Stacy et al. 2019).

Zoning in Austin

Austin’s suburbs – Round Rock, Pflugerville, and others – have received praise for pro-growth policies that incorporate extensive by-right multi-family and mixed-use zones, as well as “small lot” zoning while Austin is pointed to as an example of restrictive, supply-constrained market due to the ubiquity and intransigence of single-family zoning within city limits (Ellickson 2018). However, even in these relatively pro-growth suburbs, density restrictions are a binding regulation on development patterns that distorts the supply and cost of housing (Gray and Furth 2019).

Metropolitan areas in the United States manage to be both the most sprawling in the world while also stubbornly unaffordable for many workers (White 1998). Austin is particularly emblematic of this. While the city’s population has consistently risen, density in the Austin metropolitan area declined by 5% between 2010 and 2016 (Kolko 2017).

They build ADUs Anyway

There is evidence that, in the absence of formal enabling of ADUs, residents will produce them anyway. In fact, in the supposedly formalized and heavily regulated housing markets of many cities in the global North, informal housing, like ADUs, is increasingly providing affordable housing because of the lack of formal affordable options from public or private housing development (Gurran et al, "Hidden Homes..." 2020). In New York City, amid rising costs and restrictive zoning, 114,000 more rental units appeared on the market between 1990 and 2000 than were reflected in counts of certificates of occupancy issued by the city (Sheth and Neuwirth 2008). These "excess" units are likely informally subdivided apartments and houses that violate permitted uses of those properties (Sheth and Neuwirth 2008). Throughout Los Angeles, illegal ADUs are commonplace (Wegmann 2015). In financially distressed neighborhoods in Los Angeles - indicated by high rates of foreclosures - some neighborhoods were estimated to have illegal ADUs on as much as 80% of single-family lots (Cuff, Higgins and Dahl 2010). A study of Canadian municipalities showed that between 20% and 25% of all rentals were ADU's and half of those were likely to have been created in violation of what is permitted by the municipality's regulatory framework (Harris and Kinsella 2017). Informal housing construction tends to favor areas with high job growth but lower density of existing housing (Wegman and Mawhorter 2017).

Such informal residential development is likely a response to rising housing costs and restrictive zoning that precludes legitimate development of secondary units or division

of larger units into multiple smaller ones (Sheth and Neuwirth 2008). It may be a response to housing market pressures that lack formal, legitimate outlets due to regulations (Wegmann 2015). Informal ADUs can be a tool to supplement the income of financially stressed households or provide housing to impoverished relatives (Cuff, Higgins and Dahl 2010). Informal ADU development represents a societal response to the combination of stagnant incomes, constrained housing development, rising demand for rental housing, and short supply of affordable rentals and rental subsidies that characterize the rental markets of many fast-growing cities in the United States (Wegmann and Mawhorter 2017).

Such informal development is not without complications. Even if ADUs are permitted by right, many illegal ADUs were constructed in violation of local building code, permitting and inspection processes with serious safety concerns that will create considerable barriers to legitimization (Cuff, Higgins, Dahl 2010). In markets with extensive development of informal ADUs there may be a kind of backlog of unpermitted, impermissible and inhabited dwelling units. However, evidence of so many informal or illegal ADUs existing in single-family neighborhoods without causing major disruption supports the idea of ADUs as a form of non-invasive housing production and densification (Peterson 2018, 173).

ADU Affordability

ADUs can be a component of plans to boost housing supply through densification in areas currently zoned for single-family detached housing (Goodman et al, 2020). ADUs can provide an immediate boost to affordable housing supplies in desirable urban areas without expansive rezoning and the extended time horizons of large-scale multi-family development (Leinberger et al. 2019). ADUs, if made less cumbersome to construct, are an incremental option for expanding the supply of affordable rentals in supply constrained cities (Jakabovics 2014). In summary, ADUs can make existing neighborhoods more responsive to rising demand in the housing market without resorting to extensive redevelopment or incompatible multifamily projects.

ADUs, sometimes nicknamed “mortgage helpers”, can also offer housing affordability from the perspective homeowners whose earnings they supplement (Peterson 2018). A common reason given for the construction of an ADU by a homeowner is supplemental income from offering the ADU as either a short- or long-term rental (Chapple et al 2017; Gurran et al. “Informal Housing...” 2020). In a city like Austin, with high property tax rates and property value increases outpacing wage growth, the ability for residents to supplement their income with a rental on their property cannot be overlooked.

It is, however, debatable whether ADUs truly represent a potential source of affordable housing. In Sydney, Australia, ADUs were not found to provide affordable dwellings to low-income families and high housing costs persist despite considerable liberalization of

ADU regulations (Gurran et al, “Informal Housing...” 2020). Construction of ADUs was linked with “studentification” – a form a gentrification wherein families are pushed out of low-cost rentals in favor of students willing or able to pay higher rents (Smith et al. 2014; Gurran et al. “Informal Housing...” 2020). In fact, ADUs were generally targeted toward higher-income long-term renters and short-term renters rather than representing “truly affordable” housing options for families (Gurran et al. “Informal Housing...” 2020). Informal housing, of which ADUs are one form, has been linked to exploitation of low-income renters, poor living conditions, and strained infrastructure (Gurran et al, “Hidden Homes” 2020).

While ADUs may not represent truly affordable, or “designated affordable” housing options for low-income families, there is evidence they do offer some degree of cost-relief in high-demand housing markets. While not affordable to most extremely low-income households, ADUs are affordable to more very low-, low- and moderate-income households than primary dwellings (Wegman and Chapple 2014). In Portland, 58% of ADUs in the city rent for below market rate; providing a more affordable housing option for small households (Chapple et al. 2017). ADUs also show a lower *local rent burden index* score – a ratio of annual adjusted rent to median rent in the census tract where an ADU is located – when ADUs are compared to primary dwellings (Wegmann and Chapple 2014). It should be noted that the lower cost of ADUs is generally a function of their smaller size; costs per square foot are generally comparable to standard-sized dwellings (Christensen 2016).

Legalizing the development of ADUs does boost housing production and diversify a city's housing options to better accommodate the specific needs of individuals and households (Christiansen 2016; Gurran et al. "Informal Housing" 2020). As mentioned before, there is likely a subset of city populations that would prefer lower-cost housing options in desirable locations and do not require larger dwellings (Been et al. 2014). By providing additional, lower cost alternatives to young professionals and other households who desire urban living but don't require larger dwelling, ADUs can steer that consumer demand away from two-, three- and four-bedroom homes that suit the needs of larger households with children (Kalloch 2012). Given the surprisingly high costs and complexity of producing large-scale, high-density urban infill development (Glaeser et al 2005), ADU's are a more immediately available and lower cost alternative for producing small-scale, less expensive housing (Wegmann & Chapple 2014).

Aging In Place

ADUs present a housing option that is of interest to seniors as well, by providing an intermediate alternative between remaining in an unsuitable single-family dwelling or moving into a senior living facility. ADUs can allow seniors to age-in-place by downsizing to a more manageably sized dwelling on their own property in the form of an ADU (Pynoos, Caraviello, Cicero 2009) The addition of an ADU to a single-family property also allows adult children or other family members to provide housing and family caregiving to an elderly family member (Liebig, Koenig, Pynoos 2008). By excluding ADUs from

single-family properties, zoning laws bar households from extending such accommodations to elderly family members (Liebig, Koenig, Pynoos 2008).

Why ADUs?

While ADUs are not an end-all solution to affordability, they represent a viable component of a broader strategy to address the cost issues in a city's housing supply by filling an important niche for smaller dwellings in a neighborhood setting that are lower in cost than larger units (Cohen 2018). ADU's can offer less expensive options to households and individuals in high-cost neighborhoods comprised of mostly single-family detached homes (HUD 2008). They diversify the cost, size and setting of city's housing supply, providing housing options that may more closely align with the individual preferences of residents than the single-family detached and high-density multi-family housing that predominates the housing stock of many cities (Gurran et al. "informal housing 2020; Christensen 2016) Been et al. 2012). Legalization of accessory dwellings is also an incremental step, much more achievable than wholesale - and often politically divisive - regulatory changes required to retrofit entire existing neighborhoods to better align with sustainable development principles like SmartGrowth (Wegmann Chapple 2014). ADUs are a way to develop additional housing and denser, more efficient land use in existing neighborhoods without threatening the character of those neighborhoods as much as more intensive redevelopment would (HUD 2008).

Legalization of ADUs is also a tool that allows for gradual production and increasing density of housing in response to market demand and can be a way of protecting existing primary dwellings from demolition by increasing a property's market value – a way of preserving neighborhood character in the face of development pressure (Peterson 2017, 124). By its nature, ADU development is somewhat of a “cottage industry” with diffuse benefits for local businesses since much of the work is likely to be done by smaller contractors and tradesmen compared to large-scale urban development projects (Peterson 2017, 124). ADUs as a development strategy do not require the large-scale planning, contentious re-zoning, and complex financing arrangements of high-density multi-family projects and so offer a potential source of new housing in desirable neighborhoods that better suits the needs and preferences of modern households; is readily developable; and politically attainable for cities facing a housing crisis (Wegmann and Chapple 2014; Peterson 2018).

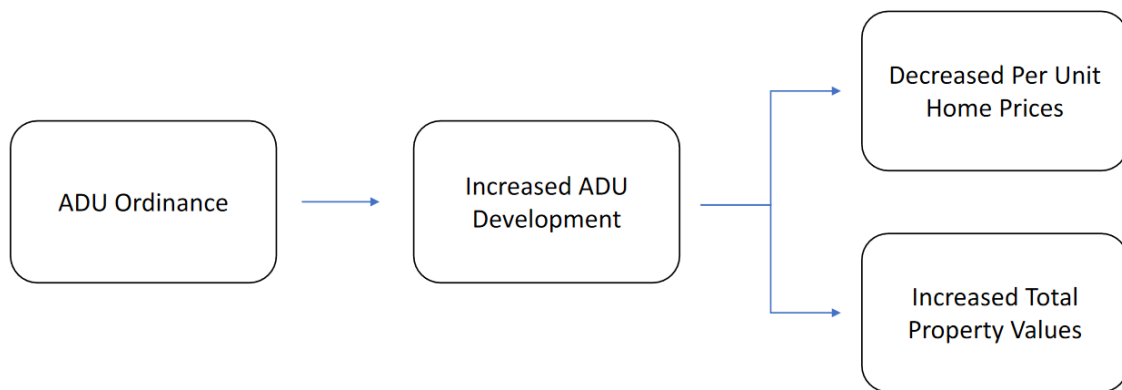
Chapter 3

METHODOLOGY

Research suggests that zoning and building regulations that restrict or forbid increasing the number of dwelling units on residential properties, in this case by restricting construction of ADUs, inflate housing costs by constraining the supply response of the housing market to rising demand. Instead of producing higher density housing, developers are steered toward the production of more expensive development at the same density. Home prices in existing neighborhoods rise without an accompanying increase in housing supply in those neighborhoods. In addition to inflating per unit housing costs, such restrictions are likely to suppress overall property values by suppressing more intense development of existing properties. If Austin's previous ADU restrictions were binding, then the implementation of Austin's ADU ordinance should result in the increased development of two-unit residential properties through the addition of ADUs to existing properties and the development of new properties to include ADUs alongside new single-family dwellings. ADUs, by virtue of their small size, should be less expensive than standard dwelling units. However, it is likely that the inclusion of an ADU in the construction of new single-family dwellings may also result in smaller, less expensive primary dwellings due in part to other development restrictions

on allowable building area. This new housing production should, in theory, result in properties with lower per unit home prices and higher overall property values compared to single-unit development in the same area. This thesis will examine whether the ADU Ordinance resulted in increased development of ADUS as well as whether that new development resulted in lower home prices and higher overall property values.

Figure 3: Causal Map for Analysis



Research Question 1: What relationship, if any, exists between the passage of Austin’s ADU Ordinance and the number of single-family lots developed into two-dwelling properties through the addition of an ADU?

Research Question 2: What relationship, if any, exists between the development of two-unit residential properties through the inclusion of an ADU and the per unit home price and total property value of those properties?

Data

Units of Analysis:

- Year – Pre & Post-Ordinance SF Home Construction
- Tax Lots – Property Value Regression
- Housing Units – Home Price Regression

Data Sources: Issued Construction Permits by City of Austin, Travis County Appraisal Rolls, American Community Survey

Though Texas is a non-disclosure state, where the sale prices of real-estate are not publicly available, in the Travis County Appraisal District during the timeframe of this study, tax appraisals of home values were derived directly from sale price data acquired from a vendor of the Travis County Board of Realtors.¹ An assumption of this study is that the 2020 tax appraisal of a property and its improvements are a valid approximation of sale price and market value.

Data on the construction of new housing units was obtained from Austin’s publicly available Issued Construction Permits database. The database includes permit codes for new construction of housing units. Construction of a housing unit is coded “new” if it takes place on a greenfield or is replacing a demolished unit. The database also includes codes for housing type. An accessory dwelling is an additional, smaller housing unit located on a lot zoned SF-3 along with a single-family dwelling. The permit database codes a single-family dwelling as “R-101 Single Family Homes” and an accessory dwelling unit as “R-103 Secondary Apartment.” A distinction will be made between properties on

¹ <https://austonia.com/tcad-abor>

which a single dwelling unit is developed and those on which two dwelling units have been developed in the form of a single-family primary dwelling and an ADU.

Home values were obtained using the Travis County Appraisal District's Certified Appraisal Roll Export for the year 2020 (Citation). This data set contains the value of land, improvements, and overall market value for tax parcels in Travis County – where the City of Austin is located. It identifies residential properties and denotes the type of dwellings present: 1 Family Dwelling, 2 Family Dwelling, Accessory Dwelling Unit, Garage Apartment, etc. While many ADUs from the permit data are marked as an ADU or Garage Apartment in the appraisal rolls, a significant number of larger ADUs are classified as "1 Family Dwellings". This is likely because the distinction between a large ADU and a single-family dwelling on the same lot is less material to the purpose of tax assessment than for zoning and permitting decisions. A visual inspection of a number of ADUs found in this study's permit data indicates that some ADUs can be quite large.

The timeframe of this analysis will extend from January 2010 to December of 2019. The selected timeframe includes 5 years of data prior to the implementation of the ADU ordinance and 4 years of data following. Beginning in 2010 avoids the disruption of the 2008 housing market collapse and Great Recession. December 2019 ends the timeframe just before the COVID19 Pandemic again disrupted housing permitting, production, and home prices. However, for regression analysis of home values, observations from 2019 were withheld. A substantial number of those observations had impossibly low market

values. I theorize that reassessments of these newly completed homes had not yet been incorporated into the Travis County Appraisal Rolls for 2020.

This analysis will focus on three dependent variables of interest: the number of accessory dwelling units and single-family homes with an ADU constructed annually, the estimated price of any new primary dwelling unit or ADU constructed on a property zoned for single-family residential, and the total property value of properties on which new single-family dwellings were constructed.

Variables of Interest

Home Price: Home price is operationalized as the estimated market value of a dwelling unit found in the 2020 Travis County Certified Appraisal Roll. However, in cases where an ADU exists in addition to a primary single-family dwelling on the same tax property the individual value of each dwelling unit is estimated using the following formula:

$$\text{Unit Value} = \text{Improvement Value} + (\text{Land Value} * (\text{Improvement Value} / \text{Total Improvement Value}))$$

This formula assigns a portion of the land value of the property to each unit proportionate to its share of the total value of improvements on the property. It is likely that this overestimates the price of ADU's because many ADU's exist as garage apartments and, while the use of the garage likely belongs to the primary dwelling, the garage and ADU are appraised as a single improvement. Because there is reason to believe that Travis County's appraisal values are likely to be an accurate indication of the

price a home would sell for on the market at the time this study was conducted, an assumption of this analysis is that property values obtained from the 2020 Travis County Appraisal Rolls are a valid estimation of the price of a home. A further assumption is that the market value of a unit correlates with the rent that would be charged for that unit and, therefore, a unit with a lower market value represents a more affordable housing option whether it is rented or sold.

Year of Construction: The year construction began on the dwelling unit, operationalized as the calendar year in which the building permit was issued.

Dwelling Units Constructed: This is a simple tally of the number of permits for new single-family dwellings, new single-family dwellings with an ADU, and ADUs issued and given final inspection during the study timeframe.

Total Property Value: This is the total estimated market value of a property, including any ADU if one is present. Values were obtained from the 2020 Travis County Certified Appraisal Roll. In some instances, an ADU has been subdivided away from its primary dwelling and is listed as a separate tax property. In these cases, ADUs were linked to their primary dwelling using the permit data and the total property value is the sum of each unit's respective property value.

Dwelling Category: Categorical variable measuring whether a dwelling unit is a single-family dwelling built without an ADU, a single-family dwelling built with an ADU, an ADU built with a single-family dwelling, or an ADU added to an existing single-family dwelling.

Analysis

This thesis will address the question of the relationship, if any, the ADU Ordinance had with the volume and price of different types of newly constructed dwellings in a number of ways. First, comparisons will be made between the average annual production of ADUs, Single-Family Units built with an ADU, as well as housing development on Single-Family properties overall, before and after the ordinance was passed. It will evaluate whether or not there was a statistically significant difference in the number of ADUs constructed annually before and after the implementation of Austin's 2015 ADU Ordinance.

Second, this thesis will also attempt to determine the relationship, if any, between the per unit home price and overall property values of single-unit development of single-family properties and two-unit development of single-family properties through the construction of a single-family dwelling together with an ADU. A series of linear regressions will examine the relationship between the dependent variables, Home Price and Total Property Value, and indicators for the various forms of housing development of interest to this study. These regressions will control for the year the unit was built and address unobservable variables by controlling for neighborhood fixed effects.

Neighborhood was operationalized as the Neighborhood Planning Area within which a unit was constructed. NPAs were chosen instead of census tract or block group because Austin's NPAs represent contiguous areas of historically relevant neighborhood

boundaries with limited authority to govern various components of the design and layout of the homes and properties within them (City of Austin).

Chapter 4

RESULTS

Housing Production

Figure 4: ADU Construction from 2010 to 2019

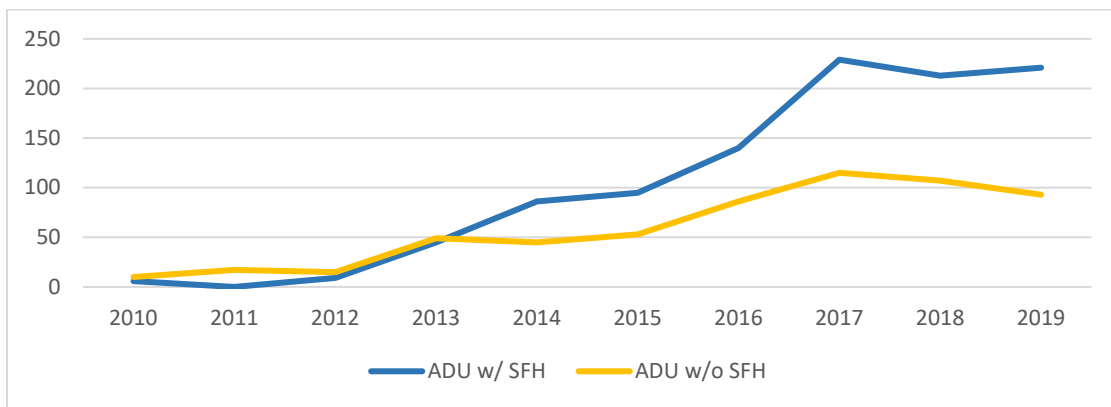
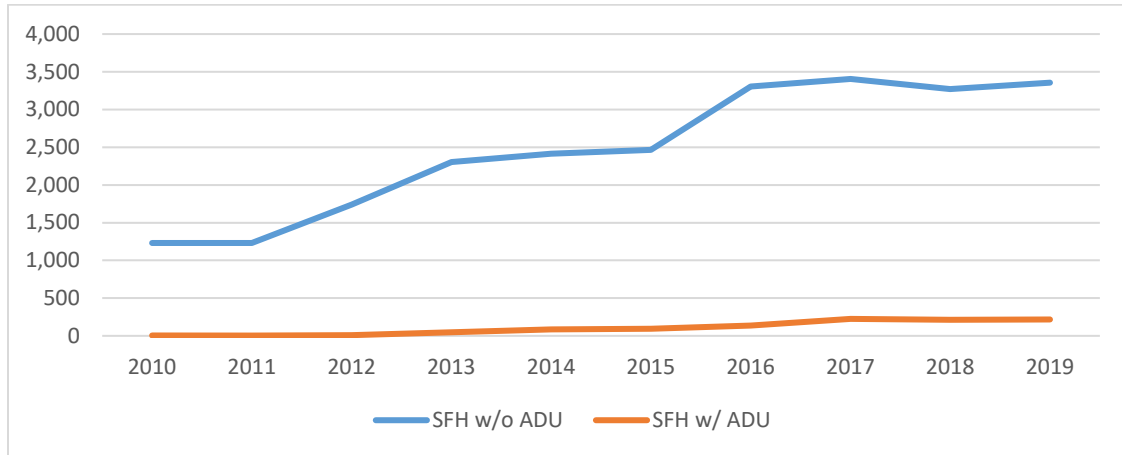


Figure 5 shows the number of ADUs constructed annually between 2010 and 2019.

While the construction of ADUs had already been on the rise, following the passing of the ADU Ordinance in late 2015 ADU construction rose sharply before leveling off from 2017 to 2019, particularly of ADUs constructed in tandem with a primary dwelling.

However, as can be seen in Figure 6, the number of single-family dwellings constructed without ADUs also rose sharply following the ADU Ordinance.

Figure 5: Single-Family Home Construction from 2010 to 2019



Comparisons were run to *t*-test the mean number of properties to which an ADU was added or an ADU was added along with a new single-family dwelling. As Table 4 shows below, the 4 years following the passage of Austin’s ADU ordinance (M = 198.75, SD = 40.8) saw significantly higher numbers of new homes permitted for construction with an ADU included ($t(8) = -5.9519$, $p = .0003$) compared to the 6 preceding years (M = 41.5, SD = 41.01). The years following the passage of the ordinance (M = 100.25, SD = 13.15) also saw significantly higher ($t(8) = -6.131$, $p = .0003$) numbers of ADUs added to existing single-family properties than the preceding 6 years (M = 31.5, SD = 19.47). However, the years following the ordinance (M = 3834.75, SD = 129.71) also saw significantly higher numbers of new units constructed overall than the preceding 6 years (M = 2010.83, SD = 672.87), $t(8) = -5.96$, $p = .0008$. Given the coinciding rise in single-family home construction and the fact that annual ADU construction had begun to rise prior to the ADU Ordinance, it is difficult to conclude definitively that the ADU Ordinance had a

causal relationship with the increased volume of ADU construction following its passing by Austin’s City Council.

Table 4. *t*-test Results Comparing Development of Properties with ADUs Before and After the ADU Ordinance

	<u>Before</u>		<u>After</u>		df	<i>t</i>	<i>p</i>
	Mean	Std. Dev.	Mean	Std. Dev.			
SFH built with an ADU	41.5	41.01	198.75	40.8	8	(5.9519)	0.0003
ADU added to Existing SFH	31.5	19.47	100.25	13.15	8	(6.131)	0.0003
Total Units Added to SF Lots	2010.83	672.87	3834.75	129.71	8	(5.2535)	0.0008

Home Prices

Table 5 shows the mean home price of the various categories of dwelling units relevant to this study during the years 2010 through 2018. New single-family homes constructed with an ADU actually have a higher average home price than those constructed without an ADU throughout the city. ADUs of any kind average a substantially lower average home price compared to single-family dwellings, likely due to the smaller size of a typical ADU compared to a single-family dwelling.

Table 5. Summary Table of Home Value by Category of Dwelling

	Mean	Std. Dev.	Freq.
SFH built w/o ADU	466174.05	430209.78	17,559
SFH built w/ ADU	623801.86	267761.81	739
ADU built w/ SFH	346773.39	115561.16	673
ADU added to existing	291175.3	109769.69	425
Total	464202.29	416068.95	19,396

Column 1 of Table 6 supports the finding in Table 5 that single-family homes built with an ADU are, on average, more expensive than single-family homes built without one. However, Column 2 shows that when unit price is controlled for the neighborhood where the new units were constructed, single-family homes built with an ADU are less expensive compared to those built without. The model accounts for 65.9% of the variation in home prices. Column 3 compares the unit price of all new units developed as either a new ADU or a single-family home built together with an ADU. Controlling for neighborhood, the unit price of new development of ADUs and new primary dwellings with ADUs is \$258,691 lower than single-family homes built alone. This would suggest that allowing for the development of single-family lots into two-family lots via the inclusion of ADUs can significantly contribute to the attainable housing stock in existing neighborhoods.

Table 6. Multiple Regression Models of per unit Home Price and Development Type

VARIABLES	(1) Market Value of Unit	(2) Market Value of Unit	(3) Market Value of Unit
SFH constructed with an ADU	157,628*** (15,954)	-34,740*** (10,531)	
Per Unit of ADUs & SFH with ADU			-258,691*** (7,930)
Year Permitted		3,810*** (827.6)	4,584*** (828.4)
Constant	466,174*** (3,206)	-6.687e+06*** (1.668e+06)	-8.256e+06*** (1.669e+06)
Neighborhood Fixed Effects	N	Y	Y
Observations	18,298	17,136	18,234
R-squared	0.005	0.659	0.625

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Property Values

Table 7 shows that lots on which a single-family home is constructed without the inclusion of an ADU are less valuable on average than lots on which a new single-family home is constructed with the inclusion of an ADU or where an ADU is added to a lot on which a single-family home already exists.

Table 7. Summary Table of Property Value by Category of Dwelling

	Mean	Std. Dev.	Freq.
SFH constructed w/o ADU	466174.05	430209.78	17,559
SFH constructed w/ ADU	959406.93	314032.6	658
ADU added to existing	731605.56	479677.55	348
Total	488631.22	438498.76	18,565

The model in Table 8 shows the relationship between property value and the type of development a lot underwent. Column 1 controls for year but shows significantly higher property values on lots where an ADU was either added or a new home was built along with an ADU, compared with lots on which only a new single-family home was built without an ADU. The model accounts for 4.8% of the variation in home prices. Column 2 evaluates the same independent and dependent variable but controls for neighborhood fixed effects. The model indicates that lots developed with an ADU are, on average, \$174,603 more valuable than lots on which only a new single-family home has been

Table 8. Multiple Regression Models of Property Values of Newly Developed Lots

VARIABLES	(1) Property Value	(2) Property Value	(3) Property Value
Lots developed with an ADU	425,418*** (13,959)	174,603*** (9,673)	
ADU added			-63,175*** (14,453)
SFH and ADU			303,418*** (11,208)
Year Permitted	-9,025*** (1,297)	4,972*** (851.4)	4,548*** (840.1)
Neighborhood Fixed Effects	N	Y	Y
Constant	1.865e+07*** (2.613e+06)	-9.033e+06*** (1.716e+06)	-8.177e+06*** (1.693e+06)
Observations	18,565	17,404	17,404
R-squared	0.048	0.658	0.667

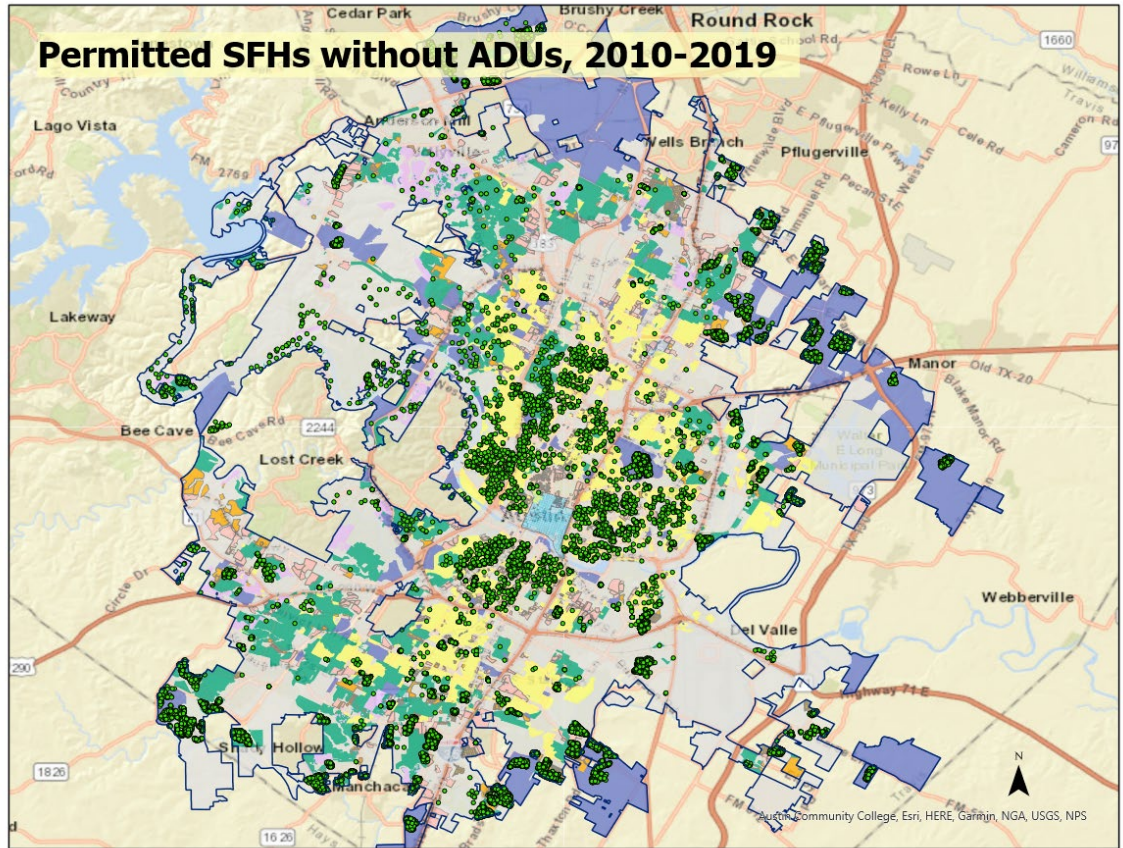
Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

built and it accounts for 65.8% of the variation in home values. The model in Column three separates lots where a new single-family dwelling was constructed along with an ADU and on which an ADU was added to an existing single-family home, again controlling for neighborhood fixed effects. This model indicates that, when controlling for neighborhood, lots on which an ADU is added to an existing home are less valuable than newly developed lots with only a single-family home constructed. However, new single-family homes constructed in the same neighborhood as newly developed lots on which only a single-family home was built are \$303,418 more valuable with the model accounting for 66.7%.

Geography of ADU Construction

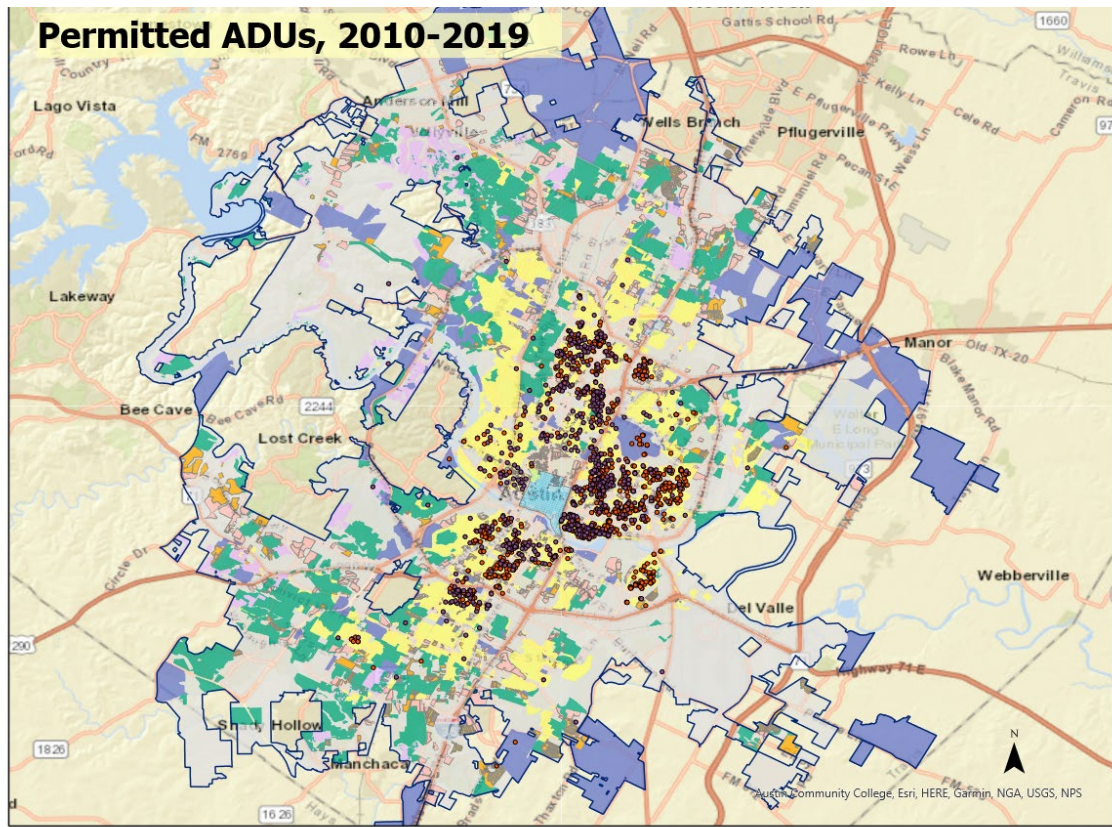
Figure 6: Geographic Distribution of New Adus



Figures 5 and 6 show the locations of permitted new dwellings on single-family lots.

Figure 5 shows the construction of single-family dwellings without ADUs was dispersed throughout the city's geography, with a number of large clusters in neighborhoods along the edge of city limits. New ADUs were largely clustered around Austin's downtown district. In fact, Table 9 demonstrates that ADUs added to existing single-family properties and new single-family homes constructed with an ADU were built an average of 1.97 and 2.14 miles from Austin's Downtown district, respectively.

Figure 7: Geographic Distribution of New SFHs without ADUs



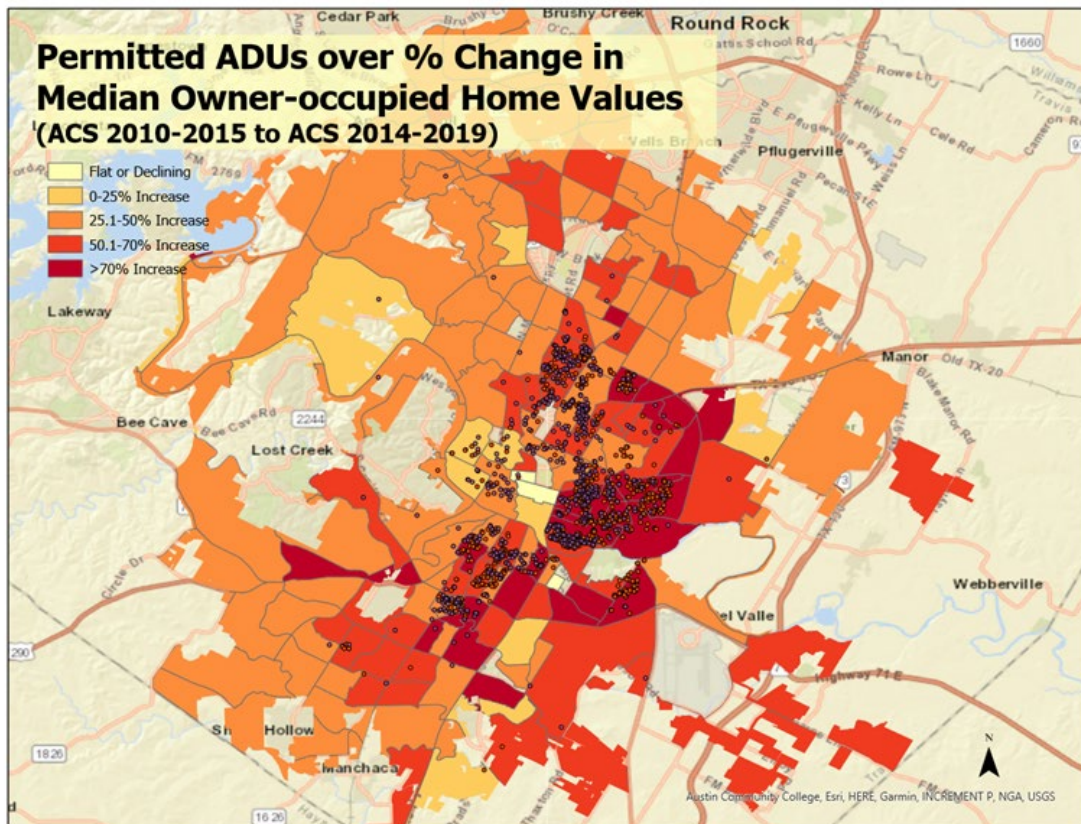
Meanwhile, new single-family homes built without an ADU were much more widely dispersed. Their mean distance from Austin’s Downtown district was 6.6 miles, as shown in Table 9, below.

Table 9. Mean Miles to Austin's Downtown District.

	Mean	Std. Dev.	Obs.
SFH w/o ADU	6.58	3.1397484	17,559
SFH w/ ADU	2.14	1.2845673	739
ADU Added to Existing	1.97	1.4888596	425

It is possible that ADU development is the result of increasing demand for new units in highly desirable neighborhoods proximate to Austin’s city center. Figure 8 shows the locations of new ADUs built during the study timeframe laid over the percent change in median owner-occupied home values by census tract. New ADU construction was largely clustered in neighborhoods that saw median home values rise by more than 50% during the study frame.

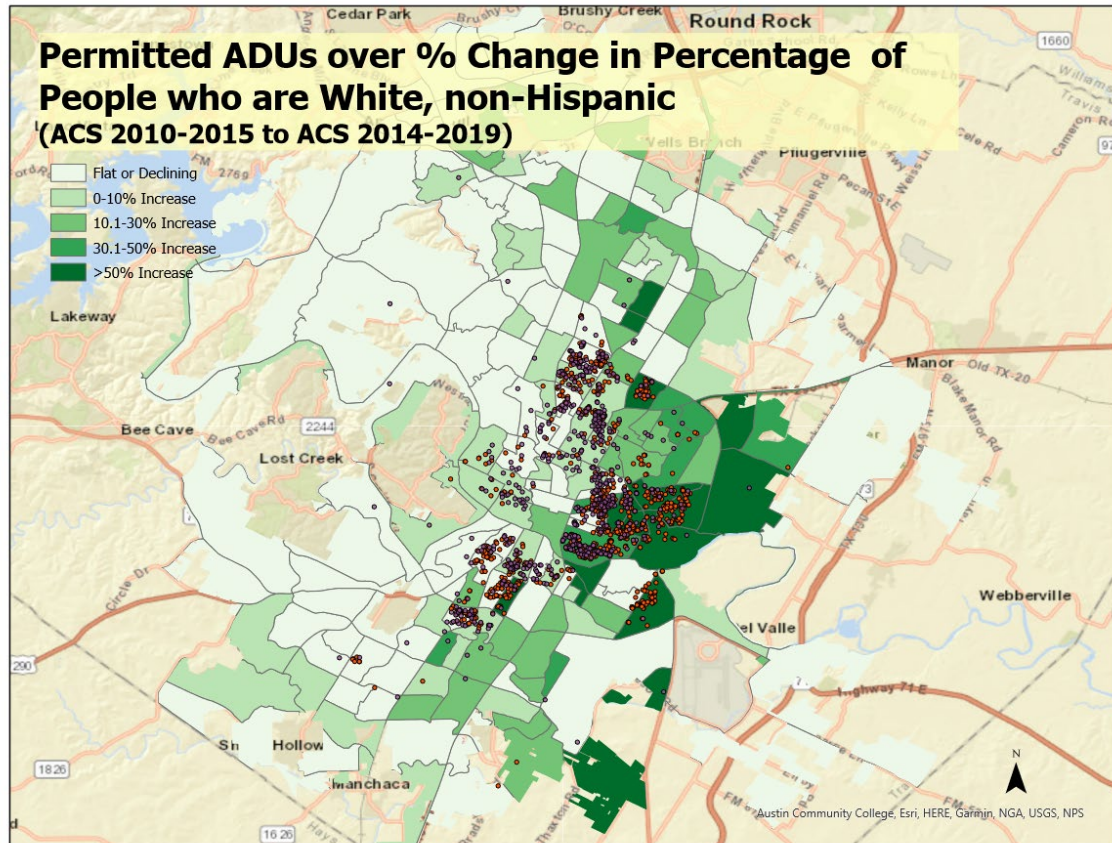
Figure 8: Permitted ADUs over % Change in Median Owner-occupied Home Values



Demographic factors may also have been a factor. Figure 9 shows the changes in percentage of people who are white by census tract and Figure 10 shows the changes in

median household income across Austin. ADUs are clustered in census tracts where the proportion of people of color are on the decline, particularly on Austin's East Side.

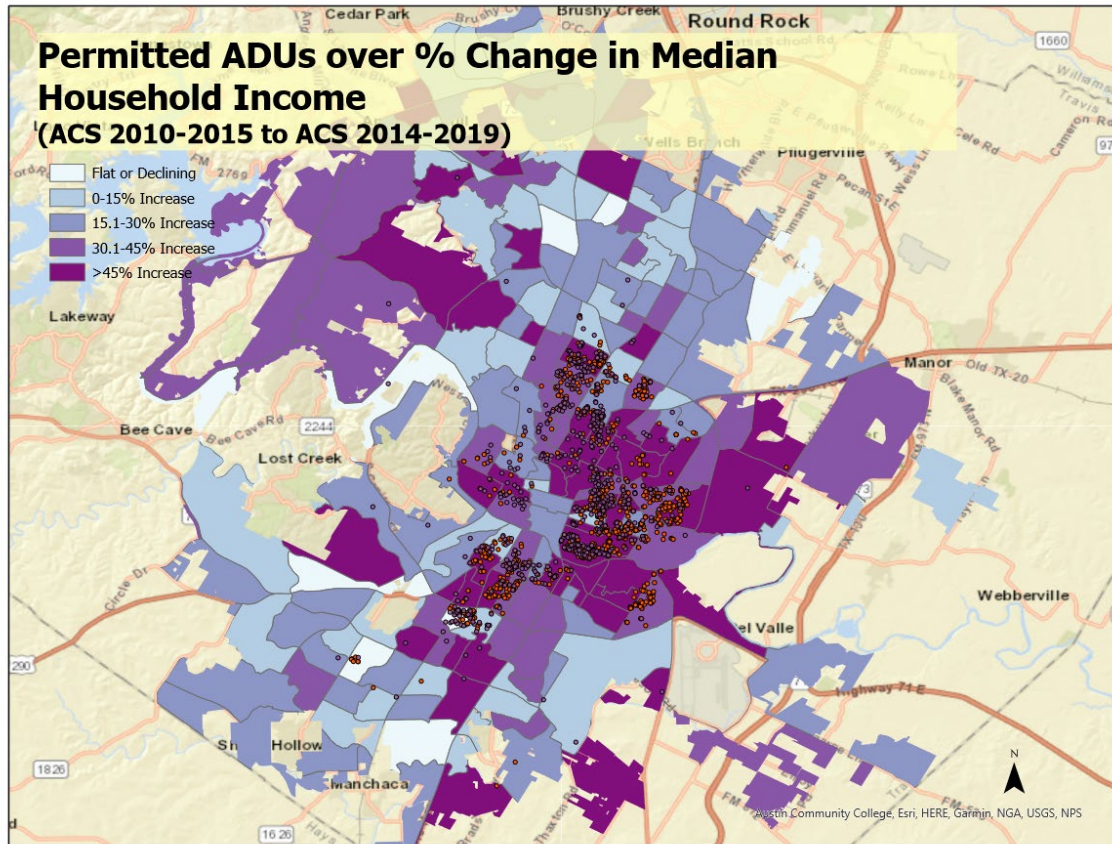
Figure 9: Permitted ADUs over % Change in Percentage of People who are White, non-Hispanic



Neighborhoods that have seen the most dramatic increases in median household income also tend to have seen more extensive ADU development. It may be that the changing demographics of Central Austin neighborhoods is resulting in a population that is increasingly open to developing ADUs on their properties. It may also be the case that

an influx of more affluent white residents has been creating a demand for housing that is both driving up home prices and spurring the construction of ADUs.

Figure 10: Permitted ADUs over % Change in Median Household Income



Summary of Findings

These analyses do not find a causal relationship between Austin’s ADU ordinance and the observed rise in ADU construction within the city because that increase predates the implementation of the ADU Ordinance by several years. This may suggest that the ADU Ordinance may have been a response by Austin’s City Council to an increased interest in

ADU construction among residents or developers in the city. However, the hypothesis that development pattern of a single-family dwelling combined with an ADU results in lower per-unit home prices and higher overall property values of lots compared to single-family only new construction is supported by this research. Both single-family homes built with an ADU and the respective ADUs are found to have a lower per unit home price compared to single-family homes without an ADU built in the same neighborhood. In addition, the combined property value of single-family home with an ADU is significantly higher than new single-family homes without an ADU in the same neighborhood. This finding suggests that permitting construction of ADUs on single family lots results in lower cost new units while also developing the city's property tax base. In addition, the construction of ADUs seem to occur in neighborhoods proximate to downtown where property values have risen sharply. These neighborhoods have also an increasing percentage of higher income and white, non-Hispanic residents. These factors indicate that ADUs are being constructed in neighborhoods that may be experiencing gentrification. However, this thesis does not explore whether the new development of ADUs has a causal relationship with the economic and demographic shifts or is simply a response to them.

Chapter 5

POLICY RECOMMENDATIONS

Expand ADU Development Rights

The City of Austin should expand the development rights of property owners to develop ADUs to SF-1 and SF-2 zoning districts. SF-2 was included in the ADU Ordinance as originally proposed but was amended out of the ordinance before it was passed by Austin City Council. An assessment done in 2015 showed that allowing ADUs on SF-1 lots would open 7,075 properties to ADU development and extending it to SF-2 would open 62,280 lots to ADU development. SF-1 was never included and the amendment to remove SF-2 from the ADU Ordinance passed 9 to 2. Assuming that resistance to extending ADU development to SF-2 lots remains solid, Austin could instead turn to incentivizing the adoption of ADUs as an infill development option at the Neighborhood Planning Area level. One theoretical mechanism could be through a Tax Increment Local Transfer (TILT; Schleicher 2012). This is similar to Tax Increment Financing of infrastructure and service improvements popular in cities like Chicago (Schneider 2019); with the exception that residents of an NPA - or some other local form of jurisdiction – receive direct compensation from any property tax increases. Residents would receive a share of the increase in property tax revenue resulting from the adoption ADUs as an

infill option on SF-1 and SF-2 lots as an incentive to support, or not oppose, increases in allowable density in their area (Schleicher 2012). TILTs have been theorized as a tool to overcome local interest groups that often organize in opposition to redevelopment or upzoning proposals in cities. The city receives the benefit of an increase to its housing supply as well as an expanded tax base, while residents affected by the increased density and development receive a remittance for any burdens they may bear as a result. Such financial consideration might be appealing to incumbent residents burdened by rising property taxes resulting from Austin's rapidly rising property values.

The importance of extending ADU development rights to SF-2 properties is not necessarily to provide immediate development of ADUs in predominantly SF-2 neighborhoods but to allow for a supply response of new development should those neighborhoods experience demand pressures similar to the predominantly SF-3 neighborhoods surrounding downtown Austin that have seen the most ADU development. Dropping regulatory barriers to ADU construction would give low- and moderate-income residents in those neighborhoods the right to construct ADUs, should they choose and have the means to, as a way to resist displacement or offset property tax increases. In addition, this would provide developers a higher density alternative to one-for-one redevelopment of single-family homes in neighborhoods predominated by SF-2 properties. Both would contribute to the city's housing supply should neighborhoods further from downtown Austin begin to experience similar housing pressures to those more central neighborhoods have.

Support and Incentivize ADU Development

The second component of facilitating ADU development is to provide more accessible financing options for homeowners who wish to add an ADU to their property. While the ADU Ordinance lowered the regulatory barriers to permitting the construction of ADUs, ADUs still represent a costly improvement for a private homeowner to make to their property. Securing financing for ADU construction has proven difficult for middle and lower-income homeowners in Austin and developers account for much of the increase in ADU production since the ADU Ordinance was passed (Wegmann et al. 2015). On April 9th, 2020 Austin's City Council adopted Resolution No. 20200409-080 directing city agencies to explore strategies to make obtaining financing for ADU construction more attainable to private homeowners and explore the viability of extending tax abatements to property owners who construct income-restricted ADUs. It is my recommendation that the City of Austin provide tax incentives to any homeowner that adds an ADU to their property, rather than only to those who offer that ADU as an income-restricted rental, in the interest of maximizing the number of new units added to the city's housing supply. Property tax abatements or other incentives for units offered as income-restricted rentals is a worthwhile program, but one that should be in addition to incentives for adding units to existing properties.

Assess the Implications of Current Development Patterns for ADUs

While the increasing addition of ADUs to single-family properties throughout Austin's core neighborhoods is encouraging, the city should assess the implications of current

development patterns for future infill development. It is necessary to assess to what extent new homes replacing older homes in single-family neighborhoods are utilizing the developable area of their lot and whether this form of one-for-one infill development will obstruct the future addition of new units, ADUs or otherwise, to these existing neighborhoods. If such one-for-one infill is indeed preempting future densification in Austin's core neighborhoods it will only entrench problematic low-density development patterns. If this is the case, the city's government may need to explore ways to steer developers towards higher unit densities or to facilitate ADU development by exempting them from building area and FAR restrictions where an existing dwelling would otherwise preempt construction of an ADU.

Chapter 6

CONCLUSION

This thesis cannot definitively conclude that Austin's ADU Ordinance was what caused the dramatic increase in development of ADUs within the city during the study timeframe. However, it is clear that ADUs, whether added to existing homes or build in tandem with a new primary unit, result in an infill of housing units that are both less expensive than new single-family dwellings in the same neighborhood while also resulting in properties with overall higher property values when considering a primary dwelling and ADU together. In addition, while the \$300,000 mean price of an ADU – or the proportionately expensive rent of such a unit – may be far from qualifying as affordable housing, it is certainly affordable to more potential buyers or renters than a new single-family home in the same neighborhood.

Future Research

Different analytic methods or research designs could allow for a more specific examination of the various components of Austin's ADU Ordinance. More can also be done to understand who is taking advantage of the potential for ADU development and who are living in, renting or buying ADUs. The distribution of ADUs examined in this

study also raises questions of why ADU development has concentrated in some areas where it is permitted but not others.

Parking and “Poison Pills”

Exploring whether relaxing parking requirements, FAR restrictions and other design restrictions changed design and development patterns of ADUs could allow researchers to determine if such “poison pill” regulations were truly binding and if the ADU Ordinance’s provisions resulted in larger ADUs, less parking, or differences in property layouts and ADU designs. Additionally, the 1-mile parking exemption around Imagine Austin activity corridors provide a natural experiment for whether homeowners and developers will provide on-site parking for an ADU if they are not required to.

Implications of the Size and Value of ADUs

Obtaining or making estimates of the interior square footage of dwellings could allow for an examination of whether the size and FAR restrictions that were revised by the ADU Ordinance were binding the construction of ADUs. Such estimates could also allow researchers to explore whether allowing larger ADUs increases the likelihood that ADUs are sold away from the primary dwellings. Thus, larger ADUs may function as single-family homes in all but name and provide more attainable homeownership opportunities in desirable neighborhoods.

In addition, estimates of dwellings’ square footage would allow researchers to discern to what extent lots are being developed under different development patterns. When infill

development is done as a one-for-one replacement of a single-family home for a single-family home, are these new homes utilizing the full extent of a lot's developable area allowed by Austin's regulations? By doing so, are developers heading off the potential for future ADU development when they replace a smaller single-family home with a larger one instead of some form of multi-unit housing? And are the higher property values of lots developed with an ADU more valuable simply because they utilize more of the developable area of a property or is the combination of a single-family home and ADU an inherently more valuable development pattern for urban infill?

Further Exploration of Property Values and ADUs

The concentration of ADUs in rapidly appreciating neighborhoods proximate to the center of Austin raises the question of what factors are driving or preventing the development of ADUs in some areas but not others. ADUs are permitted by-right on any SF-3 lot, however, many neighborhoods with a predominance of SF-3 lots experienced very little ADU development. There are a number of potentially explanatory factors worth exploring. There may be a simple lack of demand for more units in those neighborhoods. The economic circumstances of residents there may make the addition of ADUs or purchase of homes with an ADU financially unattainable for homeowners and homebuyers in neighborhoods with lower median incomes. The lack of ADU development may also be a factor of the housing stock, with larger homes occupying all or the majority of a properties permitted developable area.

There is also potential for a greater exploration of a potential two-way relationship between ADU construction and property values and home prices in the neighborhoods where it occurs. On the one hand, it may be that ADUs are a response to rising demand for housing in a neighborhood manifesting as rising home prices and property values. Homeowners and developers may be exploiting an opportunity for more intensive development in the interest of generating rental income, offsetting rising property taxes, or exploiting a more valuable form of new residential development. On the other hand, resistance to ADUs, and other forms of denser development, often stems from a perception that ADUs devalue adjacent properties. Travis County's rigorous property assessments present the opportunity to better explore this relationship by tracking the values of homes in close proximity to new ADUs before and after the development of ADUs compared to properties where new ADU development has not occurred nearby. Supporting or refuting this negative perception of ADUs would be of use to planners and policymakers as they assess the tools available to them to promote housing development in the desirable neighborhoods of their jurisdictions.

Perceptions and Experiences of ADUs

Austin's permit data provides a comprehensive log of where ADUs are located and who built them that would be a useful starting point for a survey of ADU owners, residents, builders and neighbors. Given the potential contentiousness of any new development in existing residential areas and the relative recency of extensive construction of new

ADUs there is an opportunity to explore the experiences of those affected by ADU development. It is worth investigating why developers have built a single-family home and ADU instead of a duplex on a lot where both are permitted. The reasons homeowners give for adding an ADU to their property, and whether an ADU has allowed them to remain in a neighborhood they could not otherwise afford, could add to our understanding of the roll ADUs play in the economics of homeownership in expensive cities. It could be of interest to know who is living in Austin's new ADUs and their reasons for choosing that form of housing over others. The uses of these new ADUs would also be worth investigating: are they being used as rentals, sold separately from the primary dwelling as de facto single-family dwellings, residences for relatives, or simply extra space for the owners? The dataset used by this study could be used as the basis for determining what percentage of ADUs are sold, rented, or used for other purposes. Finally, it is worth asking about the experiences of those who live next to or near ADUs about their experiences and perceptions of having ADUs built on the properties around them. The issue of "studentification" might be assessed in this way.

REFERENCES

- Anacker, Katrin B. 2019. "Introduction: Housing Affordability and Affordable Housing." *International Journal of Housing Policy* 19, no. 1 (January 2, 2019): 1–16. <https://doi.org/10.1080/19491247.2018.1560544>.
- AustinTexas.gov. n.d. "Adopted Neighborhood Planning Areas". Accessed on April 2, 2021. <https://www.austintexas.gov/page/adopted-neighborhood-planning-areas-0>
- Been, Vicki, Benjamin Gross, and John Infranca. 2014. "Responding to Changing Households: Regulatory Challenges for Micro-Units and Accessory Dwelling Units" Furman Center, New York University. September 2014. <file:///C:/Users/s1huj/Zotero/storage/2LG2FUHZ/Been%20et%20al.%20-%20Responding%20to%20Changing%20Households%20Regulatory%20Chal.pdf>
- Bertolet, Dan and Morales, Margaret. "Seattle Says Yes to the Best Rules in America for Backyard Cottages". Sightline Institute. July 1, 2019. <https://www.sightline.org/2019/07/01/seattle-approves-best-backyard-cottages-rules-united-states/>
- Paul Boudreaux. 2016. "Lotting Large: The Phenomenon of Minimum Lot Size Laws". *Maine Law Review* 68 no. 1 (January). <https://digitalcommons.minelaw.maine.edu/mlr/vol68/iss1/10>
- Brannigan, Martha. "Lennar Design Accommodates Multigenerational families". *Miami Herald*, Jan 25, 2013. http://www.miamiherald.com/2013/01/25/3199631_p2/lennar-design-accommodates-multigenerational.html.
- Brown, Barbara B., and Vivian L. Cropper. 2001. "New Urban and Standard Suburban Subdivisions: Evaluating Psychological and Social Goals." *Journal of the American Planning Association* 67 no. 4: 402–19. <https://doi.org/10.1080/01944360108976249>.
- Christensen, Pernille. 2016. "Investigating Solutions to the Affordable Housing Supply Challenges in Sydney: Two Alternative Typologies". *22nd Annual Pacific-Rim Real*

Estate Society Conference.

http://www.prrres.net/papers/Christensen_AffordableHousingSupply.pdf

City Council of the City of Austin. 1999. *Chestnut Neighborhood Plan*. July 1999.

http://www.austintexas.gov/sites/default/files/files/Housing_%26_Planning/Adopted%20Neighborhood%20Planning%20Areas/06_Chestnut/chestnut-np.pdf

City Council of the City of Austin. 2002. *Bouldin Creek Neighborhood Plan*. May 2002.

http://www.austintexas.gov/sites/default/files/files/Housing_%26_Planning/Adopted%20Neighborhood%20Planning%20Areas/01_BouldinCreek/bouldin-np.pdf

City Council of the City of Austin. 2012. *Imagine Austin Comprehensive Plan*. June 15, 2012.

<https://www.austintexas.gov/sites/default/files/files/Planning/ImagineAustin/wbiacpreduced.pdf>

City Council of the City of Austin. 2015. Ordinance No. 20151119-080.

City Council of the City of Austin. 2015. *SF Lot Comparison*.

<http://www.austintexas.gov/edims/document.cfm?id=243249>

City Council of the City of Austin. 2017. *Austin Strategic Housing Blueprint*.

https://www.austintexas.gov/sites/default/files/files/StrategicHousingBlueprint_Final_September_2017.pdf

City of Austin. "Austin Area Population Histories and Forecasts". 2018.

https://www.austintexas.gov/sites/default/files/files/Planning/Demographics/austin_forecast_2018_pub.pdf

Cohen, Josh. 2018. "California ADU Applications Skyrocket After Regulatory Reform".

Next City. January 4, 2018. <https://nextcity.org/daily/entry/california-adu-applications-skyrocket-after-regulatory-reform>

Dear, Michael. 1992. "Understanding and Overcoming the Nimby Syndrome." *Journal of the American Planning Association* 58, no. 3: 288–300.

<https://doi.org/10.1080/01944369208975808>.

Chapple, Karen, Jake Wegmann, Farzad Mashhood, Rebecca Coleman. 2017.

"Jumpstarting the Market for Accessory Dwelling Units: Lessons Learned from Portland, Seattle, and Vancouver." Terner Center for Housing Innovation,

- University of California, Berkely. <https://turnercenter.berkeley.edu/research-and-policy/more-adus/>.
- Cuff, Dana, Tim Higgins and Per-Johan Dahl. 2010. "Backyard Homes LA". Los Angeles, CA: cityLAB, UCLA Department of Architecture + Urban Design. 2010.
- United States Department Of Housing and Urban Development. 2008. "Accessory Dwelling Units: A Case Study". June 2008. <https://www.huduser.gov/Publications/PDF/adu.pdf>
- Department of Planning, City of Austin. 1980. *Austin Tomorrow Comprehensive Plan*.
- Ellickson, Robert C. 2018. "The Zoning Strait-Jacket: The Freezing of American Neighborhoods of Single-Family Houses." Rochester, NY: Social Science Research Network. <https://doi.org/10.2139/ssrn.3507803>.
- Fulton, William. 2020. "Can Texas afford to lose its housing affordability advantage?". Kinder Institute for Urban Research. April 14, 2020.
- Gabobe, Nisma. 2019. "California Looks to a Future Beyond Single-Detached House Zoning". Sightline Institute. November 22, 2019. <https://www.sightline.org/2019/11/22/california-looks-to-a-future-beyond-single-detached-house-zoning/>
- Glaeser, Edward L. 2011. "Rethinking the Federal Bias Toward Homeownership". *Cityscape: A Journal of Policy Development and Research* 13 no. 2: 5-37.
- Glaeser, Edward, Joseph Gyourko, and Raven Saks. 2003. "Why Is Manhattan So Expensive? Regulation and the Rise in House Prices." Cambridge, MA: National Bureau of Economic Research. November 2003. <https://doi.org/10.3386/w10124>.
- Glaeser, Edward L., Joseph Gyourko, and Raven E. Saks. 2005. "Why Have Housing Prices Gone Up?". *American Economic Review* 95 no. 2: 329-333.
- Goodman, Laurie, Ellen Seidman, and Jun Zhu. 2020. "To Understand a City's Pace of Gentrification, Look at Its Housing Supply." Urban Institute. June 24, 2020. <https://www.urban.org/urban-wire/understand-citys-pace-gentrification-look-its-housing-supply>.
- Gray, M. Nolan and Salim Furth. 2019. "Do Minimum-Lot-Size Regulations Limit Housing Supply in Texas?" Mercatus Center, George Mason University. May 1, 2019. <https://doi.org/10.2139/ssrn.3381173>.

- Gurran, Nicole, Sophia Maalsen & Pranita Shrestha. 2020. "Is 'informal' housing an affordability solution for expensive cities? Evidence from Sydney, Australia". *International Journal of Housing Policy*. <https://doi-org.udel.idm.oclc.org/10.1080/19491247.2020.1805147>
- Gurran, Nicole, Madeleine Pill, and Sophia Maalsen. "Hidden Homes? Uncovering Sydney's Informal Housing Market." *Urban Studies*. June 10, 2020. <https://doi.org/10.1177/0042098020915822>.
- Harris, Richard, and Kathleen Kinsella. 2017. "Secondary Suites: A Survey of Evidence and Municipal Policy." *The Canadian Geographer / Le Géographe Canadien* 61 (November 1, 2017). <https://doi.org/10.1111/cag.12424>.
- Hermann, Alexander and Wu, Dixi. 2021. "The Pandemic Reveals the Need for Space, but Building Smaller Units Remains Essential". Joint Center for Housing Studies. February 18, 2021. <https://www.jchs.harvard.edu/blog/pandemic-reveals-need-space-building-smaller-units-remains-essential>
- Joint Center for Housing Studies. 2019. *State of the Nation's Housing 2019*. Cambridge, MA: Harvard College. https://www.jchs.harvard.edu/sites/default/files/reports/files/Harvard_JCHS_State_of_the_Nations_Housing_2019%20%281%29.pdf
- Jakabovics, Andrew, Lynn M. Ross, Molly Simpson and Michael Spotts. 2014. "Bending the Cost Curve: Solutions to expand the supply of affordable rentals". Washington, DC: Urban Land Institute.
- Kahlenberg, Richard D. "How Minneapolis Ended Single-Family Zoning." The Century Foundation, October 2019. <https://tcf.org/content/report/minneapolis-ended-single-family-zoning/?session=1>
- Kalloch, Andrew L. 2012. "Start-Up City: Growing New York City's Entrepreneurial Ecosystem for All". New York, NY: Office of the Manhattan Borough President. <https://basecampaign.files.wordpress.com/2013/06/startupcity-report-stringers-office.pdf>.
- Kolko, Jed. 2017. "Seattle Climbs but Austin Sprawls: The Myth of the Return to Cities." *The New York Times*. May 22, 2017. <https://www.nytimes.com/2017/05/22/upshot/seattle-climbs-but-austin-sprawls-the-myth-of-the-return-to-cities.html>.
- Leinberger, Tracy Hadden Loh and Christopher B. 2019. "The Economic Power of Walkability in Metro Areas." Brookings. July 12, 2019.

<https://www.brookings.edu/blog/the-avenue/2019/07/12/the-economic-power-of-walkability-in-metro-areas/>.

Lens, Michael C. and Paavo Monkkonen. 2016 "Do Strict Land Use Regulations Make Metropolitan Areas More Segregated by Income?" *Journal of the American Planning Association* 82 no. 1

Liebig, Phoebe S., Teresa Koenig, Jon Pynoos. 2006. "Zoning, Accessory Dwelling Units, and Family Caregiving". *Journal of Aging & Social Policy*, 18:3-4,155-172, DOI: 10.1300/J031v18n03_11

Mueller, Elizabeth J. 2010. "Old Apartments and New Plans: Reconciling Planning and Housing Goals in Two Texas Cities." *Community Development* 41 no. 1: 121–40. <https://doi.org/10.1080/15575330903548786>.

Opticos Design. 2014. *Land Development Code Diagnosis*. https://www.austintexas.gov/sites/default/files/files/Planning/CodeNEXT/Austin_CodeDiagnosis_PublicDraft_web_050514.pdf

Parolek, Daniel. 2020. *Missing Middle Housing: Thinking Big and Building Small to Respond to Today's Housing Crisis*. Washington, DC: Island Press.

Pendall, Rolf. 1999. "Opposition to Housing: NIMBY and Beyond." *Urban Affairs Review* 35, no. 1 (September): 112–36. <https://doi.org/10.1177/10780879922184310>.

Peterson, Kol. 2018. *Backdoor Revolution: The Definitive Guide to ADU Development*. Portland, Oregon.

Planning & Zoning Department, City of Austin. 2016. *Guide to Zoning*.

Pynoos, Jon, Rachel Caraviello, and Caroline Cicero. "Lifelong Housing: The Anchor in Aging-Friendly Communities." *Generations: Journal of the American Society on Aging* 33, no. 2 (2009): 26-32. Accessed May 27, 2021. <https://www.jstor.org/stable/26555647>.

Regional Plan Association. 2016. "The Unintended Consequences of Housing Finance". February 2016. <https://smartgrowthamerica.org/resources/the-unintended-consequences-of-housing-finance/>

Romem, Issi. *n.d.* "Can U.S. Cities Compensate for Curbing Sprawl by Growing Denser". Accessed on April 7th, 2021. <https://www.buildzoom.com/blog/can-cities-compensate-for-curbing-sprawl-by-growing-denser>.

- Root Policy Research, prepared for the City of Austin. 2020. *City of Austin Comprehensive Housing Market Analysis*.
https://austintexas.gov/sites/default/files/files/Housing/Austin%20HMA_final.pdf
- Rothwell, Jonathan T., and Douglas S. Massey. 2010 “Density Zoning and Class Segregation in U.S. Metropolitan Areas”. *Social Science Quarterly* 91 no. 5 (2010): 1123–43. <https://doi.org/10.1111/j.1540-6237.2010.00724.x>.
- Schleicher, David. 2012. “City Unplanning.” *Yale Law Journal* 122, no. 7 (May): 1670–1737.
- Schuetz, Jenny. 2020. “Who’s to Blame for High Housing Costs? It’s More Complicated than You Think.” Brookings. January 16, 2020.
<https://www.brookings.edu/research/whos-to-blame-for-high-housing-costs-its-more-complicated-than-you-think/>.
- Sauter, Michael B. “Pricey homes in these 15 US cities put them at risk of a housing crisis”. *USA Today*. May 31, 2019.
<https://www.usatoday.com/story/money/2019/05/31/cities-on-a-verge-of-a-housing-crisis/39527629/>
- Schneider, Benjamin. 2019. “CityLab University: Tax Increment Financing”. CityLab. October 25, 2019. <https://www.bloomberg.com/news/articles/2019-10-24/the-lowdown-on-tif-the-developer-s-friend>
- Sheth, Rachana and Robert Neuwirth. 2008. “New York’s Housing Underground: A Refuge and Resource”. Pratt Center for Community Development. March 2008.
https://prattcenter.net/uploads/300003/1589551661571/Housing_Underground.pdf
- Smith, Darren P., Joanna Sage, and Stacey Balsdon. 2014. “The Geographies of Studentification: ‘Here, There and Everywhere’?” *Geography* 99 no. 3 (2014): 116–27.
- Stacy, Christina, Terry-Ann Craigie, Brady Meixell, Graham MacDonald, Sihan Vivian Zheng, Christopher Davis, Christina Baird, Ben Chartoff, David Hinson. 2019. “Too Far From Jobs: Spatial Mismatch and Hourly Workers”. Urban Institute. February 21, 2019. <https://www.urban.org/features/too-far-jobs-spatial-mismatch-and-hourly-workers>

- Texas Real Estate Research Center, Texas A&M. 2016. "Housing Activity for Austin (Austin BoR)". [https://www.recenter.tamu.edu/data/housing-activity#!/activity/Local_Market_Area_\(LMA\)/Austin_\(Austin_BoR\)](https://www.recenter.tamu.edu/data/housing-activity#!/activity/Local_Market_Area_(LMA)/Austin_(Austin_BoR))
- Taylor, Paul, Jeffrey Passel, Richard Fry, Richard Morin, Wendy Wang, Gabriel Velasco and Daniel Dockterman. 2010. "The Return of the Multi-Generational Family Household". Pew Research Center. March 10, 2010. <https://www.pewresearch.org/wp-content/uploads/sites/3/2010/10/752-multi-generational-families.pdf>
- Turner, Matthew. 2015. "The Economics of Land-Use Regulations." *PERC Reports* 33 no. 2 (Winter). <https://www.perc.org/2015/01/12/the-economics-of-land-use-regulations/>
- Wallace, Nancy E. 1988. "The Market Effects of Zoning Undeveloped Land: Does Zoning Follow the Market?". *Journal of Urban Economics* 23, no. 3 (May 1988): 307–26. [https://doi.org/10.1016/0094-1190\(88\)90021-6](https://doi.org/10.1016/0094-1190(88)90021-6).
- Wegmann, Jake. 2015. "Research Notes: The Hidden Cityscapes of Informal Housing in Suburban Los Angeles and the Paradox of Horizontal Density." *Buildings & Landscapes: Journal of the Vernacular Architecture Forum* 22 no. 2 (2015): 89–110. doi:10.5749/buildland.22.2.0089.
- Wegmann, Jake, and Karen Chapple. 2014. "Hidden Density in Single-Family Neighborhoods: Backyard Cottages as an Equitable Smart Growth Strategy." *Journal of Urbanism* 7 no. 3 (2014). <https://escholarship.org/uc/item/17v2s7t6>.
- Wegmann, Jake, and Sarah Mawhorter. 2017. "Measuring Informal Housing Production in California Cities." *Journal of the American Planning Association* 83 no. 2 (April 3, 2017): 119–30. <https://doi.org/10.1080/01944363.2017.1288162>.
- Wegmann et al. 2016 "Strategies to Help Homeowners Finance Accessory Dwelling Units in Austin". May 20, 2016. <https://www.austintexas.gov/edims/document.cfm?id=254852>
- White, James R. 1988. "Large Lot Zoning and Subdivision Costs: A Test". *Journal of Urban Economics* 23, 370-384. [https://doi.org/10.1016/0094-1190\(88\)90024-1](https://doi.org/10.1016/0094-1190(88)90024-1)