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The Changing Landscape of Affordable Housing in the Rural and Urban United States, 1990–2016*

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Abstract Affordable housing has declined in recent decades, yet limited research has examined the demographic and economic changes influencing place-level affordability—especially outside of large metros. In this study I examine the effects of county-level population growth and decline, population aging, and natural amenity development on rates of affordable housing, income, and housing costs across four types of counties. While declines in affordability from 1990 to 2016 were universal between rural and urban counties, population growth is associated with decreases in affordability in rural counties but increased affordability in large metros counties due to estimated decreases in housing costs. Population aging is estimated to improve affordability in large and small metro counties, despite the associated decrease in income and housing costs across all county types. The effects of aging vary greatly between owners and renters. Natural amenity development, despite its theoretical importance, is not associated with changes in affordability for rural counties.

Introduction

Housing (un)affordability has been brought to the scholarly and policy forefront in recent years, with the high profile work Matthew Desmond and the COVID-19 pandemic being key catalysts of this shift (Desmond 2016; Jones and Grigsby-Toussaint 2020). Despite this recent rise in attention, affordable housing has been on a decades-long decline in the United States. In 1990, 26.6 percent of households had housing costs deemed unaffordable, but this increased to 32.0 percent by 2016 despite increases in income over the period (Harvard JCHS 2018; Wilmers 2018). Rates of unaffordable housing in 2016 were especially high among socioeconomically vulnerable groups such as renters (47.4 percent) and households making less than $30,000 per year (73.1 percent) (Harvard JCHS 2018). Adding on to these trends were significant spikes in unaffordable housing and general housing instability during

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the Great Recession (Colburn and Allen 2018; Harvard JCHS 2018; Lens 2018).

These housing trends are important because those without affordable living arrangements are at heightened risk of joblessness, forced moves, and mental stress, among other things (Desmond and Gershenson 2016; Lee and Evans 2020; Zavisca and Gerber 2016). Accompanying this general decline in affordability is growing inequality in affordability between groups. Most studies regarding changes in the attainment of affordable housing have focused on what characteristics (e.g., race, tenure) influence individuals' risk of housing instability—addressing important evidence gaps (Colburn and Allen 2018; Desmond and Gershenson 2016; McConnell and Akresh 2010). However, housing inequality can also be viewed as a place-based or spatially aggregated process, with local or federal policy or localized demographic and economic change being seen as the key drivers of housing affordability. Research on place-level affordability has focused primarily on disparities between neighborhoods within or between metropolitan areas, generally overlooking housing in rural areas and how county-level affordability across the nation has been impacted by demographic and economic change.

This study addresses these knowledge gaps via two objectives. First, I test hypotheses regarding the socioeconomic determinants of change in affordable housing from 1990 to 2016 in U.S. counties. Of all the potential determinates of change, I focus on three that have a strong theoretical link to place-level affordability: population growth, population aging, and natural amenity development (NAD). These forces have been documented to affect local housing costs and other spatial socioeconomic outcomes (e.g., poverty) and are thus likely to produce changes in affordability (Deller 2010; Glasgow and Brown 2012; Lichter and Brown 2011). Emphasis is given to understanding how these determinates vary between urban (metropolitan) and rural (nonmetropolitan) counties, which I expect to differ in affordability dynamics given how related spatial inequalities have played out across the rural-urban continuum.[1] A second objective is to tease apart these effects on affordability into county-level changes in household income and housing costs, respectively. As subsequently explained, it is necessary to study changes in affordability, income, and housing costs together to fully understand the changing landscape of affordable housing.

[1]In this study, I use the terms urban and metropolitan, and rural and nonmetropolitan interchangeable. While I acknowledge that these terms are not direct synonyms and differ technically within U.S. federal statistics, I use both sets of terms in order to make key substantive or technical points.

Conceptual Framework and Background

Place-level rates of affordable housing—regardless of geographic scale—are determined by the relationship between the financial resources available to residents and the housing costs paid by those residents. Although there are multiple ways to measure the relationship between financial resources and housing costs to determine affordability, the most straightforward way is to measure the percentage of households that live in affordable housing. The affordable housing rate is typically defined as the proportion of households that spend 30 percent or less of their income on housing costs (Herbert et al. 2018). The main limitation of measuring affordability in this way is that when examining longitudinal changes in affordability it masks why a place is becoming more or less affordable.

This limitation arises from the issue that changes in affordability are a direct reflection of unequal changes in average income and average housing costs. To clarify, if at the individual level affordable housing reflects housing cost relative to income then longitudinal changes in affordability are due to longitudinal changes in housing costs and income. This relationship can be expressed as the following simple formula:

$$\text{Longitudinal change in affordable housing} = \frac{\text{Longitudinal change in housing costs}}{\text{Longitudinal change in income}}$$

As such a place can maintain the same relative affordability if there are relatively equal shifts—positive or negative—in income and housing costs. If both income and housing costs increase equally, then affordability remains the same. Changes in income and housing costs affect resident's lived experiences and thus must be considered when estimating changes in place-level affordability even if place-level affordability does not significantly change. Furthermore, different combinations of income and housing cost change can produce similar changes in affordable housing. A county that has become more affordable over time could have, for example, experienced a significant rise in income with minor growth in housing costs, or, alternatively, experienced a decrease in housing costs with no change in income. These scenarios reflect very different sociological realities that must be accounted for and have distinct implications for the long-term well-being of residents.

Incorporating income and housing costs also helps understand the process through which multiple socioeconomic forces produce changes

in place-level affordability. The demographic and economic forces of interest to this study—population growth, population aging, and NAD—theoretically affect the subcomponents of affordability in different ways with sometimes ambiguous implications for overall rates of affordable housing. For example, while population growth may put pressure on available housing stock within a county (Glaeser and Gyourko 2018; Mulder 2006), it may at the same time be driven by the in-migration of affluent individuals that can afford to live in a tighter housing market (Nelson and Hines 2018; Nelson et al. 2010). Alternatively, in the case of a NAD community, those permanently migrating in are often those seeking working-class jobs. These migrants may be poorer than current residents resulting in decreases in average incomes—compounding the increases in housing cost—thus decreasing affordability (Nelson et al. 2009).

The other element of this study's conceptual framework is the need to explore how affordability and its determinants vary between rural and urban areas. While rates of unaffordable housing in 2016 were at 25 percent in nonmetro counties, 26 percent in small metros, and 40 percent in large metros (Harvard JCHS 2018), differences in overall cost of living relative to income are much smaller between county types (Nord 2009). One study found that while large metro areas tend to be more costly there is little difference in costs of living between medium metros, small metros, and rural areas both near and far from metropolitan areas (Loveridge and Paredes 2018). For housing costs specifically, in the ten largest metro areas the median monthly housing costs exceeded $1,300, while costs in all other metros were around $700 and $650 for nonmetro counties (Harvard JCHS 2018). However, research on cross-sectional rural-urban disparities cannot fully explain how and why rural and urban places become more or less affordable over time.

Rural-urban status is likely a key modifier of affordability for several reasons. First, county socioeconomic heterogeneity likely means that changes in population or employment result in different impacts on housing in different types of rural and urban counties. Population growth is unequal among U.S. counties, favoring urban and suburban areas (Johnson and Lichter 2019). Urban governments tend to have a larger relative tax-base, stronger zoning ordinances, and provide more services than rural governments (Frank and Reiss 2014; Lobao and Kraybill 2005), all of which could make urban places less susceptible to drastic shifts in affordability. As a counterpoint, homeownership—generally the more affordable option than renting—is dominant in rural areas, while renting is much more common in urban areas (Barcus 2010; Brooks and Mueller 2020).

Rural places also can have specialized—or dependent—economies and thus relatively small shifts in employment could produce significant housing change (Gundersen 2006; Thiede and Slack 2017). Urban places also tend to have greater availability of newly-built housing (Harvard JCHS 2018), which can help growing populations find affordable housing (Hall 2013; Lichter et al. 2010). Income growth has generally been more stagnant over time in rural areas and rural poverty is significantly higher than urban poverty (Weber and Miller 2017). It should be noted that rural-urban poverty disparities are dependent on measurement, as rural poverty rates are only higher when using the Official Poverty Measure (Nolan et al. 2017; Pacas and Rothwell 2020). If using the alternative Supplemental Poverty Measure (SPM), then urban poverty rates are higher. This switch in disparity is attributable to the SPM's adjustment for geographic variation in cost of living (i.e., median rent)—benefiting rural areas. This geographic adjustment has been critiqued in that it masks variation in cost of living within rural areas, and as such it is likely that even when accounting for rural-urban variation in cost of living a rural disadvantage remains (Mueller et al. 2021; Pacas and Rothwell 2020). These rural disadvantages suggest that shifts in income and housing costs are more likely to be unequal in rural areas—resulting in significant changes in affordability—and that the potential effects of demographic and economic change may be smaller in urban areas than in rural areas.

The second reason why rural-urban status is important is that certain types of counties may benefit—become more affordable—from a given socioeconomic change while other nearby counties may become worse off. Rural America continues to be exploited by urban America for its cheaper land and labor in ways that affect housing (Lichter and Brown 2011; Lichter and Ziliak 2017). Exurban housing developments are often built in nonmetro counties that border metro counties with developments sometimes just across the county line. While these developments increase the available housing stock for the nearby suburban population, they may have the unintended effect of increasing the nonmetro county's housing costs (Clark et al. 2009; Esparza 2010; Lichter et al. 2020; Lichter and Ziliak 2017). Population change may make urban places more affordable at the expense of rural places. Furthermore, employment changes in one county can spill-over to another, which is particularly true for NAD (Hunter et al. 2005). The potential for uneven effects on housing within a multi-county area—containing both rural and urban places—suggests a need to incorporate spatial processes into this study's analysis.

The final reason to include rural-urban status into this framework is a practical one. Rural-urban status can help identify the on-the-ground changes. Rural-urban status is needed to understand the potential effects of NAD, as the occupations associated with NAD—hospitality, real estate, and recreation—mean different things in rural and urban areas (Deller 2010; Winkler et al. 2012). For example, it is unlikely that growth in tourism-related occupations will create universal changes in affordability across rural-urban counties. How population growth translates to housing change is also affected by rural-urban status. Growth in rural areas may potentially lead to the building of expensive suburban-style housing developments (Clark et al. 2009; Marx 2010; Roskey 2010), but urban growth may increase rental prices in large metros (Colburn and Allen 2018). Further, rural and urban America have different ethnoracial compositions, with rural areas having a relatively larger white population relative to urban areas (Lichter and Brown 2011). This is relevant for affordable housing—and housing disparities overall—in that population growth in urban areas might be mostly driven by immigrant, Black, and Hispanic population growth, with these groups having a long and ongoing history of marginalization in the housing market (Korver-Glenn 2018; Massey et al. 2016) while rural population growth might be mostly white.[2] The former potentially has a negative effect on affordability while the latter might have no effect or even a positive effect. Overall, rural-urban status is needed to fully understand why some places in the United States are becoming more or less affordable.

Past Research on Housing, Demographic, and Economic Change

This study views changes in housing affordability as a form of spatial inequality, in that a social advantage—the attainment of affordable housing—is unequally distributed among places in the United States (Lobao et al. 2008). To theorize and understand how population growth, aging, and NAD affect affordability it is necessary to overview past research regarding how these processes have produced related spatial inequalities.

Population growth is unequal across the United States with growth favoring urban counties and significant decline present in rural

[2]This is not to say that rural minorities do not experience the same discrimination as their urban counter parts. Ethnoracial segregation is on the rise in rural areas (Lichter et al. 2010), rural minorities have been excluded from city services through so-called municipal under bounding (Lichter et al. 2007), and experience high rates of residential mobility (Clark 2012; Fitchen 1994)—all of which negatively impact affordability among these groups.

remote counties (Johnson and Lichter 2019). However, even within rural areas there is not a consistent pattern with many micropolitan and metropolitan fringe counties experiencing growth (Johnson and Lichter 2019; Lichter et al. 2020). Population growth and decline are associated with several key socioeconomic changes that are relevant to this study. Counties that have been consistently classified as nonmetropolitan since 1960—and thus have had limited population growth—had poverty rates in 1970 that were 3.1 percent higher than consistently metropolitan counties (15.9 percent vs. 12.8 percent), while high-growth, rural-to-urban counties had a poverty rate of 14.0 percent (Johnson and Lichter 2020). Longitudinal poverty change is also affected by county growth type, with declines of 5.4 percentage points for consistently nonmetropolitan counties since 1970, −1.8 points (indicating an increase) for nonmetro-to-metro counties, and 5.1 points for consistently metropolitan counties. Population growth is also related to income inequality. Butler and colleagues (2020) found that high growth nonmetropolitan counties experienced a decline in income inequality relative to stable growth counties, while population decline counties became more unequal over time. Similar trends may cross over to inequality in affordability, where growing populations create more equitable housing markets and it is easier for households of all income groups to find suitable housing. Alternatively, population decline could lead to excess housing stock resulting in decreased housing prices for those who remain in these places (Mulder 2006). The vast majority of counties that have experienced population decline in these studies are also classified as rural (Butler et al. 2020; Johnson and Lichter 2019), which for this study may mean that population change may also be associated with larger relative changes in affordability in rural counties compared to urban counties.

While research on population change and affordability specifically is limited, several studies document the effects of growth on housing costs and home values. In general, population growth increases housing prices within an area especially if new local housing stock does not also match this growth (Füss and Zietz 2016; Mulder 2006). A study of change between 1984 and 1998 found that a one percent increase in population was associated with a 1.1 percent increase in housing prices (Jud and Winkler 2002). Füss and Zietz (2016) find that while rising housing costs often accompanies population growth, the relationship is moderated by availability of land and federal funds. However, both studies only focused on changes within metropolitan areas.

The United States is aging (Lichter and Johnson 2020; Thiede et al. 2017), and this is particularly true for many rural areas. In 2010, for

example, approximately 15 percent of the rural population was over 65 years old compared to only 12 percent of the urban population (Glasgow and Brown 2012). The growth of the elderly population can be driven by two trends: aging in place and the emergence of rural retirement destinations. Aging in place communities are categorized by increases in median age due to the aging of long-term residents and the outmigration of young adults (Glasgow and Brown 2012; Johnson and Lichter 2019). In many nonmetro counties deaths each year outnumber births, which likely have an effect on the availability of housing in those communities (Johnson 2020). Aging places can suffer economically due to decreased relative size of the working-age population and increased stress that seniors often put on local health and social services (Erickson et al. 2012). Yet modest levels of population aging is also associated with an increase in community services in many rural counties (Thiede et al. 2017), which may help keep housing costs stable over time. Counties with initially very large proportions of elderly residents see declines in services, meaning that the relationship between aging and affordability may be nonlinear (Thiede et al. 2017). Aging in place is also a function of population loss at the bottom of the age pyramid, with many rural places experiencing brain drain and youth out-migration (Jacquet et al. 2017; von Reichert et al. 2014). While no research has looked at the relationship between housing affordability and youth outmigration directly, there are strong conceptual reasons to believe that as a county shifts from significant portions of population having a high risk of housing instability (i.e., young adults) to a population with a lower risk (i.e., elderly), local rates of housing affordability should increase.

The other major driver of local population aging is the emergence of rural retirement destinations (Brown et al. 2011; Glasgow and Brown 2012), in which wealthy retired individuals migrate to select amenity-rich communities. Rural retirement destination communities can greatly benefit from such migration streams as many retirees have high incomes and help support local civic and social organizations (Brown et al. 2011; Sherman 2018). Elderly individuals who migrate to rural areas tend to do so to micropolitan counties (Johnson and Winkler 2015).

Although there are reasons to expect older individuals to be more housing stable, affordable housing is a growing concern for the elderly population (Vega and Wallace 2016). One study found that in 2017, 30.9 percent of people aged 65–79 lived in unaffordable housing compared to 28.2 percent in 2001—likely driven by increases in renting among the elderly (Harvard JCHS 2019). Despite this increase in renting, homeownership is the modal tenure for those aged 65+, and the majority (54 percent) have paid off their mortgage (Harvard JCHS

2019). Homeownership is even more prevalent among the rural elderly (Barcus 2010; Nelson 2014). Elderly households in recent decades have also seen significant increases in household wealth compared to other types of households, with significant portions of that wealth gain coming from housing assets (Gibson-Davis and Percheski 2018). As previously stated, population aging indirectly reduces the prevalence of young families with children, who experience very high rates of housing burden and instability. Young adults are significantly more likely to rent compared to older adults (Harvard JCHS 2019), which again is associated with unaffordable housing. Finally, poverty rates among the elderly also differ by county type: those in metro areas have a poverty rate of 9.3 percent, 10.8 for micropolitan counties, and 13.1 for other nonmetro counties (Glasgow and Brown 2012). Indeed, it is unlikely that the effects of population aging on rates of affordable housing are consistent across counties.

NAD is the third phenomenon of interest for this study, and the link between it and housing has been studied quite extensively. Most counties that have experienced NAD are located in the Mountain-West region (Hines 2010), but are also present in the Sunbelt and Northeast, with many of those counties being on the metropolitan fringe (Nelson et al. 2010; Winkler et al. 2012). NAD is a key driver of county-level population growth, particularly for rural counties (Chi and Marcouiller 2013; McGranahan 2008), but the evidence regarding impacts of NAD on economic well-being is mixed (Mueller 2021b). One study found that income growth over time in nonmetro NAD counties was not significantly different from nonmetro counties that did not experience NAD (Hunter et al. 2005), while others have found that high amenity counties can experience significant economic growth under the right circumstances (Deller 2010; Deller et al. 2008). There is a linked migration of two groups—wealthy outsiders and Hispanic immigrants—to NAD communities, with the latter population moving there to take advantage of the new jobs in tourism, hospitality, and construction (Nelson et al. 2009, 2010). These two different income migration streams potentially complicate the effects of NAD on income and housing costs.

Two case studies demonstrate the potential effects of NAD on housing. In coastal North Carolina, NAD was shown to lead to new housing developments with the largest developments having occurred in metropolitan fringe areas, and much of this new housing was targeted toward "later-life in-migrants," (Crawford et al. 2013). In another example, NAD in Jackson Hole, Wyoming also had a significant impact on the building of new high-price housing as well as increasing land values throughout the area (Nelson and Hines 2018). Importantly, the

effects of NAD on income and costs of living likely spill-over to nearby counties. Thus, even though a specific place may not have been experiencing the associated employment and gentrification shifts of NAD directly, there may potentially be an impact on housing (Hunter et al. 2005). Finally, an important characteristic of NAD is the purchase of second homes in these areas by wealthy outsiders and the transition of existing housing to vacation or seasonal housing (Glasgow and Brown 2012; Ulrich-Schad and Qin 2018). While these community and housing changes have been studied as a point of conflict between long-term residents and newcomers, the direct impact on affordable housing has not yet been tested.

Hypotheses

I test three hypotheses regarding the impact of population growth, aging, and NAD on housing affordability, and these impacts vary across county types.

1. Population growth has a significant impact on county-level rates of affordable housing. As counties grow in population, they will experience decreases in affordability due to pressure on the supply of housing. The effects of population growth are unequal across different types of counties, with growth having a larger effect in nonmetro counties due to significant increases in housing costs outweighing potential increases in income.
2. Changes in county age structure impact rates of affordable housing. As counties have proportionately larger elderly populations, they will experience increases in affordability due to decreases in housing costs. The effects of population aging are larger in nonmetro counties due to the prevalence of homeownership.
3. Natural amenity development (NAD) has a significant impact on county-level rates of affordable housing, with increases in NAD-related employment being associated with decreases in affordability. The effects of NAD are larger in nonmetro counties due to the over-specialized nature of many nonmetro labor markets.

Current Study

To test these hypotheses, and in general assess the changing landscape of affordable housing, I estimate a series of regression models in which the dependent variables are county-level rate of affordable housing, median household income, and median housing costs. These models include county fixed effects to estimate within-county variation over time in affordability as they relate to population growth, population aging, and NAD. By focusing on within county change over time, this study provides substantive lessons on why affordable housing for many areas is on the decline.

Data and Measures

The unit of analysis is county and county equivalents within the continental United States. Counties provide the smallest unit in which socioeconomic data are universally available for all time periods and nationally. Conceptually, they are an appropriate geographic scale to test this study's hypotheses as they best capture mesoscale changes in demographics and employment. I account for significant county boundary changes by merging select counties to create time consistent units (n = 3,070).[3]

Data for this analysis were obtained from a variety of sources to create a dataset of county-level variables across four time-periods—1990, 2000, 2010, and 2016. Using IPUMS-NHGIS, I obtain data for the three outcome variables from the 1990 and 2000 decennial censuses and the 2006–2010 and 2012–2016 American Community Survey (ACS) 5-year estimates (Manson et al. 2021). Rate of affordable housing is measured as the percentage of households within a county that spent 30 percent or less of their monthly income on housing cost. This variable on rate of affordable housing is pre-constructed within the ACS, but census data do not provide the median housing cost for all households directly, but instead the median costs for owner and renter households separately. To remedy this issue, I construct a variable of median housing costs for all households by calculating the weighted average of owner and renter housing costs based on the proportion of owner and renter households in the county. Median household income and housing costs are reported as monthly values and were adjusted to 2016 dollars to account for inflation. Census data also provided two independent variables: county total population and percent of residents aged 65+.

Although census data do provide employment estimates, it does not provide the detailed information needed to estimate the proportion of workers in occupations associated with NAD. To get the necessary estimates, I use the County Business Patterns for 1990, 2000, 2010, and 2016, obtained via the imputed County Business Patterns data created by Eckert and colleagues (Eckert et al. 2020).[4] Imputed County Business Pattern data have the advantage of providing accurate estimates of detailed occupation groups that are harmonized to NAICS 2012

[3]A table of specific county boundary changes is available in Online Appendix Table A1.

[4]County business patterns capture employment by place of work, not place of residence. This has the potential to be an issue when a large portion of workers live in one county but work in another; however, this is partially mitigated by the inclusion of lagged employment variables (i.e., employment in neighboring counties).

classifications. I categorize NAD-related employment as those employed in accommodation and food services (NAICS = 72); arts, entertainment, and recreation (NAICS = 71); real estate and rental and leasing (NAICS = 531); and scenic sightseeing and transportation (NAICS = 487) (Mueller 2021b).

The analysis includes several control variables. First, percent of residents that are non-Hispanic Black and percent that are Hispanic (all races). These ethnoracial variables serve as controls to the effects of population growth and aging. It is important to assess whether changes in population size and aging in themselves have a significant relationship with affordability, and that the effects of these demographic changes are not just a reflection of the increase or decrease in the proportion of residents that are at high risk of living in unaffordable housing. The percentage of residents employed in manufacturing (NAICS = 31–33) is used as a control for NAD employment. Manufacturing employment often provides stable and above-average income (Thiede and Slack 2017), opposed to NAD employment which is often seasonal and low wage (Hunter et al. 2005). Increases in NAD-related employment may indicate a general larger economic shift away from stable income occupations which can affect affordability.

County rural-urban status—operationalized as metropolitan status—is included in the analysis as an interaction term. Metropolitan status is fixed at 1990 to account for county reclassification during the study period. I use the 1990 Rural-Urban Continuum Codes (RUCC) to create four groups (Economic Research Service 2004): counties in metro areas of one million or more people (large metros, RUCC = 0–1; n = 300), counties in metro areas of less than one million people (small metro, RUCC = 2–3; n = 512), nonmetro counties adjacent to a metro area (nonmetro adjacent, RUCC = 4,6,8; n = 987), and nonmetro counties not adjacent to a metro area (nonmetro remote, RUCC = 5,7,9; n = 1,271).

Analytical Strategy

I employ a panel data approach via the inclusion of county and year fixed effects. This study's models are a variation of a spatial lag of X (SLX) model. A SLX model involves the inclusion of spatially lagged versions of all independent and control variables created through a spatial weights matrix (LeSage 2014). SLX models control for local spatial spillovers, which for this study means that there is an assumption that county affordability is affected by changes in neighbors' socioeconomic variables (X), but not neighboring affordability (LeSage 2014). The main advantage of SLX models for this study is that the size and significance of the effects of local—within-unit—changes in independent

variables can be more accurately assessed. I create the spatial weights matrix for these SLX models using a Queen's contiguity matrix. I produce three models that each use the same set of independent variables but use a different outcome variable: rate of affordable housing, median household income, and median housing costs. All three models are used in complement to test this study's hypotheses. From these models, I produce tables of the average marginal effects of the three independent variables to better understand the significance and effect size of each variable by county type.[5,6]

Results

County-level rates of affordable housing declined between 1990 and 2016 (Tables 1 and 2). On average, affordability declined by 3.6 percentage points over the study period. When disaggregating by county type, large metro counties experienced an average decline of 5.87 points, compared to 5.34 points for small metro, 3.60 points for nonmetro adjacent counties, and 2.38 for nonmetro remote counties. The Great Recession—captured by 2010 data—also had a significant impact on county-level affordability: county affordable housing rates declined by an average of 9.84 percentage points relative to their 1990 levels. Large and small metros were particularly impacted by the Great Recession, with decreases of 16.25 and 12.76 points, respectively. Despite the general decline, patterns were far from uniform: 660 counties became more affordable during the study period. Most of these counties were nonmetro, with 223 adjacent and 385 remote counties having higher rates of affordable housing in 2016 compared to 1990. Median housing costs also increased during the study period, with the largest increases being for large metros at $207.66 and nonmetro adjacent counties at $146.20.

There is a pronounced spatial pattern of rates of affordable housing (Figure 1). In 1990, many counties in the Midwest were very

[5]Average marginal effects report the effect that a one-unit change in an independent variable has on the outcome or dependent variable given a set of values for other independent variables in the model. These differ from the beta coefficients presented in a regular regression table that show interaction effects between two variables. For example, I report the average marginal effect of population change in metro adjacent counties instead of relying on beta coefficients of the effect of population change for the reference county type (large metro) and the interaction effect for metro adjacent. The choice to focus average marginal effects is done to compare the effects of population growth, aging, and NAD more easily across models and across county types.

[6]Descriptive statistics of all variables by county type are available in Online Appendix Table A2.

Table 1. Mean Rate of Affordable Housing, Income, and Housing Costs by County Type.

	Large Metro	Small Metro	Nonmetro Adj.	Nonmetro Remote.	All Counties
Rate of affordable housing					
1990	71.920	73.405	73.102	72.846	72.931
	(6.058)	(5.402)	(5.843)	(6.578)	(6.121)
2000	71.313	72.250	72.507	72.335	72.276
	(5.659)	(5.343)	(5.365)	(6.225)	(5.768)
2010	55.673	60.641	63.423	65.571	63.091
	(6.659)	(6.168)	(6.226)	(6.639)	(7.093)
2016	66.044	68.066	69.503	70.465	69.323
	(6.825)	(5.485)	(5.740)	(6.426)	(6.252)
Median household income					
1990	5288.212	4204.001	3462.948	3161.106	3639.937
	(1,223.475)	(746.115)	(671.083)	(629.367)	(985.297)
2000	5870.357	4618.719	3957.221	3607.355	4109.647
	(1,360.832)	(845.801)	(743.974)	(675.472)	(1,060.378)
2010	5778.840	4514.411	3966.265	3737.183	4139.965
	(1,436.044)	(900.475)	(734.545)	(704.964)	(1,038.153)
2016	5595.097	4376.586	3824.891	3653.414	4018.892
	(1,441.002)	(923.360)	(818.014)	(844.941)	(1,089.176)
Median housing costs					
1990	1042.729	762.770	542.473	479.248	601.922
	(325.429)	(196.249)	(157.946)	(139.374)	(251.919)
2000	1211.861	877.182	667.862	575.805	717.819
	(343.564)	(213.383)	(191.367)	(162.220)	(281.047)
2010	1405.526	982.936	751.038	638.340	807.012
	(405.720)	(256.413)	(222.494)	(180.841)	(330.744)
2016	1250.388	890.886	688.673	607.519	743.690
	(375.261)	(227.218)	(188.089)	(156.959)	(285.028)

Note: Standard deviations in parentheses.

affordable, with over 80 percent of households living in affordable housing in many places. Attainment of affordable housing was low in certain counties in California, the Mountain West, and the Mississippi Delta. The map of affordable housing changed significantly by 2016. While the Midwest still has many high affordability counties (rates greater than 80 percent), the number of counties declined significantly (from 334 to 83). Many more counties in California and the Mountain West had very low rates of affordability, and new clusters of low affordability emerged in the Southeast and Northeast. The number of very low affordability counties—less than 60 percent of

Table 2. County-Level Affordability Groups.

	All Counties			
	Less than 60%	60.1%–70%	70.1%–80%	More than 80%
1990	89	801	1,846	334
2000	78	896	1,879	217
2010	937	1,648	466	19
2016	256	1,321	1,410	83
	Large Metro			
	Less than 60%	60.1%–70%	70.1%–80%	More than 80%
1990	14	88	182	16
2000	13	89	194	4
2010	212	83	5	0
2016	58	143	99	0
	Small Metro			
	Less than 60%	60.1%–70%	70.1%–80%	More than 80%
1990	8	114	340	50
2000	8	151	331	22
2010	203	293	16	0
2016	49	262	199	2
	Nonmetro Adjacent			
	Less than 60%	60.1%–70%	70.1%–80%	More than 80%
1990	17	274	577	119
2000	14	292	606	75
2010	275	580	129	3
2016	62	441	463	21
	Nonmetro Remote			
	Less than 60%	60.1%–70%	70.1%–80%	More than 80%
1990	50	325	747	149
2000	43	364	748	116
2010	247	692	316	16
2016	87	475	649	60

Note: Groups refer to the percentage of households that live in affordable housing.

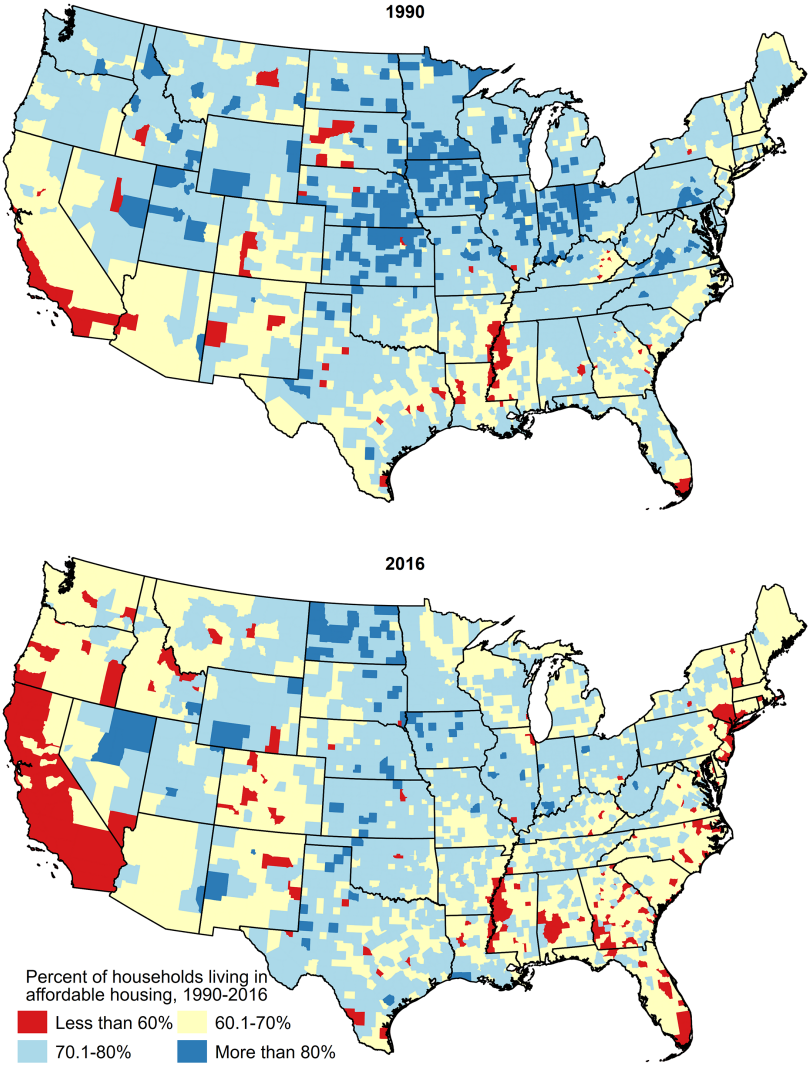

Figure 1. County Rates of Affordable Housing between 1990 and 2016. [Colour figure can be viewed at wileyonlinelibrary.com]

residents living in affordable housing—increased from 89 to 256, with 136 (53.13 percent) of those counties in 2016 located in the South.[7]

[7]If focusing specifically on nonmetro counties, in 2016, 87 counties had rates of affordable housing below 60 percent with 67.82 percent and 24.12 percent of those counties being in the South and West, respectively. The spatial pattern of decline in affordability from 1990 to 2016 in rural counties is much less concentrated, with 43.00 percent of decline counties located in the Midwest and 34.42 percent in the South.

Table 3. Average Marginal Effect of Demographic and Economic Change on County Rate of Affordable Housing by County Type.

	Marginal Effect	SE	95% Conf. Interval	
Total population (1,000s)				
Large metro	0.002**	(0.001)	0.000	0.004
Small metro	−0.002	(0.002)	−0.006	0.002
Nonmetro adj.	−0.075***	(0.015)	−0.104	−0.046
Nonmetro remote	−0.122***	(0.019)	−0.158	−0.085
Natural amenities employment share				
Large metro	−0.063	(0.067)	−0.195	0.069
Small metro	−0.001	(0.053)	−0.104	0.103
Nonmetro adj.	0.013	(0.051)	−0.087	0.114
Nonmetro remote	0.015	(0.034)	−0.053	0.082
Elderly (65+) population share				
Large metro	0.190*	(0.075)	0.042	0.337
Small metro	0.210*	(0.086)	0.042	0.379
Nonmetro adj.	0.066	(0.070)	−0.070	0.203
Nonmetro remote	0.009	(0.111)	−0.208	0.226

*Sig < .05; **Sig < .01; ***Sig < .01.

These temporal and spatial trends provide evidence that there is a changing landscape of affordable housing and therefore insights as to why this is occurring must be produced.

Demographic and Economic Impacts on Affordability

Estimates of the effects of demographic and economic change on rates of affordable housing are shown in Table 3 and Online Appendix Table A3. These estimates reveal several insights into why place-level affordability has changed between 1990 and 2016. First, population growth has a significant association with affordability. I find that in both types of nonmetro counties that population growth is associated with a decline in affordability, but in large metro counties the opposite is true. The largest estimated effect is for nonmetro remote counties, where a population growth of 1,000 people is associated with a .12 (average marginal effect) percentage point decline in the rate of affordable housing. While these estimates do support this study's hypothesis regarding population change, I did not anticipate the benefits—although small—of population growth large metro counties. To understand why this occurs, the analysis of income and housing cost change is needed.

I find that population aging also has a significant effect on affordability. However, these effects are opposite of what was originally hypothesized. Models indicated that an increase in elderly population (i.e., 65+) share is associated with increased affordability in large and small metro areas. The largest coefficient is for small metro counties, where a one percentage point increase in the share of elderly residents is associated with a .21-point increase in affordability; in large metros this coefficient is .19-points. While I originally hypothesized that the effects of population aging would be larger in nonmetro counties, these estimates suggest there is not a significant association between aging and affordability in nonmetro counties. Overall, population aging is associated with increased affordability in metro counties.

Finally, increases in employment related to NAD do not have a significant association with changes in affordability, despite what was hypothesized. Statistical insignificance is universal across county types, even in nonmetro counties where NAD-related employment should have the largest supposed impact. However, just because there is no effect on affordability directly, does not in itself indicate that NAD does not impact the livelihoods of residents. NAD could produce relatively equally sized changes in income and housing costs; whether this is a positive or negative change has yet to be determined within this study.

Income and Housing Cost Change

I continue the analysis with models that examine the effects of demographic and economic change on income and housing costs (Table 4, Online Appendix Table A4). Population growth has been shown to have a negative effect on affordability in nonmetro counties. Adding on this finding, I find that population growth increases median household income and median housing costs. In nonmetro adjacent counties, a population gain of 1,000 individuals increases income by approximately $4.95 (per month), and housing costs by $2.26; in remote counties these effects are $6.53 and $2.64, respectively. While these effects are both positive, it is important to note that changes in rates of affordable housing are produced by unequal increases in income and housing costs. The ratio of the income and housing coefficients in nonmetro adjacent counties is 2.19 and 2.47 in remote counties.

These models suggest that while income has increased in these counties, this is seemingly outweighed—regarding affordability—by increase in housing costs and thus growing nonmetro counties have become less affordable over time due to significant increases in

Table 4. Average Marginal Effect of Demographic and Economic Change on County Income And Housing Costs by County Type.

	Median Household Income			
	Marginal Effect	SE	95% Conf. Interval	
Total population (1,000s)				
Large metro	0.097	(0.168)	−0.233	0.427
Small metro	0.673	(0.358)	−0.028	1.375
Nonmetro adj.	4.947***	(1.295)	2.409	7.486
Nonmetro remote	6.532***	(2.054)	2.506	10.557
Natural amenities employment share				
Large metro	5.991	(6.420)	−6.592	18.574
Small metro	4.710	(7.354)	−9.705	19.124
Nonmetro adj.	2.467	(2.300)	−2.040	6.975
Nonmetro remote	6.526**	(2.210)	2.194	10.858
Elderly (65+) population share				
Large metro	−33.425*	(13.687)	−60.252	−6.598
Small metro	−35.318**	(11.510)	−57.877	−12.760
Nonmetro adj.	−23.307**	(7.532)	−38.069	−8.544
Nonmetro remote	−34.091***	(7.468)	−48.727	−19.455

	Median Housing Costs			
	Marginal Effect	SE	95% Conf. Interval	
Total population (1,000s)				
Large metro	−0.136*	(0.039)	−0.212	−0.060
Small metro	−0.011	(0.052)	−0.113	0.092
Nonmetro adj.	2.258***	(0.373)	1.526	2.990
Nonmetro remote	2.641***	(0.497)	1.667	3.615
Natural amenities employment share				
Large metro	0.786	(1.573)	−2.296	3.868
Small metro	2.905*	(1.341)	0.277	5.532
Nonmetro adj.	2.271**	(0.801)	0.700	3.841
Nonmetro remote	1.001	(0.826)	−0.617	2.619
Elderly (65+) population share				
Large metro	−19.189***	(4.177)	−27.376	−11.002
Small metro	−20.377***	(2.369)	−25.021	−15.734
Nonmetro adj.	−9.189***	(1.442)	−12.015	−6.362
Nonmetro remote	−5.745***	(0.851)	−7.412	−4.077

*Sig < .05; **Sig < .01; ***Sig < .01.

housing costs. These seemingly irregular results on the relationship of affordability, income, and housing costs also reflect challenges associated with ecological inference. While these results support this study's stated hypothesis, they also explain why population growth is associated with increased affordability in large metro counties. I find that population growth is associated with decreases in monthly housing costs—although the effect size is quite small—but has no association with income. In sum, population growth not only has opposite effects on affordability between metro and nonmetro counties, but housing costs as well.

I find that population aging has a significant negative effect on both income and housing costs for all types of counties. The largest effect on income is for small metro counties, where a one percentage point increase in the elderly population share is associated with a decrease in median household income of $35.32. Large metros and nonmetro remote counties have a very similar, but slightly smaller, coefficient. The largest effect size on housing costs is also observed in small metro counties, with a decrease of $20.38. For housing costs there is a significant gap in coefficient size between metro and nonmetro counties, with the estimated effects in metro counties being more than twice that of nonmetro counties. As with population growth, the relationship between aging and affordability is influenced by unequal—but negative—shifts in income and housing. The ratios of income to housing cost change are 1.74, 1.73, 2.54, 5.93, respectively, across the four county types, all indicating that income is declining a greater rate than housing costs.

These ratios of income to housing costs change suggest that there is significant nuance into how these unequal shifts over time produce changes in affordability. Despite large and small metro counties having relatively smaller—or more equal—ratios there is corresponding significant increase in affordability related to population aging. Nonmetro counties have larger ratios—with very large decreases in income—but this does not translate into a significant effect on affordability. Importantly, the rate of affordable housing, median household income, and median housing costs are conceptually related, but they may move in seemingly conflicting directions given differences in the underlying units of analysis (i.e., the percent of households vs. a population median). Relying on the ratio of coefficients of income and housing costs—while useful—does not provide mathematically precise insights as to why county-level affordability is changing. Overall, population aging decreases the average available financial resources in the county but at the same time decreases average housing costs.

A potential explanation for this divergence is growth in income inequality during the study period. Dong (2018) found that metropolitan counties with increasing levels of income inequality had higher proportions of residents living in unaffordable housing. It may be that longitudinal changes in income within a county are affecting different individuals than those that are experiencing changes in housing costs, and thus changes are income and housing costs are not as linked as originally theorized.

Issues of ecological inference also complicate testing the relationship between affordable housing and its constituent components. As it relates to aging, for example, the decreases in housing costs maybe experienced only by elderly individuals within the county, while the decreases in income maybe felt by young and middle-aged individuals. In this potential scenario, one group is experiencing increased affordability while another is experiencing decreased affordability and thus overall county-level rates of affordable housing stay relatively the same. Alternatively, since population aging is the potential result of several age-specific processes (Glasgow and Brown 2012); it may be the phenomenon of youth out-migration is what drives declines in median income while separately the aging in place of older residents affects declines in housing costs. Future research must continue to disentangle the relationship between aging and affordability.

In addition to these findings on the effects of population aging, I find that there is no estimated relationship between NAD and rates of affordable housing there are some notably estimated relationships between NAD, income, and housing costs that are worth reporting. In nonmetro remote counties increases in NAD-related employment have a significant positive association with income. While in small metros and nonmetro adjacent counties NAD-related employment is associated with increased housing costs.

Supplemental Analyses

These findings clearly show that there is a complex relationship between affordable housing, its subcomponents, and county-level demographic and economic change. Nevertheless, some of these results run counter to this study's hypotheses and deviate from previous work on rural housing. As such, I have produced a series of supplemental models to help shed light on these issues and further disentangle the complexities surrounding the changing landscape of affordable housing.

First, I produce an additional set of models to examine county-level rates of affordable housing among owner and renter households separately (Table 5; Online Appendix Table A5). An immediate takeaway is

that population growth has the same basic association with affordability for owners as it does for affordability among all households. There is no effect on renting affordability for any type of counties. Unlike with population growth, the effects of aging do differ between owner and renter households. In metropolitan areas aging is associated with increased affordability among owners, but decreased affordability among renters in large metros and nonmetro adjacent counties.

A curious original finding is the lack of a relationship between affordable housing and NAD. As previous research has shown NAD is a highly regional phenomenon (Mueller 2021a; Winkler et al. 2012), there is potential for the effects of NAD to be significant in specific regions while being insignificant nationally. In turn, I produce additional models in which NAD is interacted with county type and region (Table 6). These new results show that in most regions NAD still does not have a significant effect on affordable housing directly. However, NAD does increase income in remote counties in the south and increases housing costs in small metros and adjacent nonmetro counties in the west—supporting previous work on the topic. While this new evidence still does not support this study's hypothesis, I do find that NAD can have a strong regional impact on housing costs.

The final two supplemental analyses relate back to this study's theoretical perspective that place-level changes in affordable housing are explained by constituent changes in median household income and housing costs. This study has modeled changes as three separate models yet it is also valid to view income and housing costs as directly influencing affordability alongside other county-level demographic and economic changes. In Table 7, I present a model in which median income and median housing costs are included as additional independent variables with rates of affordable housing as the dependent variable. Much of the findings from the earlier analysis hold. An exception is population aging, for which its effects on affordability do not persist over and above what could be explained by income and housing costs. To be clear, this does not mean that population aging does not influence income and housing costs themselves as shown in prior models. While population growth still has a significant effect for large metro counties, this effect has flipped to being negative—further suggesting that the benefits of growth in these counties is due to previously documented associated decreases in housing costs. The final supplemental model introduces a control for housing stock: the percent of a county's housing stock built in the previous five years in each period (i.e., 1986–1990). New housing stock likely moderates the effects of demographic and economic change in that if a community

Table 5. Average Marginal Effect of Demographic and Economic Change on Affordability by Tenure and County Type.

	Owner Households			
	Marginal Effect	SE	95% Conf. Interval	
Total population (1,000s)				
Large metro	0.004***	(0.001)	0.001	0.006
Small metro	−0.003	(0.002)	−0.008	0.001
Nonmetro adj.	−0.098***	(0.016)	−0.129	−0.068
Nonmetro remote	−0.147***	(0.021)	−0.188	−0.106
Natural amenities employment share				
Large metro	−0.058	(0.082)	−0.218	0.103
Small metro	0.033	(0.058)	−0.080	0.146
Nonmetro adj.	−0.039	(0.045)	−0.128	0.050
Nonmetro remote	−0.002	(0.045)	−0.091	0.086
Elderly (65+) population share				
Large metro	0.314***	(0.086)	0.146	0.481
Small metro	0.193*	(0.090)	0.017	0.369
Nonmetro adj.	−0.086	(0.068)	−0.220	0.047
Nonmetro remote	−0.123	(0.096)	−0.312	0.066

	Renter Households			
	Marginal Effect	SE	95% Conf. Interval	
Total population (1,000s)				
Large metro	0.001	(0.001)	−0.002	0.003
Small metro	−0.002	(0.002)	−0.006	0.002
Nonmetro adj.	−0.015	(0.017)	−0.047	0.018
Nonmetro remote	−0.004	(0.023)	−0.050	0.041
Natural amenities employment share				
Large metro	0.007	(0.049)	−0.090	0.103
Small metro	0.021	(0.064)	−0.105	0.147
Nonmetro adj.	0.139	(0.042)	0.056	0.221
Nonmetro remote	0.045	(0.053)	−0.058	0.148
Elderly (65+) population share				
Large metro	−0.170*	(0.083)	−0.333	−0.007
Small metro	−0.199	(0.111)	−0.416	0.018
Nonmetro adj.	−0.234*	(0.104)	−0.438	−0.030
Nonmetro remote	−0.201	(0.124)	−0.444	0.042

*Sig < .05; **Sig < .01; ***Sig < .01.

Table 6. Average Marginal Effect of Natural Amenities Employment with Regional Interactions on County Rate of Affordable Housing, Income, and Housing Costs by County Type.

	Rate of Affordable Housing			
	Marginal Effect	SE	95% Conf. Interval	
Natural amenities employment share				
Large metro * Northeast	−0.277	(0.168)	−0.607	0.052
Large metro * South	−0.067	(0.097)	−0.257	0.124
Large metro * Midwest	0.017	(0.049)	−0.078	0.113
Large metro * West	−0.295	(0.272)	−0.827	0.238
Small metro * Northeast	−0.018	(0.115)	−0.243	0.206
Small metro * South	0.083	(0.076)	−0.066	0.231
Small metro * Midwest	−0.333***	(0.088)	−0.505	−0.162
Small metro * West	0.023	(0.150)	−0.271	0.317
Nonmetro adj. * Northeast	0.066	(0.086)	−0.102	0.234
Nonmetro adj. * South	0.097	(0.051)	−0.003	0.198
Nonmetro adj. * Midwest	−0.019	(0.055)	−0.127	0.090
Nonmetro adj. * West	−0.082	(0.064)	−0.208	0.044
Nonmetro remote * Northeast	−0.272	(0.185)	−0.635	0.090
Nonmetro remote * South	0.034	(0.058)	−0.079	0.147
Nonmetro remote * Midwest	0.021	(0.069)	−0.114	0.156
Nonmetro remote * West	0.024	(0.055)	−0.084	0.131

	Median Household Income			
	Marginal Effect	SE	95% Conf. Interval	
Natural amenities employment share				
Large metro * Northeast	39.297	(35.451)	−30.187	108.780
Large metro * South	8.707	(13.933)	−18.602	36.015
Large metro * Midwest	5.779	(6.994)	−7.929	19.487
Large metro * West	−0.160	(27.505)	−54.069	53.748
Small metro * Northeast	−2.726	(14.617)	−31.375	25.923
Small metro * South	22.470*	(9.998)	2.874	42.067
Small metro * Midwest	−30.523	(21.439)	−72.543	11.497
Small metro * West	−18.244	(19.616)	−56.692	20.203
Nonmetro adj. * Northeast	8.432	(10.583)	−12.311	29.175

Table 6. ***Continued***

	Median Household Income			
	Marginal Effect	SE	95% Conf. Interval	
Nonmetro adj. * South	4.281	(2.293)	−0.214	8.775
Nonmetro adj. * Midwest	−8.098	(4.464)	−16.847	0.651
Nonmetro adj. * West	7.014	(5.756)	−4.268	18.295
Nonmetro remote * Northeast	−1.766	(17.159)	−35.398	31.866
Nonmetro remote * South	7.821**	(2.526)	2.869	12.772
Nonmetro remote * Midwest	3.405	(4.603)	−5.617	12.426
Nonmetro remote * West	6.871	(4.422)	−1.795	15.538

	Median Housing Costs			
	Marginal Effect	SE	95% Conf. Interval	
Natural amenities employment share				
Large metro * Northeast	−17.593	(12.584)	−42.258	7.072
Large metro * South	3.306	(2.879)	−2.336	8.947
Large metro * Midwest	1.946	(1.795)	−1.572	5.463
Large metro * West	13.990	(14.830)	−15.078	43.057
Small metro * Northeast	5.416	(3.209)	−0.873	11.706
Small metro * South	2.737	(1.605)	−0.409	5.883
Small metro * Midwest	−1.577	(2.175)	−5.841	2.687
Small metro * West	6.872*	(2.811)	1.364	12.381
Nonmetro adj. * Northeast	2.341	(3.203)	−3.937	8.619
Nonmetro adj. * South	1.153	(0.782)	−0.380	2.685
Nonmetro adj. * Midwest	1.012	(1.179)	−1.299	3.324
Nonmetro adj. * West	5.480**	(1.833)	1.887	9.074
Nonmetro remote * Northeast	2.901	(3.704)	−4.359	10.161
Nonmetro remote * South	1.130	(0.757)	−0.353	2.614
Nonmetro remote * Midwest	0.949	(0.900)	−0.815	2.714
Nonmetro remote * West	0.972	(2.254)	−3.446	5.390

*Sig < .05; **Sig < .01; ***Sig < .01.

Table 7. Average Marginal Effect of Demographic and Economic Change on County Rate of Affordable Housing by County Type; Additional Controls for Median Household Income and Median Housing Costs.

	Marginal Effect	SE	95% Conf. Interval	
Total population (1,000s)				
Large metro	−0.002*	(0.001)	−0.003	0.000
Small metro	−0.003	(0.002)	−0.007	0.001
Nonmetro adj.	−0.031***	(0.009)	−0.048	−0.014
Nonmetro remote	−0.071***	(0.013)	−0.096	−0.045
Natural amenities employment share				
Large metro	−0.114*	(0.054)	−0.221	−0.007
Small metro	−0.002	(0.048)	−0.097	0.092
Nonmetro adj.	0.050	(0.034)	−0.017	0.117
Nonmetro remote	0.017	(0.026)	−0.035	0.068
Elderly population share				
Large metro	0.083	(0.078)	−0.070	0.236
Small metro	−0.022	(0.067)	−0.155	0.110
Nonmetro adj.	0.024	(0.046)	−0.067	0.115
Nonmetro remote	0.056	(0.085)	−0.110	0.222
Median household income				
Large metro	0.002***	(0.000)	0.001	0.002
Small metro	0.002***	(0.000)	0.002	0.003
Nonmetro adj.	0.004***	(0.000)	0.003	0.004
Nonmetro remote	0.004***	(0.000)	0.004	0.005
Median housing costs				
Large metro	−0.009***	(0.001)	−0.011	−0.007
Small metro	−0.011***	(0.001)	−0.014	−0.008
Nonmetro adj.	−0.017***	(0.001)	−0.019	−0.015
Nonmetro remote	−0.021***	(0.002)	−0.025	−0.018

*Sig < .05; **Sig < .01; ***Sig < .01.

builds new housing to accommodate its growing or changing population than there is likely to be limited changes in affordability. I find that new housing itself has a negative impact on affordability in nonmetro counties—likely reflecting suburbanization and gentrification— and that the negative effects of population growth in nonmetro counties and the positive effects of population aging in metro counties both still hold from prior models (Table 8).

Discussion and Conclusions

The purpose of this study was to evaluate the changing landscape of affordable housing at the county level and understand how certain

Table 8. Average Marginal Effect of Demographic and Economic Change on County Rate of Affordable Housing by County Type; Additional Controls for Recent Housing Stock Share.

	Marginal Effect	SE	95% Conf. Interval	
Total population (1,000s)				
Large metro	0.002	(0.001)	0.000	0.004
Small metro	−0.002	(0.002)	−0.006	0.002
Nonmetro adj.	−0.104***	(0.017)	−0.137	−0.071
Nonmetro remote	−0.149***	(0.022)	−0.193	−0.106
Natural amenities employment share				
Large metro	−0.035	(0.050)	−0.133	0.063
Small metro	0.025	(0.054)	−0.081	0.132
Nonmetro adj.	0.019	(0.054)	−0.087	0.124
Nonmetro remote	0.014	(0.033)	−0.052	0.080
Elderly population share				
Large metro	0.285***	(0.077)	0.135	0.435
Small metro	0.247**	(0.090)	0.070	0.424
Nonmetro adj.	−0.001	(0.079)	−0.155	0.153
Nonmetro remote	−0.054	(0.108)	−0.266	0.158
Recent housing stock share				
Large metro	0.049	(0.034)	−0.018	0.116
Small metro	0.028	(0.030)	−0.030	0.086
Nonmetro adj.	−0.175***	(0.036)	−0.245	−0.104
Nonmetro remote	−0.097**	(0.041)	−0.176	−0.017

*Sig < .05; **Sig < .01; ***Sig < .01.

socioeconomic forces explain these changes. Indeed, the same forces that have created other types of spatial inequalities have also yielded significant changes in affordability. While a few past studies have shown that housing costs can be influenced by population size, age structure, and NAD these findings have not yet been extended to housing affordability. This is an important gap since living in unaffordable housing has negative consequences for individuals and households (Zavisca and Gerber 2016). Like concentrated poverty and income inequality, there are likely to be long-lasting consequences for places where the majority of residents live in unaffordable housing.

To best understand changing local rates of housing affordability it is necessary to decompose these changes into shifts in income and housing costs. While this study's analysis suggests that in most circumstances the direction of change in income and housing costs tends to be the same, the magnitude of these changes often varies considerably. Decreased

affordability is often the result of housing costs outweighing any potential gains in place-level income. Future research on housing change must not look at trends in housing costs, income, and affordability independently of each other; these trends are inherently linked and understanding the growing imbalance of income and housing costs over time is important as this directly and negatively affects the lives of residents.

The other motivation of this study was to understand how affordable housing is changing across places of all sizes in the United States. Despite the urban focus of past studies on place-level affordability, I find that affordability is on the decline in nonmetro counties as well, particularly in regions such as the Southeast that were already socioeconomically disadvantaged (Baker 2020; Brooks 2019; Weber and Miller 2017). Declining affordability is a problem shared between metros of all sizes and nonmetro areas both near and far from metro areas. This study builds upon past work that documents that cost of living varies less between urban and rural areas than what is generally perceived (Mueller et al. 2021; Nord 2009). While the general decline in affordability is shared between different types of counties; the reasons as to why are not. For example, population growth is an important factor across the board, but the direction of effect differs by county type. Much of this study's findings on the differential effects of population growth and aging add to the literature on the complex interplay between rural and urban places within the United States (Lichter and Brown 2011; Lichter and Ziliak 2017). A key takeaway from research on the rural-urban interface is that urban areas have taken advantage of available land in rural areas for exurban and suburban development (Esparza 2010; Marx 2010). While not directly tested, this study's findings do suggest that affordability in rural communities is on the decline due to demographic and economic forces originating in nearby metro areas.

This study's analyses provide several specific conclusions. *First*, county-level affordability declined by an average of 3.60 percentage points between 1990 and 2016; but there is significant variation between county types. While I find that the largest average declines were for large metro counties, both types of nonmetro counties became less affordable during the study period. Growing unaffordability—as with other key housing issues (York Cornwell and Hall 2017)—is not a problem exclusive to America's largest cities.

Second, population growth is associated with decreased affordability in nonmetro counties. I find that a thousand-person population increase is associated with a decrease in rate of affordable housing of .08 percentage points for nonmetro adjacent counties and .11 points for remote counties. Effect size matters since they can help identify on the ground

community processes and the potential magnitude of these processes' effects. In this specific instance, these estimates suggest the relationship between affordability and the likely driver of population growth in adjacent counties (i.e., suburbanization) is stronger than the corresponding relationship with the likely driver of growth in remote counties (i.e., natural increase, increase related to NAD). Population growth associated decline in affordability can be attributed to increases in median housing costs—reinforcing the findings of past studies on the matter. Further, the supplemental models show that even when controlling for the building of new housing in a county, that population growth—potentially driven by suburbanization and gentrification—still negatively impacts rural housing affordability. Importantly the negative effects of population growth hold even if there is building of sufficient new housing. An example of the substantial effect of population growth can have on affordability is Baldwin County, GA, which experienced a 15.06 percentage point decline in affordability between 1990 and 2016 (71.11 percent vs. 56.05 percent) while at the same time experiencing a growth of over 6,000 new residents (15.88 percent increase). Indeed, population growth has real impacts on place-level affordability in rural areas.

Third, while this decline in nonmetro affordability was hypothesized, past research would not have predicted that population growth would be beneficial for large metro counties. Population growth has opposite relationships with housing costs in metro and nonmetro counties, with housing costs going down in growing large metro counties. This surprising finding is potentially explained by the building of suburban and exurban housing developments along the metro fringe, with these new housing developments theoretically relieving some pressure on urban housing markets while also transforming nearby rural communities (Esparza 2010; Lichter and Ziliak 2017).

Fourth, I find that population aging has a positive effect in metro counties—increasing affordability—and has no effect in nonmetro counties net of other population changes. Aging has a similar effect of decreasing income and housing costs across all county types, but only results in affordability change in metro counties. Past research on housing and aging has shown that there is not a single set pattern on whether America's elderly population has experienced increased or decreased affordability over time (Harvard JCHS 2019; Vega and Wallace 2016). This study's analyses show that population aging is beneficial to rates of affordable housing among owner households but is harmful for rates among renter households. Affordable housing is greatly stratified by housing tenure (Harvard JCHS 2018; McConnell 2013), and the results of this study are no exception. Elderly homeowners have often paid off

their mortgage in full, while elderly renters tend to be economically vulnerable and susceptible to the instability often associated with renting (Gibson-Davis and Percheski 2018; Harvard JCHS 2019).

In this study, population aging was measured as the percent of the population over the age of 65. While this measure does reflect population aging it combines the underlying drivers of population aging—elderly in-migration (i.e., retirement migration), youth out-migration, and aging in place of long-term residents—into a single variable. It is possible that the positive effects of aging in metro areas and the non-effect in nonmetro areas documented here originate from only one of these underlying processes. One potential reason for the estimated non-effect in nonmetro areas is that potential changes in income and housing costs are caused by separate age-specific migration streams and processes—thus population aging in the aggregate has no effect on affordability. Further, the subgroups that are a part of these processes are potentially experiencing significant changes in their housing costs and their affordability even if the overall population is not. In short, this study has shown that changes in county age structure likely have important consequences for housing and that future research should further explore how age-specific migration patterns affect affordable housing and its subcomponents.

Finally, employment related to NAD has no association with change in affordability. This goes against what past research would have suggested and what was originally hypothesized (Nelson and Hines 2018). While NAD does have a slight effect on housing costs in certain types of counties and in certain regions, there is not a corresponding effect on income. NAD and population aging often go together in many rural communities (Glasgow and Brown 2012; Nelson et al. 2010), and since both phenomenon do not have an estimated effect on affordability in nonmetro counties, one could argue that rural retirement destination communities are not likely to experience significant declines in affordability. Future research may need to test other operationalizations of NAD to fully understand the potential impacts on housing.

All things considered, this study provides a starting point for research on how demographic and economic change have produced disparities in affordability over the past few decades. At the individual level, the risk of living in unaffordable housing is much higher among ethnic and racial minority groups (Harvard JCHS 2018; McConnell 2013; Zavisca and Gerber 2016). While this study included some ethnoracial variables in these models, they served as controls. As such, this study does not provide answers into the extent of which place-level diversity may be associated with declines in affordable housing. Future research must look

at place-level ethnoracial processes and disparities in affordability. Both urban and rural ethnoracial minorities experience significant economic marginalization and discrimination in the housing market, this must be addressed in future research (Korver-Glenn 2018; Lichter et al. 2007).

In the end, this study speaks most directly to the continued need to look at changes in affordability at the county scale. At the county level, population growth and aging can play a significant role in change in affordability and its subcomponents. Given that affordability has decreased across the rural-urban continuum, this study's finding suggests that researchers can no longer ignore housing problems in rural America. As social problems related to unaffordability—like poverty and income inequality—continue to grow and become more spatially unequal, and as the U.S. population continues to age and grow, it is likely that the landscape of affordable housing will continue to change in the coming decades.

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