

Affordable Housing and Workforce Issues:
Nexus at the Local Level

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Abstract

Scholars debate ways to better match the available job opportunities and housing supply within a local community (Blumenberg and King, 2021; Been et al, 2018). I argue that affordable housing and workforce availability challenges are experienced in different ways across metropolitan, suburban, resort, and rural communities. Housing that is unaffordable for low and middle income earners is related to higher commute times to work, which results in a mismatch between housing affordability and the availability of workers with suitable skills to fill open job positions. Across the United States, there is an immediate need to address housing and workforce issues; however, local policies must be tailored to the unique characteristics of communities.

The research tests three sets of hypotheses that were derived from qualitative insights, and the first line of questioning involves the proportion of high income earners at the county level in both Colorado and across the United States with its relationship regarding median rent and median owner-occupied housing values as well as mean commute times to work. Secondly, the research tests median rent, median owner-occupied housing values, and mean commute times within U.S. counties that identify as metropolitan, suburban, and rural. The third set of hypotheses involves the relationship between a county's political ideological tilt and the percentage of housing stock that is either multifamily or single-family as well as median rent prices and median owner-occupied housing values across the U.S. and within Colorado. 45 qualitative interviews were conducted to learn more about the distinct housing and workforce conditions that exist within Colorado communities, and stakeholders that participated in the study range from housing authorities, local economic development organizations, chambers of commerce, cities, community colleges, a nonprofit, and a county commissioner.

Regression findings illustrate that the higher the proportion of high income earners within a community, the higher median rent prices and owner-occupied housing values are across metropolitan, suburban, and rural community types. Colorado communities face higher median housing prices the more the proportion of high income earners increases compared to the nationwide regression analysis. The population level within a community was also found to increase housing prices for both renters and owners across metropolitan, suburban, and rural community types. Most interestingly, regression findings indicate that counties with a liberal-leaning political tilt have a greater availability of multifamily housing stock and are more expensive places to live for both multifamily and single-family housing units. Since the regression models controlled for metropolitan central counties, suburban counties, and rural counties, lower median housing prices found in areas with a conservative-leaning political tilt is not due to the communities being rural counties. Scholars have produced a limited understanding of housing and workforce challenges within resort and rural communities, as there is an overemphasis on areas of research that focus on challenges within metropolitan settings.

Research Question

The question for the research analysis is what is the nexus between availability of affordable housing and workforce availability in different types of communities? To expand on this, the research seeks to understand the conditions that result in housing and workforce issues at the county level across the following community types: metropolitan, suburban, resort, and rural.

“You cannot separate housing and workforce issues anymore. A healthy workforce means access to housing, skills and training, education, and commuting options,” (Local Economic Development Organization, Resort Community Type).

“As wages stagnate, rents increase, and the dream of homeownership seems more and more out of reach, more and more people are finding themselves in need of affordable housing...this is truly an issue that touches every household within a community,” (Housing Authority, Suburban Community Type).

Area median income (AMI) refers to the median income at a local geographical level determined by the U.S. Department of Housing and Urban Development (HUD), and AMI is a critical measure for allocating federal funding towards affordable housing programs such as the Low Income Housing Tax Credit (LIHTC) for new affordable housing developments, and determines who qualifies for housing assistance through the local housing authority (Hamann 2023; “Low-Income Housing Tax Credit,” U.S. Department of Housing and Urban Development). According to HUD, household incomes that are no greater than 80% of the AMI are considered low income, households no greater than 50% of the AMI are very low income, and households that are 30% or below the AMI are considered extremely low income (Hamann, 2023).

In addition to the area median income measure that HUD provides, a key reference point for policymakers interested in preserving and expanding affordable housing options aligned to incomes is that households should not spend more than 30% of their income towards housing costs. “Severe rent burden” means that households are allocating more than 50% of their income towards housing costs (“Rental Burdens: Rethinking Affordability Measures,” U.S. Department of Housing and Urban Development). HUD notes that “the imbalance between the demand for affordable housing and the supply of low-cost rentals can be seen in metropolitan areas across the United States,” as worker wages are not aligned with the rising costs of housing (“Rental Burdens: Rethinking Affordability Measures,” U.S. Department of Housing and Urban

Development). According to the Joint Center for Housing Studies of Harvard University's "The State of the Nation's Housing" report, about half of individuals that occupy rental housing units pay more than 30% of their income on housing costs, which signals that many Americans are rent burdened (2019). Housing affordability is becoming an increasingly significant challenge for middle income earners, especially in metropolitan areas that have economic opportunities (Schuetz, 2020). Ultimately, affordable housing stock is dwindling for middle and low income earners because the cost of single-family homes and rental prices have increased beyond the pace of income levels ("The State of the Nation's Housing," 2019).

Access to housing that is affordable is crucial to maintaining individual well-being, economic stability, and may increase social capital (Immergluck, 2015). When individuals have the opportunity to live near where they work, commute times decrease (Immergluck, 2015). Another advantage of workers living near their place of employment is the development of a strong local economy and labor force (Immergluck, 2015). Public policy solutions to address the spatial mismatch between available job opportunities and the skills of local workers are needed (McQuaid, 2006). In addition, a misalignment of local jobs and the local housing stock exists, which does not allow workers across income levels to find housing in a given community (Ding and Bagchi-Sen, 2018). Scholars express an interest in engaging with new research that accounts for the relationship that exists between the cost of housing and local worker attributes and skills (Blumenberg and King, 2021). In the United States, residents are beginning to live in distinct geographic locations due to their economic and social class (Florida, 2019).

Homeowners have a political and economic stake in their community because a single-family home is the largest and most valuable financial asset they own (Fischel, 2005). Thus, homeowners are concerned about local government actions that may decrease the value of

their home, which often takes the form of changes to local land use and zoning policies (Fischel, 2005). Historically, homeowners have expressed opposition to the construction of high density housing due to concerns that the policy would result in loss of home value (Fischel, 2005). Municipal zoning is currently a policy tool to preserve single-family property values, and its origin is traced back to the United States' intention to expand opportunities for economic mobility and opportunity to more citizens through homeownership (Hirt, 2015). Zoning laws exist internationally; however, the United States is unique for its use of land use and zoning policies to protect the values of single-family homes (Hirt, 2015). In the United States, land use and zoning policies are increasing the price of housing to the point that it is no longer affordable (Kotkin, 2020). To expand on this, land use and zoning laws decide what type of building can be built on a specific area of land, which artificially lowers opportunities to increase units within the local housing stock (Kotkin, 2020).

Local governments are key actors when it comes to addressing housing and workforce issues, as local officials know their economy better than other stakeholders (Florida, 2019). Solving issues related to affordable housing must occur at the local level of government due to opportunities for localities to prioritize increasing the availability of dense, mixed-use housing to provide earners across income levels the option to live in a particular location, especially within economic centers (Florida, 2018). Opportunities exist for local governments to reform and innovate with regard to the local regulatory environment that may inhibit the construction of new housing, most notably through high development and permitting fees and strict land use and zoning codes that prohibit the construction of dense, multifamily housing (Galster and Lee, 2019; Schuetz, 2020). The construction of denser housing units range from owner-occupied units, such as townhomes and duplexes, as well as less expensive housing for renters, which

helps to provide housing for workers that are aligned to their incomes (Schuetz, 2020). In addition, skilled and higher income workers, referred to as the “creative class,” choose to live in locations that are socially diverse and offer attractive neighborhood or city amenities, so it is crucial that local governments are establishing policies to attract workers to meet the needs of its local economy (Florida, 2019). Key characteristics to foster innovation and economic growth in local communities include technology, talent, and tolerance (Florida, 2019). However, in the United States, the middle class is diminishing, as there are decreasing opportunities for upward mobility for middle income earners, and younger generations are less likely to reach homeownership compared to earlier generations (Kotkin, 2020). Historically, a middle class dominated by property owners promoted healthy standards for the economy and democracy (Kotkin, 2020).

The research article contributes to the understanding of policymakers and researchers due to its novel approach of analyzing how housing and workforce issues exist in types of communities ranging from metropolitan, suburban communities, rural communities, and resort destinations such as mountain towns. There is insufficient research available that discusses housing and workforce challenges within rural and resort communities, as existing research is primarily focused on what occurs within metropolitan settings. The research focuses on the distinct mismatches between local housing stock and worker attributes across different types of communities. Research examines the impacts that the proportion of high income earners, mean commute times, median housing prices, and the political tilt of communities at the county-level have on the nexus between housing and workforce issues.

Literature Framework

Jobs-housing balance

What is the relationship between housing availability and the ability of people to be employed in a community? The jobs-housing balance refers to the relationship that exists between the jobs and housing stock at a regional or local level (Blumenberg and King, 2021). When the housing supply is scarce, workers are unable to live in the area, which has negative effects on local economic growth and job opportunities (Been et al, 2018). When a lack of affordable housing options near a worker's place of employment exists, the worker must reside in a location that is further away and requires longer commute times to work (Been et al, 2018). In other words, when there is a restriction in housing supply, it impacts workers' ability to find housing in areas that have available job opportunities (Been et al, 2018). The relationship between available employment opportunities and the prospective workers within a metropolitan area illustrates a disproportionate impact on workers in low income positions compared to workers in high income positions, as low income earners are subjected to longer commute times due to the lack of affordable housing options located close to the urban core compared to the housing options that are present for high income earners (Yao and Kim, 2022). Low income earners must live within a nearby community with cheaper housing prices and commute into the urban core because the availability of low income positions is higher within urban core locations (Blumenberg and Wander, 2022). Within a metropolitan area, the most significant mismatch between housing options and employment opportunities exists within suburban communities, as workers must travel longer distances to reach their place of employment, which appears to be due to suburban workers favoring the amenities of suburban communities while commuting into the central urban core for employment (Yao and Kim, 2022). To better align the availability of jobs and the local housing stock, policymakers must understand the context surrounding the needs of workers across income levels and to establish job opportunities within a reasonable

commuting distance where workers within different income levels are located spatially within a metropolitan area (Yao and Kim, 2022). Specifically, there is a need for expanding affordable housing options that are aligned to different income levels within areas with high housing costs and an abundance of job opportunities, which are also referred to as “job-rich” communities (Blumenberg and Wander, 2022). Challenges associated with expanding affordable housing options within communities with high housing costs and high availability of jobs includes land use and zoning policies that support the construction of single-family homes as opposed to multifamily housing, community opposition to proposed high density housing projects, and a shortage of land to build new housing projects on (Blumenberg and Wander, 2022).

Self-containment refers to a municipality’s ability to retain community members as both residents and workers (Blumenberg and King, 2021). A lack of self-containment means there are more workers that commute into an area for work and reside elsewhere (Blumenberg and King, 2021). Workers with higher incomes are more likely to have shorter commute times, which implies that high income earners have the financial resources to live close to their place of employment (Blumenberg and Wander, 2022). Places with greater affordable housing options aligned to different income levels have a higher proportion of residents that commute out of the area for work and into an area that has higher housing prices and higher opportunities for employment (Blumenberg and Wander, 2022).

A developing concern related to the jobs-housing balance is the increase in remote workers as a result of the COVID-19 pandemic. The COVID-19 pandemic resulted in areas with high population density reducing the need for dense housing due to the rise of remote work and a move away from a daily commute to work (Liu and Su, 2021). Low income earners often do not have the option to telecommute for their work (Blumenberg and Wander, 2022).

Past research on the jobs-housing relationship has primarily used the U.S. Census Longitudinal Employer-Household Dynamics (LEHD), especially a dataset referred to as the U.S. Census Employer-Household Dynamics Origin-Destination Employment Statistics (LODES), which offers information on the location of workers, the location of residents, and the commuting patterns of workers and residents. A study that utilized LODES data researched the State of California during years 2002 and 2015 to understand the extent to which workers and residents are contained within the same community (Blumenberg and King, 2021). Another research article analyzed the changes in commuting patterns of 26 metropolitan centers across the United States from 1990 to 2003 and from 2003 to 2013 using the LODES dataset (Schleith et al, 2016). An additional use of the LEHD data analyzed the jobs-housing balance across low, middle, and high income earners within the Cincinnati metropolitan statistical area (Yao and Kim, 2022). In addition to LEHD data, past research has used the U.S. Census American Community Survey and housing price data derived from Zillow, Redfin, and CoreLogic (Liu and Su, 2021).

Commuting patterns

To what extent does transportation impact a person's access to housing and employment opportunities and options? In areas that are urban and densely populated, there are higher rates of upward mobility compared to areas that are spread out and commuting is necessary (Ewing et al, 2016). Thus, due to the higher rates of upward mobility that exist within dense urban areas, there is an incentive to increase density in local communities (Ewing et al, 2016). Conversely, research has illustrated that a worker's "commuting threshold," which is the distance a worker will travel for employment, depends on qualities including income, age, and the type of industry they are

employed in (Ding and Bagchi-Sen, 2018). Thus, increasing the number of available jobs locally may not have a significant effect on commute times (Ding and Bagchi-Sen, 2018). Workers with higher incomes are more likely to have shorter commute times and can afford housing at higher rates (Islam and Saphores, 2022). Those who have shorter commute times often received a degree in higher education (Islam and Saphores, 2022). Research has illustrated that Hispanic and African American workers have a higher commute time on average compared to Caucasian workers (Islam and Saphores, 2022). Workers who own a personal vehicle have higher chances of finding employment (Hu, 2017). However, the further a worker resides from their place of employment, there is a greater need to own a personal vehicle for commuting, and research indicates that this correlation disproportionately impacts low income earners who must live further away from their job to find affordable housing options that are aligned with their income (Blumenberg and Wander, 2022).

Unfortunately, cities are no longer maintaining the same workers and residents, and the rate of people who commute from one community to another for employment is increasing (Blumenberg and King, 2021). Workers that are unable to locate affordable housing close to their job may opt to live outside of the economic center their employment is located in, which results in higher commute times (Galster and Lee, 2021). A spatial mismatch exists between the location of jobs and housing for workers across different industries and occupations (Ding and Bagchi-Sen, 2018). The spatial mismatch of housing and employment options available to low income earners is the most apparent, as low income job positions are located the furthest distance spatially from housing that aligns with their income (Bostic and Carpenter, 2018). Policymakers must work towards aligning employment opportunities by using worker skill and educational attainment metrics to account for the distinct key industries and the variation of jobs needed

within a given community across skill levels (Martinus and Biermann, 2022). Research has explicated that there is a spatial mismatch between affordable housing and programs for workforce development, which could inhibit low income workers from learning new skills for employment, and a common issue related to job opportunities for higher wages is access to public transportation services and a dependence on automobiles (Bostic and Carpenter, 2018). Another spatial mismatch involves a disconnect between the unemployment rate and availability of jobs (Chen et al, 2021).

Past research studying the spatial mismatch of low income housing and suitable job opportunities conducted a survey of local government stakeholders involved with workforce development programs across the metropolitan area in Atlanta, Georgia (Bostic and Carpenter, 2018). Additionally, research concerning the spatial mismatch between the availability of employment opportunities and affordable housing has analyzed different individual attributes that impact chances of economic mobility, such as social capital, racial segregation, the distribution of low income earners in a given area, how compact a metropolitan area is, and others (Ewing et al, 2016). Specifically, the study used structural equation modeling (Ewing et al, 2016). Consistent with literature on the jobs-housing balance, past research studying commuting patterns has also used U.S. Census Longitudinal Employer-Household Dynamics (LEHD) data, and a specific use includes a study on the commute times for workers in Buffalo, NY across industries and wages for the year 2014 (Ding and Bagchi-Sen, 2018). Another study used Generalized Structural Equation Modeling with analysis from 2012 California Household Travel Survey data to understand commuting issues within Los Angeles County specifically (Islam and Saphores, 2022).

Housing Supply and Affordability

Under what conditions do housing issues manifest in local communities? Barriers to increasing the supply of affordable housing include local opposition to increasing affordable housing supply, construction costs and regulation, and land use limitations (Scally and Tighe, 2015; Glaeser et al, 2006). The demand for housing supply varies across communities, and the local housing stock offers options across the age of the housing and for renter and owner-occupied units at different price levels (Been et al, 2018). Thus, each community has a demand for housing in the areas of price and housing stock type (Been et al, 2018). Housing demand is characterized by the unit size, age, and nearby natural or human-made amenities that consumers prefer (Galster and Lee, 2019). The demand for additions to the local housing stock occurs when population growth or a rise in average incomes is present, and an increase in demand for housing results in higher overall housing prices (Galster and Lee, 2019). The extent to which housing prices are affordable for workers depends on the individual's ability to pay for housing and the price of housing options available within a community, which means that the affordability of housing is a result of both housing and labor market conditions (Galster and Lee, 2019). Housing affordability and a county's median income are closely related, and it is vital that research approaches these topics with the understanding that they are interrelated issues (Brooks, 2022).

An area of past research suggests a "housing as opportunity" model that states that increasing housing supply will bring about additional economic growth (Rodríguez-Pose and Storper, 2020). However, the article's evidence is unclear whether easing land use and zoning restrictions leads to more affordable housing and an increase in housing supply (Rodríguez-Pose and Storper, 2020). To provide further insight, an additional article illustrates that cities that

adopt land use and zoning policies that do not support high density housing have residents with higher incomes than those who work within the city (Durst, 2021). Cities that promote affordable housing through land use and zoning policies that allow high density and accessory dwelling units (ADUs) report better alignment between the amount of local residents and workers as well as housing units that are affordable to low-income workers (Durst, 2021).

Existing literature finds that when the supply of housing at the market rate is increased, lower and middle income earners are more likely to find affordable housing options as well (Been et al, 2018). Increasing housing supply with market rate units does provide additional housing opportunities for low and middle income earners; however, increasing market rate units is not adequate action for expanding housing that is affordable (Been et al, 2018). The authors state that government intervention is necessary to ensure that there is a range of housing options available to varying income levels (Been et al, 2018). Housing affordability and a local area's level of productivity are connected to the types of housing offered locally (Glaeser et al, 2006).

In contrast, a piece of literature that rejects the idea that new housing will increase affordability of housing options states that rental prices are more tied to a local community's amenities rather than due to housing stock constraints (Anenberg and Kung, 2020). When a lack of housing supply that is affordable to a wide range of workers exists, workers must live further away from their place of employment (Blumenberg and King, 2021). There is a need to establish new housing supply in "job-rich" municipalities and in areas that have unaffordable housing options to allow workers to live near or within the community they work in (Blumenberg and King, 2021). Workers have a higher chance of living near their place of employment if they are located in a "balanced" or "housing-rich" community (Blumenberg and King, 2021).

When approaching the implications of gentrification, past research has asked the question of whether gentrification offers positive social and economic benefits to current residents, specifically in the form of expanded economic or employment opportunities to current low income residents (Meltzer and Ghorbani, 2017). Past research found that low pay positions, especially in service industries, decrease in cases of economic transitions within a local community through gentrification (Meltzer and Ghorbani, 2017). Businesses that are chain companies or are established within the local community can help retain employment (Meltzer and Ghorbani, 2017).

Past research has used neighborhood choice data from the 2014 American Community Survey and Zillow rent prices to test whether an increase in housing supply would impact rental rates across ten metropolitan areas in the United States (Anenberg and Kung, 2020). In addition, research has used U.S. Census information, including LEHD Origin-Destination Employment Statistics (LODES) and 3-year data from the American Community Survey (Meltzer and Ghorbani, 2017). Aspects of the evidence collected include data for total local jobs, when units were built, how many residents commute, how many residents have lived in the same unit for at least five years, percent change in median gross rent, percent change in poverty rate, percent change in population, employees per place of business for retail and non retail, and total number of businesses (Meltzer and Ghorbani, 2017). Lastly, a previous research study conducted an analysis of housing policies that may increase the supply of housing units within a local community (Been et al, 2018).

Local Economic Factors and Workforce Development

Under what conditions do workforce and economic development issues manifest in local communities? When companies relocate or expand to a particular area, it is crucial that there are adequate housing options to support their employees, as issues of housing supply and regional urban development are deeply intertwined (Glaeser et al, 2006). Both businesses and workers benefit when they are located within their community of choice and within areas of economic growth and productivity (Been et al, 2018). Impacts to population levels will subsequently affect industry and retail employment levels, and the regional population and employment characteristics are interconnected on an “intersectoral” level (De Graaff et al, 2012). A local labor market is characterized by the demand for workers in particular industries and the supply of workers that possess the necessary skills (Galster and Lee, 2019). The supply of labor depends on where workers with the necessary skills are located spatially within a geographical region, and the demand of labor relies on the types of industries offered within a particular region (Galster and Lee, 2019).

Existing literature emphasizes how the built environment of a city impacts economic growth (Glaeser et al, 2006). In other words, economic and population growth depends on the characteristics of the city’s physical structures (Glaeser et al, 2006). Shortages of housing may indicate underlying economic issues in the areas of “employment, wages, and skills” (Rodríguez-Pose and Storper, 2020). In other words, the contexts of employment distribution and the skills needed in a workforce are significant variables that could lead to local economic decline outside of housing issues (Rodríguez-Pose and Storper, 2020). Levels of construction regulation and building density requirements impact the elasticity of the local housing supply, population levels, and economic growth (Glaeser et al, 2006).

It is not adequate to simply have jobs available in a local area, as the open positions must match the skills of nearby residents (Immergluck, 1998). To expand on this, people not only consider housing prices but also the jobs available to them based on the skills they possess when deciding to locate in a certain area (Rodríguez-Pose and Storper, 2020). In regards to the decline of low skill employment positions in metropolitan areas, the authors suggest that these positions are decreasing due to higher commute times and low wages (Rodríguez-Pose and Storper, 2020). Imbalances of available jobs and the skills of workers can be explained by a mismatch of the required competencies an employer is seeking compared to the qualifications or skills that a potential worker holds (Sevinc et al, 2020). When there is a lack of in-demand skill sets within a local community, regional economic growth is limited (Sevinc et al, 2020).

Past research has used United States Census data, specifically from the American Housing Survey, and the research looks at housing unit vacancy rates and increases in housing stock within metropolitan areas (Glaeser et al, 2006). Additionally, research has used the 1990 Census Transportation and Planning Package (CTPP) to understand where jobs and housing are located spatially (Immergluck, 1998). Another research approach analyzed the following: GDP per capita growth versus population growth from 2000-2016, house price growth versus population growth from 1990-2010, and population growth and house price increase versus increase in developed land percentages from 1990-2010 (Rodríguez-Pose and Storper, 2020).

Local Community Types

To what extent does housing and workforce issues vary within local communities? Communities at the local level across the United States experience housing and workforce conditions differently, ranging from variance in median housing costs, income levels, and the

unemployment rate (Wu and Gopinath, 2008; Brooks, 2022). Additionally, individuals with high, middle, and low incomes have different housing and employment preferences, and workers at different income levels vary in commute time between their place of employment and their residence (Yao and Kim, 2022). The focus of this research is an analysis of local communities across metropolitan, suburban and exurban, resort, and rural communities.

Metropolitan Communities

Within large metropolitan cities, a spatial misallocation of labor across income levels coupled with strict land use and zoning codes exists (Hsieh and Moretti, 2019). Housing prices are determined by the incomes of the residents within metropolitan areas (Monkkonen, 2018). An increase in population density within a metropolitan community leads to an increase in the median housing prices (Brooks, 2022). The extent of a city's responsiveness to an increase in job growth and economic productivity as it relates to the local housing supply depends on whether the city chooses to increase units in the housing stock to accommodate for the increase in workers in order to live and work within the same community or if the city chooses inaction, meaning the price of housing increases and no significant additions to the housing stock are made (Monkkonen, 2018). In addition, large metropolitan cities have a high demand for workers; however, employment growth within the city and surrounding areas is negatively impacted by a constrained housing supply (Hsieh and Moretti, 2019). To expand on the challenges related to a lack of housing supply aligned with the different income levels of individuals who would like to live within the city, very low income and middle income earners experience difficulty finding housing that is affordable and may be unable to qualify for housing programs funded by the U.S. government (Been et al, 2018). Rental housing prices are high in the zip codes closest to the urban core within a metropolitan area, which could signal a tradeoff for long commute times to

reside in areas that offer housing that is affordable (Anenberg and Kung, 2020). Affordable housing efforts within cities are often targeted towards individuals that make 50-60% of the area median income (AMI) due to income limitations with the use of the Low Income Housing Tax Credit for affordable housing programs (Been et al, 2018). Ultimately, mean commute times for employment opportunities depend on the balance or mismatch between available jobs and the available housing stock that is affordable for workers within a metropolitan community (Sultana, 2002).

Increasing public transportation networks to local economic centers is critical in addressing the needs of individuals that work within a metropolitan area (Hsieh and Moretti, 2019). Commute times for low and middle income workers is higher compared to high income earners within metropolitan areas, and opportunities for economic growth locally and nationally are hindered when individuals are unable to find affordable housing options within their price range and within a reasonable commute time to their job (Yao and Kim, 2022; Been et al, 2018; Islam and Saphores, 2022).

Past research has analyzed the mismatch between housing stock and employment opportunities across 220 U.S. metropolitan areas from 1964 to 2009 (Hsieh and Moretti, 2019). Additionally, research has used the U.S. Census American Community Survey data from 2014 to better understand the impact that new multifamily housing stock has on rent prices (Anenberg and Kung, 2020).

Suburban Communities

Suburban communities are defined by their connection to a metropolitan center, according to the United States Census (“About Metropolitan and Micropolitan,” 2021). Research has illustrated that the housing supply found within the city core is often constrained, and the

lack of housing options within the city results in higher housing prices due to a greater demand for housing (Been et al, 2018). A lack of housing supply aligned to worker incomes results in those who are “priced out” of a city to opt for housing that is more suitable to their economic resources by living somewhere else, namely within suburban and exurban communities (Been et al, 2018). Metropolitan areas have addressed the lack of affordable housing available for urban core workers by developing new housing within surrounding suburban and exurban areas, as areas that are not immediately central to the urban core have a greater availability of developable land (Brooks, 2022).

Across metropolitan areas, housing costs have increased, and this rise does not accommodate workers with employment that is low skill and low wage (McLafferty and Preston, 2019). As a result, individuals with low wage jobs have the longest commute times for workers with employment in the city, and a policy implication of low income earners moving further away from the city is potential segregation by income level within a metropolitan area (McLafferty and Preston, 2019; Been et al, 2018). In addition to the challenges that low income workers face when living in exterior communities and working within the city core, the demographic also is impacted by a spatial mismatch between housing that is affordable for their income and employment opportunities within suburban areas (Bostic and Carpenter, 2018). To expand on this, retail and other service industries have located their business operations in suburban areas with high costs of living, and the aforementioned industries rely heavily on low wage, entry level workers to staff positions (Bostic and Carpenter, 2018). Despite the need for low income workers within wealthy suburban communities, the housing options affordable for this demographic are located far away from opportunities for employment (Bostic and Carpenter, 2018).

Land use and zoning regulations within the United States that promote the construction of single-family housing inhibit a community's ability to provide multifamily housing for individuals ranging in income levels (Lens, 2022; Hirt, 2015). Historically, zoning for single-family homes was intended to expand the ability for upward mobility by building long-term wealth through homeownership; however, there are concerns that U.S zoning policies' original intent of increasing economic opportunities does not align with current phenomena (Hirt, 2015).

Past research has analyzed commute times for low wage workers within a metropolitan area based on age and gender within the New York area from 2000-2010 and used U.S. Census American Community Survey and Public Use Microdata Sample (PUMS) data (McLafferty and Preston, 2019). An additional area of research focused on the spatial mismatch between middle and low income employment opportunities with affordable housing stock options within the Atlanta, Georgia metropolitan area (Bostic and Carpenter, 2018).

Resort Communities

When a community's employment opportunities within the local economy involves the development of natural amenities, housing prices increase (Brooks, 2022). In the short term, a shortage in housing supply is due to a mismatch between the seasonal demands of the local workforce and the area's visitors and tourists (Hall, 2010). However, a lack of housing in resort communities in the long term is a result of restrictions in land use and zoning, which are often used in an effort to maintain the natural features of the area (Hall, 2010). Communities whose economic activity is dominated by outdoor recreation or use of natural amenities have the ability to attract skilled workers due to advantages in the quality of life found within these communities compared to metropolitan areas (McGranahan, 2011). In regards to second home ownership

found within resort areas, research has explained that second home ownership in resort communities may expand opportunities for economic growth and development because visitors spend more money within the local economy and there is a greater chance for future economic activity when individuals retire within the second homes (Hall, 2010). In addition, the presence of short term rentals within resort communities removes housing units that would otherwise be available for longer periods of time to house the local workforce (Galster and Lee, 2021). Short term rentals constrain the local housing supply and result in higher housing costs within a community (Galster and Lee, 2021).

Previous research indicates that highly educated, skilled workers are attracted to the natural amenities located in resort destinations, and there are opportunities to expand businesses that offer the option of remote work (Wu and Gopinath, 2008). In order for resort communities that are located outside of metropolitan areas to increase economic activity and growth, it is important to have the presence of a local skilled workforce or entrepreneurial activity (McGranahan, 2011; Hall, 2010). Resort communities must prioritize their focus on sound land use and zoning policies to better address the unique housing and economic development problems these types of communities face (Hall, 2010).

Resort communities are differentiated from rural communities based on the presence of economic activity tied to the area's natural amenities (Wu and Gopinath, 2008). Past research has conducted an analysis of the median income of households and median housing costs at the county level across metropolitan areas and rural areas from 1990-2016 using National Historical Geographic Information System and U.S. Census American Community Survey data, and the study specifically looks at how an increase in job positions involving a community's natural amenities impacts housing prices (Brooks, 2022). Additional research has analyzed county-level

data from the U.S. Census County Business Patterns and the U.S. Department of Agriculture's Economic Research Service for the year 2000 to understand how wages and housing prices vary by communities that are metropolitan, suburban, high amenity rural, and low amenity rural (Wu and Gopinath, 2008).

Rural Communities

A lack of economic development in rural communities has been found to relate to the extent of their remoteness, meaning distance from economic centers, compared to other types of communities that have larger concentrations of human capital, especially attainment of a bachelor's degree and the road infrastructure for commuting (Wu and Gopinath, 2008). In addition, rural housing prices have been found to vary due to the presence of natural amenities, such as topographic qualities, water, and weather patterns that are found in a local community (Wu and Gopinath, 2008). According to past research, not all rural areas are concerned with housing affordability, and the extent to which housing affordability is an issue depends on the area's population growth and geographical location (Ziebarth, 1997). Rather, housing availability, meaning the number of housing units listed for sale or rent, appears to be a higher concern across rural communities varying in population and location (Ziebarth, 1997). Specifically, past research reported that rural communities are highly concerned with the lack of rental units available to individuals (Ziebarth, 1997). Conversely, additional research has illustrated that a lack of affordable housing stock is not an issue specific to a metropolitan area, and housing prices have increased within rural communities as well (Brooks, 2022). Population growth within rural communities helps to explain the increase in housing prices from 1990 to 2016 (Brooks, 2022). When new jobs are created within rural communities, roughly one third of

workers available to fill the newly established positions are commuting into work from a different county (Renkow, 2003).

Research has illustrated that expanding the skilled labor located within a rural area will increase the number of firms located within this type of community (Wu and Gopinath, 2008). In addition, scholars have indicated that previous research on economic development and housing within rural communities has not received enough attention, and this research expands on the knowledge of local policies that promote or inhibit economic development and attainable housing (Wu and Gopinath, 2008).

Previous research has used econometrics models to understand the characteristics of rural labor markets, such as commuting patterns and job growth, within North Carolina communities for the years 1980-1990 (Renkow, 2003). As aforementioned in the resort community type literature section, past research on rural communities has used county-level data from the U.S. Census County Business Patterns and the U.S. Department of Agriculture's Economic Research Service for the year 2000 looking at wages and housing prices variation by communities that are tied to a metropolitan area as well as high amenity rural and low amenity rural communities (Wu and Gopinath, 2008).

Guiding Hypotheses

The research questions test housing and workforce challenges in the following issue areas: a county's proportion of high income earners, the housing and workforce challenges within specific community types, and the impact of a county's political ideological tilt on housing and economic policy decisions. This study analyzes housing and workforce characteristics across U.S. counties, as the majority of local policies geared toward these issues are concentrated at the county level (Wu and Gopinath, 2008). Additionally, the study provides

qualitative and quantitative insights on the housing and workforce conditions present within the State of Colorado at the local level to better understand how issues vary across communities. Hypotheses were derived from the Colorado qualitative survey of housing and workforce stakeholders. The supply of housing may become an issue after other issues are not dealt with, including worker wages and the cost of housing (Brooks, 2022; Rodríguez-Pose and Storper, 2020). On the other hand, if there are restrictions in the supply of housing, it prevents workers' ability to move into an area, which could negatively impact the economic activity and growth in a local community (Been et al, 2018). There is a common desire for workers to reside within a reasonable walking or driving time from their place of work (Blumenberg and King, 2021; Blumenberg and Wander, 2022). Unfortunately, workers are being pushed out of communities they desire to live in due to rising housing costs (Blumenberg and King, 2021; Blumenberg and Wander, 2022). In addition, employers have trouble locating workers to fill vacant positions, and the workers that are available may not possess the required skills to fulfill the role (Sevinc et al, 2020). The research provides insight on the distinct housing and workforce challenges that U.S. counties across metropolitan, suburban, resort, and rural communities experience.

A community's proportion of high income earners is tested with its relationship to the prices of owner and renter housing stock as well as average commute times present in counties across the United States and within the State of Colorado. The hypothesis analyzes how the proportion of people earning the highest wages within the county impacts the individuals earning less money, as a high proportion of high income workers present within a county is suspected to drive housing prices to become unaffordable for other members of the community (Galster and Lee, 2021; Brooks, 2022). Higher income levels may signal that workers hold positions that require advanced skills (Florida, 2019). Specifically, the research asks the following: if there is a

high proportion of high income earners within a community, then housing prices will be higher as well as if there is a high proportion of high income earners within a community, then there will be higher commute times.

An additional area of analysis focuses on how housing and workforce challenges vary among communities that identify as metropolitan cities, suburban communities, and rural communities across the United States at the county level. Please note that I was unable to find variables that would effectively encompass the characteristics of resort communities and that would be easily comparable to metropolitan, suburban, and rural community types. The research seeks to understand how commute times and housing stock characteristics vary among communities and ultimately contribute to the distinct policy problems found within a county. Specifically, the research asks the following for metropolitan community types: if the community type is metropolitan, then housing prices will be higher and if the community type is metropolitan, then commute times to work will be lower. Hypotheses for suburban community types include the following: if the community type is suburban, then housing prices will be higher and if the community type is suburban, then commute times to work will be higher. Lastly, hypotheses for rural communities include the following: if the community type is rural, then housing prices will be lower and if the community type is rural, then commute times to work will be higher.

The research tests whether the political ideological tilt of communities across metropolitan cities, suburban communities, and rural communities impacts the local housing and working conditions present at the county level across the United States and within Colorado counties. Specifically, the research asks the following: if a community's political ideology is liberal-leaning, then there will be a greater availability of multifamily housing stock as well as if

the community's political ideology is liberal-leaning, then there will be more affordable housing stock.

Case Selection

Qualitative Findings

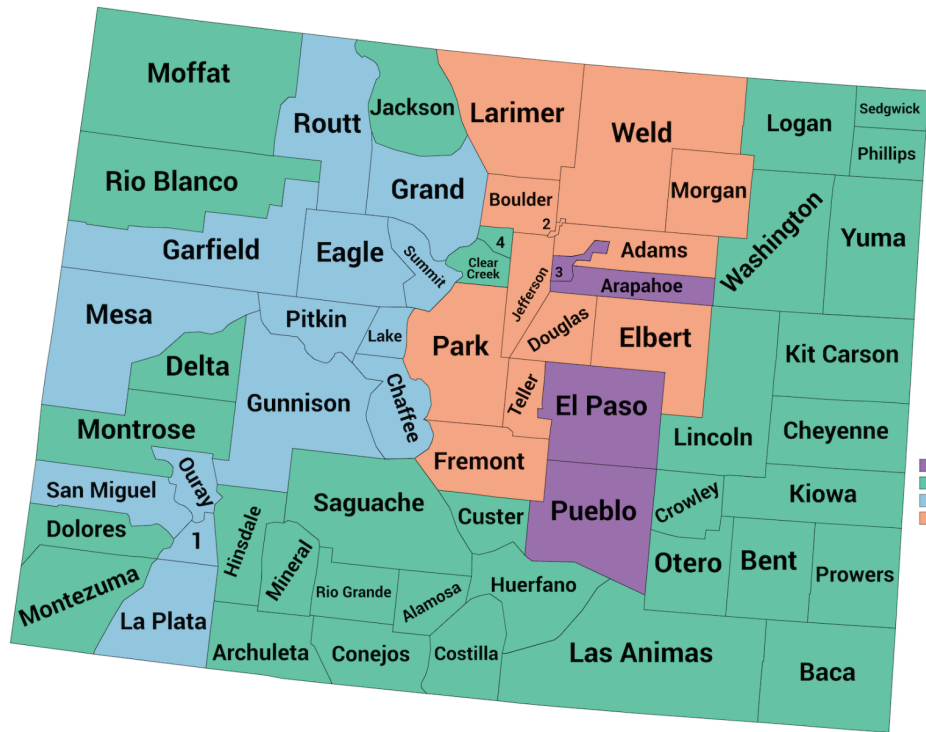
“Employers are doing it themselves to provide housing and are approaching the housing authority. Places like the chamber of commerce and economic development organizations are focusing their work and efforts on housing because it is a problem. Businesses suffer without good housing stock” (Housing Authority, Resort Community Type).

Two qualitative surveys were completed from July 2022 to January 2023 to learn more about the distinct housing and workforce challenges that local communities face. Housing survey participants included staff members of Colorado housing authorities and other organizations involved with housing when a housing authority was not present within the community or could not be reached, which included cities, a nonprofit, and a county commissioner. Workforce survey participants included organizations involved in local economic development across the State of Colorado, which range from chambers of commerce, local economic development organizations, community colleges, and cities. The selection of stakeholders by organization type is due to my interest in learning from individuals directly involved with housing and workforce issues at the local level. To expand on this, a majority of local communities have both a housing authority and a chamber of commerce or local economic development organization, which allowed the research to compare the qualitative responses across community types (see Appendix A). I had a specific interest in speaking with community colleges as part of the workforce qualitative study because of their unique ability to address workforce challenges due to the opportunities for workers to receive training and other avenues for skill advancement (see Appendix A).

Survey meetings were conducted via phone, Microsoft Teams, or Zoom. The meetings were not recorded, and I took notes during the conversation. No compensation was provided for participation in the study. Participant responses remain anonymous and not tied to an individual. The goal of the qualitative research is to discover what housing and workforce issues different types of Colorado communities are facing by learning directly from public interest staff members that engage with housing and workforce issues in their work. For the housing survey, lines of questioning included topics such as affordability, land use and zoning, community opposition, the supply of housing and housing scarcity, funding limitations, rehabilitation of housing units, supportive services, and the Housing Choice, also known as Section 8, voucher program (see Appendix A). For the workforce and economic development survey, the questions that were asked included the following topics: workforce availability, workforce skills, business retention, key industries, job growth, transportation, and housing (see Appendix A). Survey questions generally focused on the challenges and opportunities associated with each topic relevant to the housing and workforce issues present in the local community (see Appendix A).

The different types of Colorado communities that participated in the housing and workforce surveys included metropolitan, suburban communities, rural communities, and resort mountain towns, and both surveys involved the same Colorado communities. Community selection was a result of the distinct economic and population regions that exist in Colorado. I created a map to illustrate the county level community types that are found within Colorado (see Appendix C).

Map of Colorado Counties by Community Type



Map Key

Community Type	County Color
Metropolitan	Purple
Suburban	Orange
Resort	Light Blue
Rural	Green

Prior to the qualitative study of Colorado housing authorities and other housing stakeholders, I spoke to six Colorado-based organizations to serve as beta testers in order to receive feedback on the questions I hoped to ask, and the meetings occurred in June and July 2022 (see Appendix A). A critical aspect of the beta testing phase was to ensure the questions were well-formed and mentioned a variety of topics relevant to affordable housing (see Appendix A). The housing survey beta testers included a staff member at a housing authority, senior staff at two member-based organizations, staff at two nonprofit organizations that focus

their work on housing issues, and a Colorado General Assembly state representative. During the beta tester stage, I received feedback on how to rephrase questions in addition to learning more about how housing issues are seen by local housing authorities (see Appendix A). Beta survey participants also provided insight on additional topics to ask during my survey interviews, for example, adding the line of questioning on the Housing Choice Voucher, or Section 8, program and adding a question about who is impacted most as a result of the housing challenges within a community (see Appendix A).

Survey interviews of Colorado housing authorities and other organizations involved with local housing issues were conducted July, August, and November 2022. 16 Colorado housing authorities, four cities, one nonprofit, and one county commissioner participated in the qualitative interviews. Interview participants were located in different parts of the State of Colorado, ranging from large metropolitan areas, suburban areas, the Western Slope, and the Eastern Plains, as these types of communities reflect the metropolitan, suburban, resort, and rural communities the research focuses on.

The workforce qualitative survey involved a beta testing phase of the survey instruments to ensure that local economic development organizations and other workforce stakeholders would be able to address each question with information based on their work experience and that key economic factors were mentioned in the questions (see Appendix A). Beta tester participants included senior staff members at two chambers of commerce, staff at a local economic development organization, and a community college staff member that focuses their work on skill advancement, and the meetings were conducted September 2022 (see Appendix A). Feedback from workforce beta testers included the suggestion of omitting the line of questioning about funding limitations and affirmed that the questions for the qualitative survey would be

policy areas that economic development and workforce stakeholders would be equipped to answer based on their work experience.

Workforce survey interviews were completed September 2022 through January 2023, and organizations involved with local workforce and economic development issues located in Colorado participated in the study. 13 local economic development organizations, four chambers of commerce, three community colleges, and two cities participated in the workforce qualitative interviews. Local communities contacted for the survey are consistent with the housing survey's participation and include distinct regions of Colorado including metropolitan, suburban, rural, and mountain or resort towns.

Qualitative Insights from Metropolitan Communities

“There is a rising cost of housing, and this is concerning because the city does not want to lose people in different income brackets, and the city does not want to lose workers” (Economic Development Organization).

Colorado metropolitan cities expressed that there is a shortage of housing stock to support all members participating in the local economy, specifically for middle and low income earners that make 60-120% of the area median income (Housing Authority). The cost of living within metropolitan communities is not a concern for high income workers, and the prospects of homeownership for young generations of professionals is low (Economic Development Organization). Private market prices of housing are increasing at a rapid rate, and housing authorities are unable to keep pace with rising costs through the Housing Choice Voucher, or Section 8, program for low income earners (Housing Authority). Housing stock shortages present within metropolitan communities produce increased competition for the available housing stock

and ultimately leads to higher prices for housing (Economic Development Organization). There are challenges associated with land use and zoning regulations that make it difficult to expand the supply of a city's multifamily housing stock (Housing Authority). Metropolitan communities are desirable locations to live and work (Economic Development Organization). Thus, when new housing stock is established, more workers have the ability to participate in the city's labor market, which is an insight that was echoed by both a metropolitan housing authority and an economic development organization. Ultimately, when workers at low and middle income levels are unable to afford housing, there are concerns that metropolitan communities are losing workers that are critical to a functioning city ecosystem (Economic Development Organization).

Meeting the hiring needs of businesses located within a metropolitan city through the attraction and retention of workers across skill levels is becoming more difficult over time due to the shortage of housing stock and high housing prices, according to two economic development organizations. The available workforce located within metropolitan communities is shrinking because more people are choosing to live further away from their place of employment within the urban core, which leads to longer commute times (Economic Development Organization). Metropolitan communities that lack a robust public transportation system report that low income earners struggle to work and live within the same area and are forced to be reliant on automobiles for transportation (Economic Development Organization).

Businesses with operations based in metropolitan communities report the need for employees with additional skills and training in a delayed fashion, and workforce skills in demand vary by industry type (Economic Development Organization). When the unemployment rate is low, some industries do not focus their resources on advancing the training of their workers (Community College). Low income, underserved individuals possess a lack of training,

financial resources, and upward mobility prospects, and they are the demographic impacted most as a result of the workforce challenges within metropolitan communities (Community College). Challenges associated with acquiring new skills are cost and time-related for the adult learning population, as it is difficult to convince an individual to receive additional educational credentials or training when they have been working within the same industry for years and when considering the high cost of housing, transportation, and other basic necessities (Community College). In addition, when workers are subjected to frequent moves due to unaffordable housing and their basic needs are not met due to high costs of living, it is difficult to consider options for educational or career advancement (Community College and Economic Development Organization).

Qualitative Insights from Suburban Communities

“Affordable housing is economic development...while many people think of economic development as being only focused on attracting the highest paid jobs, we know that there is an entire workforce that makes up a community that those jobs are apart of: nurses, teachers, emergency responders, service industry professionals, pharmacy technicians, retail workers...and this demographic is just as integral to a thriving community” (Housing Authority).

The primary housing and workforce challenge present within suburban communities is that businesses are struggling to locate workers with the necessary skills for available job openings, and this insight was reflected by an economic development organization, a housing authority, and a city official. Both an economic development organization and a housing authority shared with me that businesses seeking to hire skilled workers for industries, such as information technology, prefer prospective workers that possess a degree in higher education

with the necessary skills for the open job position as opposed to providing in-house training or other avenues to advance a prospective worker's skills. There must be a shift in the way businesses search for prospective employees as a result of not being able to locate the workers to meet their needs (Housing Authority). Businesses possess an overreliance on the traditional K-12 and higher education school systems to produce suitable workers, and businesses must be more willing to offer internships, training, and other ways to upgrade skills (Housing Authority). A current phenomena that corresponds to businesses having challenges with hiring suitable workers relates to workers expressing difficulty with furthering their careers due to their current skills not aligning with advanced roles they hope to fill in the future (Economic Development Organization).

Hiring skilled workers within suburban communities is an immediate issue that must be addressed, as key industries are seeking new workers at this moment (Economic Development Organization). However, suburban communities are working on addressing the future availability of workers that possess skills that businesses need through the development of a local talent pipeline within the K-12 public education system and nearby community colleges (Economic Development Organization). There are concerns that an individual's ability to further their skills through training opportunities depends on their access to transportation and their ability to afford basic needs (Economic Development Organization). Low income earners are impacted most in regards to financial limitations to further their educational and professional credentials in the absence of an in-house training program that the business offers or a program that the business reimburses the worker for, and as a result, the opportunities to improve their situation are minimal (Economic Development Organization).

Suburban communities are experiencing challenges with attracting and retaining workers due to unaffordable housing costs, as more workers are commuting into the area they work in and living elsewhere with greater affordable housing options (Housing Authority). Workers have a threshold for how long they are willing to travel for work, and typically workers do not want a lengthy daily commute within a metropolitan area that exceeds 30 minutes (Two Economic Development Organizations). Over time, less workers are being retained as residents of suburban communities and are being pushed out to further locations due to the unaffordable housing stock within the communities they would prefer to live in, and this results in higher commute times (City). A shortage of housing stock that allows low and middle income earners of a local labor market to live and work within the same area exists within suburban communities, and the mismatch between wages and housing stock characteristics results in high commute times (Housing Authority). According to survey participants affiliated with a city, a housing authority, and an economic development organization, suburban communities lack a diversity in housing stock types, and there is a need for more housing units more generally to expand housing choices for prospective residents across income levels. Specifically, there is a need for more multifamily housing options for both renters and owners, as suburban communities have an abundance of single-family homes (City, Housing Authority, and Economic Development Organization). Two housing authorities noted that there are not nearly enough Housing Choice Vouchers, also known as the Section 8 program, to meet the current need for housing assistance, and voucher recipients are struggling to find affordable rentals. Suburban communities are in need of last mile public transportation services to improve workers' access to business centers (Economic Development Organization). Businesses consider a given community's housing stock and overall regulatory environment when deciding where to establish an office, and businesses are often located in

areas that are desirable places for their employees to live (Economic Development Organization). In order to attract employees, suburban communities must maintain a range of housing options to attract workers. A unique aspect of suburban communities is that they are connected to metropolitan cities or other major economic centers (Economic Development Organization). Suburban communities understand that workers commute across the metropolitan area for work, so it is imperative that the community offers housing for a range of incomes, especially for workers making 80-120% of the area median income (Economic Development Organization and Housing Authority). There is a shortage of housing policies to address the needs of the “missing middle,” meaning middle income earners, as the private market is equipped to address the housing demands of high income earners, and there are subsidies available for low income earners that meet certain financial thresholds (Economic Development Organization).

When new housing construction occurs within suburban communities, developers face challenges with permitting fees and other high costs associated with construction, as well as restrictive regulations related to parking and density requirements (Two Housing Authorities). Thus, there is a desire for more flexible, relaxed zoning and land use policies to ease restrictions related to adding to the existing local housing stock (Two Housing Authorities and City). Gaining access to reliable water sources and the tap fees associated with water access are growing challenges for suburban communities, which is an insight provided by both a city and a housing authority. Another challenge associated with land use and zoning within suburban communities relates to the protection of open space parcels of land that could be used for other purposes including new housing construction (Housing Authority). Unfortunately, the presence of open space creates an artificial shortage of affordable housing in some suburban communities because the available land for the development of new housing is limited (Housing Authority).

An adjacent issue to land use and zoning policies is the community opposition to proposed projects and policies to increase the supply of affordable housing. While community actors that oppose proposed housing policies exist within suburban communities, two housing authorities noted that opposition has lessened over time because more people are beginning to recognize the immediate need for housing, but there is still pushback from residents not wanting new housing projects established within their community specifically. However, community opposition to proposed policies remains unwavering within suburban communities that have a high proportion of high income earners (Housing Authority).

Qualitative Insights from Resort Communities

“Workforce challenges are an existential risk to the county. What is the solution to these problems? The answer to this question is unclear, and everyone is trying to figure this out” (Economic Development Organization).

Entry level, low wage workers are impacted most by the housing and workforce issues within resort communities that have worsened over time; however middle income earners are also impacted by the rising costs of home and rental prices, according to two housing authorities. A massive gap in housing affordability exists within resort communities due to the high median home value, and people who earn 140% of the area median income and below struggle to find affordable housing (Housing Authority). Average wages do not reflect the average cost of housing, and wages found within resort communities are often lower than the statewide median wage (Housing Authority). Historically, service workers have allocated 50% of their income towards housing costs within resort communities, and unfortunately the share of income low income workers have paid towards housing costs has increased further over time (Housing

Authority). Workers that hold entry-level positions have long commute times to work that may exceed one hour because they must live further away from the area's economic center in order to find affordable housing options that are suitable for their income (Nonprofit). Homeownership is no longer attainable for the local workforce within resort communities, and there is a shortage of multifamily housing stock, which was noted by both an economic development organization and a housing authority. A distinctive aspect of the challenges that resort communities face is that families and workers are beginning to leave the area, which is changing the social fabric of resort towns (Economic Development Organization). Access to childcare services is a significant challenge within resort communities, and this is partly due to the lack of workers to fill early childhood positions and the low pay associated with the occupations (Economic Development Organization). The majority of economic activity within resort communities focuses on resort-centered businesses that require high amounts of entry level, low pay service workers to fulfill roles that have a seasonal demand in alignment with peak tourism times of the year (Economic Development Organization). While resort communities offer many employment opportunities for entry level, low wage positions to support its economy, resort communities have a high proportion of workers that have received a bachelor's degree or higher, and there is a need to introduce more skilled positions (Economic Development Organization). While the tourism industry is profitable, an economy that is not diversified is at higher risk of severe challenges associated with economic downturns or in the case of a pandemic (Chamber of Commerce).

As a result of the COVID-19 pandemic, more middle and high income earners had the option of completing work hours remotely (Economic Development Organization). Thus, more remote workers chose to live in communities with an abundance of natural amenities that they

would not have the opportunity to live within if they had to commute to work, and the influx of new residents that are remote workers poses an economic opportunity for the local economy because they are higher paid, skilled workers (Economic Development Organization). The COVID-19 pandemic also resulted in an influx of retirees and second home or out of state home buyers purchasing property within resort communities that are rich in natural amenities (Economic Development Organization). While high income earners may bring in new streams of revenue and opportunities for a skilled workforce, the housing supply located within resort communities was depleted even further than it was prior to the COVID-19 pandemic, and the severely constrained housing supply has resulted in housing prices rising at an exponential rate (Economic Development Organization). In addition, housing developers are more likely to focus their efforts on high cost housing projects that are often worth over \$1 million in value within resort communities due to the private market incentives for producing large profits within the area (Housing Authority). There is a need to expand developer incentives using the Low Income Housing Tax Credit (LIHTC) to increase the supply of affordable housing stock (City and Housing Authority). The abundance of short-term rental housing found within resort communities further exacerbates the challenges associated with a lack of housing supply and affordability (Housing Authority). However, an opportunity associated with the rise in short-term rental housing is related to the increase in community support for expanding affordable housing within resort communities (Housing Authority).

Resort communities lack developable land available for new housing developments, whether the land is designated as open space, is physically challenging to develop on, or is owned by the federal government, according to two housing authorities. Access to water sources is another increasingly challenging issue, especially for new, large-scale housing projects

(Housing Authority and County Commissioner). Land use and zoning policies may produce barriers for constructing affordable housing due to zoning for commercial use or a preference for low density housing through the use of height limits in an effort to protect the natural landscape and amenities, according to two housing authorities. In general, the approval process to build housing in resort communities is long and overly burdensome, which prevents housing developers from adding to the existing housing stock (Housing Authority). Lastly, housing developers face high fees associated with the cost of housing construction within resort communities (Economic Development Organization).

Since the labor shortage found in resort communities is due to unaffordable housing prices, it is difficult to attract new workers to the area (Economic Development Organization). Major employers and essential services such as public education and health care are struggling to hire workers, and businesses are beginning to shorten their daily operating hours due to staffing constraints (Housing Authority and Economic Development Organization). Because of this challenge with importing new workers to fulfill roles for the resort economy and for essential services, there is an immediate need for expanding programs to develop a local talent pipeline in an effort to retain young people and the available workforce that are currently located within resort communities (Economic Development Organization). The objective of advancing a local talent pipeline for young prospective workers is to gain a familiarity with the community's key industries and employment opportunities that are available to them while providing a critical need for businesses seeking to hire workers (Economic Development Organization). Developing a local talent pipeline for young people within resort communities is occurring at the high school and college levels (Economic Development Organization). For high school students, exposure to trade skills through internships or other skills-based learning environments is a path for

participating in the labor force upon graduation while providing a need for resort communities that have a shortage of trade workers (Economic Development Organization). At the college level, there are opportunities to provide traditional and nontraditional adult learner populations with pathways for upskilling or reskilling through learning new, in-demand skills through short-term, skill-based learning programs such as educational courses, internships, and apprenticeships (Economic Development Organization). Businesses located within resort communities have a growing interest in helping to develop a worker's skills through in-house training rather than seeking prospective workers that already hold the necessary educational or experiential qualifications the firm needs (Economic Development Organization). Another key aspect of a local talent pipeline involves the retention of individuals who are already participating in the community's labor force, which translates to providing opportunities for career development and advancement for workers moving from entry-level to middle management positions, and the option for workers to advance their careers within resort communities is currently at risk (Economic Development Organization).

Qualitative Insights from Rural Communities

“Workforce challenges are occurring because workers cannot find housing” (Economic Development Organization).

Colorado rural communities report that housing costs have increased, and the high housing costs have resulted in more workers finding housing in less expensive, exterior cities and commuting into the region's economic center for work (Housing Authority). As a result of workers living in nearby communities with more affordable housing options available, workers must travel over 15 miles in one direction to reach their place of employment, and some

entry-level workers commute 100 miles daily for work (Chamber of Commerce). A unique feature of rural areas is that communities are spread out geographically, as the closest town is often several miles away, which presents challenges with living in one community and working in another community (Economic Development). In order to live comfortably in a rural community, residents must own an automobile to commute to and from work and to access basic necessities (Community College).

The local housing stock of rural communities includes an abundance of older, dilapidated homes, and generally the average property values are low compared to urban areas (Economic Development Organization and Housing Authority). Some Colorado communities are in the process of updating the older housing stock to provide more housing opportunities (Community College). There is an immediate need to increase housing options for workers making 70-80% of the area median income (Economic Development Organization). Rural communities have a lack of multifamily housing stock for its workers, and there is a lack of new housing development in general, according to two housing authorities. Challenges associated with updating and adding to the existing housing stock are costs associated with construction materials and labor, as building private market housing is not affordable or profitable within rural communities, according to a community college and an economic development organization.

In addition to the lack of sufficient housing stock in rural communities, there is a shortage of workers to fill positions in established and prospective businesses as well as businesses that hope to grow and expand (Community College). Rural communities experience challenges with hiring workers across income levels, but especially with hiring entry-level, low wage workers (Community College). Entry level workers found in rural communities include the following industries: retail, service, construction, agriculture, and trades such as plumbing, electrical, and

carpenters (Chamber of Commerce). Other industries that are experiencing challenges with hiring include essential services, such as health care as well as K-12 and higher education (Economic Development Organization). If new businesses seek to move operations to a rural community, there are concerns with prospective workers' ability to locate housing within a reasonable commuting distance to their place of employment (Economic Development Organization). In other words, if there is a shortage of housing stock, challenges with attracting new workers to the area are present, which limits opportunities for economic growth (Economic Development Organization). Rural communities are experiencing a loss of skilled workers that leave the area to locate economic opportunities (Economic Development Organization). The rise in remote work settings following the COVID-19 pandemic presents an opportunity for attracting skilled workers that have the option of telecommuting to work (Economic Development Organization). However, access to reliable broadband services is needed for economic development within rural communities, and remote work is impossible without this critical infrastructure (Economic Development Organization). If difficulties associated with hiring new workers are present, then the rural community must focus its efforts on building a local talent pipeline through the public school system offering educational or apprenticeship opportunities to learn skills that are in-demand for the area's businesses and by offering training programs through community colleges and workforce centers (Community College and Economic Development Organization).

Summary and Hypotheses

I have summarized the qualitative insights provided by both housing and workforce survey participants from Colorado metropolitan, suburban, resort, and rural communities in

matrices. The two matrices are separated based on the type of work the participant is involved in and whether the participant was part of the housing or workforce survey.

The qualitative interviews were conducted within Colorado communities to learn more about the context regarding housing and workforce challenges and opportunities that exist locally. Hypotheses for the quantitative analysis on housing and workforce conditions at the local level were generated from the insights provided in the qualitative interviews.

Key insights from the housing survey emphasized the need for expanding the supply of housing and the affordability of housing, particularly for low and middle income earners. Workers are choosing to reside further away from their place of employment due to high housing costs, which results in higher commute times to work. Unlike rural communities that experience challenges with older, dilapidated units that must be updated to be added back to the existing housing stock, metropolitan, suburban, and resort communities experience challenges with restrictive land use and zoning codes that produce limitations with adding to the existing housing stock. Resort communities reported similar land use restrictions to increase the supply of housing as metropolitan areas, and resort communities experience additional challenges with land availability due to land designated as open space, land that is physically difficult to develop housing projects on, or has land owned by the federal government.

	Metropolitan	Suburban	Resort	Rural
Housing Authority	Shortage of housing stock for 60-120% AMI. Zoning regulations prevent multifamily housing construction.	Difficulties with attracting and retaining workers due to high housing costs. More housing needed, especially for 80-120% AMI.	Shortage of housing stock for 140% AMI and below. Wages do not reflect the cost of housing. Lack of developable land for housing, strict zoning	Housing costs are increasing, workers are living further away from their work.

			codes.	
City	0	Need for relaxed zoning policies to make it easier to construct housing.	Need for increasing incentives for affordable housing developers.	0
Nonprofit	0	0	Entry-level workers have lengthy commute times, commute into economic center and live in an area with affordable housing.	0
Elected Official	0	0	Access to water sources for housing projects is a challenge.	0

Key insights from the workforce survey include challenges attracting and retaining suitable workers to meet the needs of the community's businesses, and workers are unable to find affordable housing near the place they work and opt for longer commute times to work. Metropolitan, suburban, resort, and rural communities experience challenges with locating low income, entry level workers; however metropolitan and suburban communities are also having difficulties locating skilled workers, and resort and rural communities are having difficulties locating workers to meet the needs of their essential service industries. In order to maintain a healthy, sustainable workforce, workers must have access to affordable housing that aligns to their incomes.

	Metropolitan	Suburban	Resort	Rural
Economic Development Organization	Losing middle and low income earners that are critical to the city ecosystem, workers are choosing to live further away.	Businesses are seeking workers with suitable skills, not willing to provide training. Opportunities for a local talent pipeline. Shortage of housing stock diversity.	Difficulties with attracting and retaining workers. COVID-19 workforce issues exacerbated housing stock shortage and price issues. Need for a local talent pipeline.	Need for housing stock for 70-80% AMI. Housing stock includes dilapidated units. Shortage of housing stock impacts the area's ability to attract new workers. Need for a local talent pipeline.
Chamber of Commerce	0	Affordable housing and commute times are linked: do not want long commute times to work. Wages do not reflect housing prices.	Resort economies are not diversified, there are severe impacts in times of economic shock and a pandemic.	Difficulties with living and working in different communities because they are spread out spatially, long commute times.
Community College	Learning new skills is the most difficult for low income earners, financial and time barriers exist.	0	0	Building housing is not affordable or profitable. Shortage of workers to fill positions across income levels, especially low wage.
City	0	Unable to find workers with the skills for current job openings.	0	0

Quantitative Findings

In addition to the qualitative research study, the research completed quantitative research that illustrates connections between housing and workforce issues. The research used data from the U.S. Census American Community Survey (ACS) 5-Year Estimates Data Profiles for the year 2020 at the county level to analyze different types of communities across the United States. In addition to the ACS data, the quantitative analysis includes data from the U.S. Census Core-Based Statistical Areas (CBSAs) to provide insight on communities that surround a metropolitan area and those that do not. The U.S. Census defines CBSAs as either metropolitan or micropolitan areas (“About Metropolitan and Micropolitan,” 2021). Specifically, a metropolitan statistical area must include a minimum of one “urban cluster” with the population exceeding 50,000 people, and a micropolitan statistical area must have at least 10,000 people but no more than 50,000 people (“About Metropolitan and Micropolitan,” 2021). Within a metropolitan statistical area, a central county is defined by over half of the population living in areas “within urban areas of 10,000 or more population, or that contain at least 5,000 people residing within a single urban area of 10,000 or more population,” (“About Metropolitan and Micropolitan,” 2021). Outlying counties within a metropolitan statistical area are defined by their commuting characteristics with regard to the urban core (“About Metropolitan and Micropolitan,” 2021). The research also uses data from county-level voting outcomes for the 2020 election based on a two party voting system between Joe Biden and Donald Trump (see Appendix B). Regression analyses are conducted at the county level across the United States, and hypotheses were derived from qualitative interview insights. In addition to the nationwide regression models, the hypotheses studying the proportion of high income earners and political tilt of a community also provide an analysis of the conditions found within the State of Colorado.

Proportion of High Income Earners

If there is a high proportion of high income earners within a community, then housing prices will be higher.

The variable `renter_housing_median_2020` measures the median gross rent for the occupied units paying rent within a county (see Appendix B). For the proportion of high income earners variable `high_income_2020`, it was calculated by combining the percentage of households that make \$150,000 to \$199,999 and \$200,000 or more in total income and benefits within a county in the year 2020, and the data is adjusted for 2020 inflation (see Appendix B). Next, the proportion of middle income earners within a county variable `middle_income_2020` was calculated by combining the percentage of earners within the following income brackets: \$35,000 to \$49,999, \$50,000 to \$74,999, \$75,000 to \$99,999, and \$100,000 to \$149,999 (see Appendix B). The variable `logpop` is a base ten log of the total population within a county in the year 2020 (see Appendix B). `Metrocentraldv` is a dummy variable of the central counties within a metropolitan statistical area, and `metroouterringdv` is a dummy variable of the outlying counties within a metropolitan statistical area (see Appendix B). The variable `microdv` is a measure of the micropolitan statistical areas (see Appendix B). Lastly, the `_cons` section of the regression analysis accounts for rural counties (see Appendix B).

The regression analysis indicates that the higher the proportion of high income earners within a community, the higher the median rent for renter-occupied units is, specifically, for each percent increase in the proportion of high income earners, median gross rent increases by roughly \$27. When comparing the impact of each percent increase of middle income earners within a community, median gross rent prices increase by only \$2. Thus, a high proportion of

high income earners drives up rental prices (Brooks, 2022; Galster and Lee, 2021). In addition, the higher the log unit of population is within a community, the higher the median rental prices are, and the regression model indicates that for every increase in the log population unit, median gross rent increases by nearly \$41. To expand on the correlation between population and median rental prices, demand for housing increases the higher the population density is (Brooks, 2022). Median rental prices are higher within counties located closer to the metropolitan core, as central counties have rent prices that are about \$29 relative to the excluded categories, according to the regression model. The findings from outer ring counties of metropolitan areas, micropolitan communities, and rural communities do not have findings that are statistically significant.

```
reg renter_housing_median_2020 high_income_2020 middle_income_2020 logpop metrocentraldv
> metroouterringdv microdv
```

Source	SS	df	MS	Number of obs	=	3,211
Model	141091837	6	23515306.2	F(6, 3204)	=	1709.63
Residual	44069682.4	3,204	13754.5825	Prob > F	=	0.0000
				R-squared	=	0.7620
				Adj R-squared	=	0.7615
Total	185161520	3,210	57682.7164	Root MSE	=	117.28

renter_housin~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	27.2764	.4228332	64.51	0.000	26.44734	28.10545
middle_income_2020	2.683721	.2676171	10.03	0.000	2.159003	3.20844
logpop	40.66217	2.204744	18.44	0.000	36.33932	44.98502
metrocentraldv	29.26149	8.487913	3.45	0.001	12.61919	45.90378
metroouterringdv	-8.496548	6.943577	-1.22	0.221	-22.11085	5.117756
microdv	5.591813	6.096463	0.92	0.359	-6.361552	17.54518
_cons	-29.37793	26.86164	-1.09	0.274	-82.04567	23.28981

In order to test statistical relationships within the State of Colorado regarding median rent prices, the regression model isolates data based on the state's FIPs code, which is 8 (see Appendix B).

When looking at the State of Colorado's circumstances surrounding the median rent prices and its relationship with the proportion of high income earners, the median rent increases by \$30 for each percentage increase of high income earners compared to \$27 as illustrated in the

nationwide regression analysis. In addition, the proportion of middle income earners' impact on median rent prices in Colorado is slightly higher than the nationwide median income, as for each percentage increase in middle income earners in Colorado, median rent prices increase by \$9 compared to \$2. The findings for the log unit of population, central counties of metropolitan areas, outer ring counties of metropolitan areas, micropolitan communities, and rural communities are not statistically significant from zero, and the regression model is unable to provide conclusive evidence on this data.

```
reg renter_housing_median_2020 high_income_2020 middle_income_2020 logpop metrocentraldv
> metroouterringdv microdv if statefip == 8
```

Source	SS	df	MS	Number of obs	=	62
Model	5461053.86	6	910175.643	F(6, 55)	=	60.51
Residual	827321.238	55	15042.2043	Prob > F	=	0.0000
				R-squared	=	0.8684
				Adj R-squared	=	0.8541
Total	6288375.1	61	103088.116	Root MSE	=	122.65

renter_housin~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	30.43105	2.816811	10.80	0.000	24.78603	36.07607
middle_income_2020	9.537608	2.593953	3.68	0.001	4.339209	14.73601
logpop	30.6556	18.55292	1.65	0.104	-6.525281	67.83648
metrocentraldv	54.06117	92.28159	0.59	0.560	-130.8753	238.9976
metroouterringdv	-117.5819	73.04711	-1.61	0.113	-263.9716	28.80778
microdv	118.7866	54.24638	2.19	0.033	10.07444	227.4988
_cons	-249.2269	233.8007	-1.07	0.291	-717.7739	219.3201

To test for the relationship that the value of the owner-occupied housing stock has with the proportion of high income earners in the community, the variable owner_housing_median_2020 represents the median value of owner-occupied housing units within a county (see Appendix B).

The regression model illustrates that for each increase in percentage for the proportion of high income earners within a community, the median value of owner-occupied housing increases by nearly \$13,000. For each increase in the log unit of population, owner-occupied housing values increase by about \$11,523. According to the regression model, the median value of owner-occupied housing units decreases by \$21,555 in central counties of metropolitan

communities. The outer ring of a metropolitan area also has a negative relationship with the median value of owner-occupied housing, which illustrates that living outside of the urban core offers affordable housing options for the owner-occupied housing stock. Specifically, outer ring counties of a metropolitan area observe a decrease in the median value of owner-occupied housing by \$10,347. When looking at the `_cons` section of the regression model, with rural communities included in this section, it appears that the median value of owner-occupied housing units decreases by about \$59,013. The findings associated with the proportion of middle income earners and micropolitan counties are not statistically significant.

```
reg owner_housing_median_2020 high_income_2020 middle_income_2020 logpop metrocentraldv
> metroouterringdv microdv
```

Source	SS	df	MS	Number of obs	=	3,216
Model	2.0927e+13	6	3.4878e+12	F(6, 3209)	=	1001.45
Residual	1.1176e+13	3,209	3.4828e+09	Prob > F	=	0.0000
				R-squared	=	0.6519
				Adj R-squared	=	0.6512
Total	3.2103e+13	3,215	9.9855e+09	Root MSE	=	59015

owner_housing~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	12936.94	212.5209	60.87	0.000	12520.25	13353.63
middle_income_2020	-72.5671	135.1317	-0.54	0.591	-337.5203	192.3861
logpop	11523.84	1100.984	10.47	0.000	9365.14	13682.55
metrocentraldv	-21555.09	4263.013	-5.06	0.000	-29913.59	-13196.58
metroouterringdv	-10347.05	3493.446	-2.96	0.003	-17196.66	-3497.44
microdv	-1179.303	3058.725	-0.39	0.700	-7176.555	4817.949
_cons	-59013.58	13479	-4.38	0.000	-85441.89	-32585.26

To understand the characteristics of Colorado's relationship between the median value of owner-occupied housing and the proportion of high income earners within communities, housing values increase by about \$16,910 for each percentage of increase of the proportion of high income earners within a community, which is higher than the relationship observed in the nationwide regression model. When looking at the impact that middle income earners have on median housing values, for every percentage increase in middle income earners within a community, housing values increase by \$5,328. According to the `_cons` section that rural

communities are part of, median values of owner-occupied housing units decrease, which aligns with the findings from the nationwide regression analysis. Regression data for the log unit of population, central counties of a metropolitan area, outer ring counties of a metropolitan area, and micropolitan communities are not statistically significant.

```
reg owner_housing_median_2020 high_income_2020 middle_income_2020 logpop metrocentraldv
> metroouterringdv microdv if statefip == 8
```

Source	SS	df	MS	Number of obs	=	64
Model	1.0991e+12	6	1.8319e+11	F(6, 57)	=	47.09
Residual	2.2176e+11	57	3.8905e+09	Prob > F	=	0.0000
				R-squared	=	0.8321
				Adj R-squared	=	0.8144
Total	1.3209e+12	63	2.0967e+10	Root MSE	=	62374

owner_housing~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	16910.59	1425.105	11.87	0.000	14056.86	19764.31
middle_income_2020	5328.372	1299.775	4.10	0.000	2725.618	7931.127
logpop	8241.149	9084.248	0.91	0.368	-9949.744	26432.04
metrocentraldv	-85174.59	46008.59	-1.85	0.069	-177305.2	6956.029
metroouterringdv	-76261.13	37119.7	-2.05	0.045	-150592	-1930.218
microdv	40489.4	27501.63	1.47	0.146	-14581.67	95560.46
_cons	-291174.7	116306.4	-2.50	0.015	-524074.3	-58275.16

If there is a high proportion of high income earners within a community, then there will be higher commute times to work.

The variable mean_commute_time measures the mean travel time to work in minutes for workers 16 years and older (see Appendix B).

Regression analysis suggests that the higher proportion of high income earners correlates to a higher mean commute time to work. Specifically, for each percentage increase in the proportion of high income earners within a community, commute times increase by less than one minute. While the increase in mean commute time to work as it relates to each percentage increase of high income earners within a community is not an extremely high number initially, mean commute time in minutes compounds the higher the proportion of high income earners is.

The implications of the correlation between high income earners and mean commute time signals that lower income earners are pushed out of communities near their place of employment and must commute longer into work in order to live in affordable housing aligned to their income level (Galster and Lee, 2021; Blumenberg and Wander, 2022). Locations that have a higher proportion of middle income earners have shorter commute times by less than a minute, which may indicate that essential services are located closer together spatially. For each log unit increase in population, mean commute times to work increase by about one minute. A negative correlation exists between the central counties near a metropolitan area and the mean commute time to work by nearly 3 minutes, which is expected due to the spatial location of urban core counties in relation to a metropolitan area. Conversely, outer ring counties of a metropolitan area have a higher mean commute time to work by 4 minutes, and this finding supports existing understandings of suburban locations being located further away from the urban core spatially. The implications of the negative relationship between mean commute times to work and outer ring metropolitan counties is that residents have committed to longer commute times to work for affordable housing prices (Yao and Kim, 2022). Residents of micropolitan communities do not spend a considerable amount of time commuting, as there is a decrease in mean commute time to work by about 2 minutes. Lastly, when observing the _cons section as it relates to the rural communities represented in the model, mean commuting time to work increases by 17 minutes, which makes sense because rural communities are more spread out spatially compared to urban community types.

```
reg mean_commute_time high_income_2020 middle_income_2020 logpop metrocentraldv metroouterringdv
> microdv
```

Source	SS	df	MS	Number of obs	=	3,221
Model	25618.5027	6	4269.75045	F(6, 3214)	=	158.98
Residual	86319.2081	3,214	26.857252	Prob > F	=	0.0000
				R-squared	=	0.2289
				Adj R-squared	=	0.2274
Total	111937.711	3,220	34.7632642	Root MSE	=	5.1824

mean_commute_time	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	.1194881	.0186502	6.41	0.000	.0829206	.1560555
middle_income_2020	-.1438627	.0117775	-12.22	0.000	-.1669549	-.1207705
logpop	1.43754	.0959023	14.99	0.000	1.249504	1.625576
metrocentraldv	-2.93846	.3728178	-7.88	0.000	-3.669445	-2.207476
metroouterringdv	4.298604	.3066435	14.02	0.000	3.697368	4.899841
microdv	-2.471657	.2677112	-9.23	0.000	-2.996559	-1.946755
_cons	17.19564	1.179182	14.58	0.000	14.88362	19.50767

When analyzing the mean commute time to work within Colorado communities, outer ring metropolitan counties observe an increase in 14 minutes, which is 10 minutes higher than the nationwide regression findings. The findings from the proportion of high income earners within a county, the proportion of middle income earners within a community, the log unit of population, the metropolitan central counties, micropolitan counties, and the _cons section are not statistically significant.

```
reg mean_commute_time high_income_2020 middle_income_2020 logpop metrocentraldv metroouterringdv
> microdv if statefip == 8
```

Source	SS	df	MS	Number of obs	=	64
Model	1524.3128	6	254.052134	F(6, 57)	=	10.34
Residual	1399.89173	57	24.5595041	Prob > F	=	0.0000
				R-squared	=	0.5213
				Adj R-squared	=	0.4709
Total	2924.20454	63	46.415945	Root MSE	=	4.9558

mean_commute_time	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	.1050464	.1132285	0.93	0.357	-.1216897	.3317825
middle_income_2020	-.0060312	.1032707	-0.06	0.954	-.2128272	.2007648
logpop	1.450808	.7217683	2.01	0.049	.0054915	2.896124
metrocentraldv	-.9477026	3.655509	-0.26	0.796	-8.267733	6.372327
metroouterringdv	14.06576	2.949262	4.77	0.000	8.159964	19.97155
microdv	.1129036	2.18508	0.05	0.959	-4.262643	4.48845
_cons	6.30457	9.240863	0.68	0.498	-12.19994	24.80908

Local Community Types

If the community type is metropolitan, then housing prices will be higher.

Please recall from the set of hypotheses studying the proportion of high income earners that the variable `renter_housing_median_2020` measures the median gross rent within counties (see Appendix B). The proportion of high income earners is represented by the variable `high_income_2020`, and the variable was calculated by combining the percentage of households that make \$150,000 to \$199,999 and \$200,000 or more in total income and benefits within a county in the year 2020, and the data is adjusted for 2020 inflation (see Appendix B). Next, the proportion of middle income earners within a county variable `middle_income_2020` was calculated by combining the percentage of earners within the following income brackets: \$35,000 to \$49,999, \$50,000 to \$74,999, \$75,000 to \$99,999, and \$100,000 to \$149,999 (see Appendix B). The variable `logpop` is a base ten log of the total population within a county in the year 2020 (see Appendix B). `Metrocentraldv` is a dummy variable of the central counties within a metropolitan statistical area. In an effort to learn about housing specifically within metropolitan communities, I isolated the central counties within a metropolitan statistical area in the regression model.

The regression model suggests that the median gross rent within central counties of a metropolitan statistical area increases by \$28 for each percentage increase in the proportion of high income earners and increases by \$52 for each increase in log units of population. When the proportion of middle income earners within a community increases by a percentage point, median rent prices increase by \$2. The regression model suggests that the proportion of high income earners and population levels are highly predictive elements for determining the median rent prices within central counties of metropolitan areas. When looking at the `_cons` section of the regression model, the findings are not statistically significant.

```
reg renter_housing_median_2020 high_income_2020 middle_income_2020 logpop if metrocentraldv == 1
```

Source	SS	df	MS	Number of obs	=	732
Model	43620450	3	14540150	F(3, 728)	=	699.46
Residual	15133454.7	728	20787.7125	Prob > F	=	0.0000
				R-squared	=	0.7424
				Adj R-squared	=	0.7414
Total	58753904.8	731	80374.6987	Root MSE	=	144.18

renter_housin~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	28.65465	.7592952	37.74	0.000	27.16398	30.14532
middle_income_2020	2.453609	1.192293	2.06	0.040	.1128655	4.794352
logpop	52.46052	5.449194	9.63	0.000	41.76251	63.15853
_cons	-149.071	103.8282	-1.44	0.152	-352.9094	54.76742

The research conducted an additional regression analysis looking at the median housing value, which is represented by the variable `owner_housing_median_2020`, as it relates to the proportion of high and middle income earners as well as population levels within central counties of metropolitan areas. Consistent with the findings on the median gross rent within central counties of a metropolitan statistical area, owner-occupied housing values increase when there is a high proportion of high income earners within a community and when there are high population levels. Specifically, for every percentage increase in the proportion of high income earners within central counties of a metropolitan area, median home values increase by \$12,702. In addition, for each increase in log units of population, median housing values within central counties of a metropolitan area increase by \$13,793. However, owner-occupied housing values have a negative correlation with the proportion of middle income earners within central counties of a metropolitan statistical area, which signals that communities with a higher density of middle income earners are more affordable places to live. Specifically, the regression model indicates that for every percentage of middle income earners within a central county of a metropolitan area, median values of owner-occupied housing units decreases by about \$2,539. The `_cons` section findings in the regression model are not statistically significant.

```
reg owner_housing_median_2020 high_income_2020 middle_income_2020 logpop if metrocentraldv == 1
```

Source	SS	df	MS	Number of obs	=	732
Model	8.7860e+12	3	2.9287e+12	F(3, 728)	=	452.36
Residual	4.7132e+12	728	6.4742e+09	Prob > F	=	0.0000
				R-squared	=	0.6509
				Adj R-squared	=	0.6494
Total	1.3499e+13	731	1.8467e+10	Root MSE	=	80462

owner_housing~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	12702.01	423.741	29.98	0.000	11870.11	13533.91
middle_income_2020	-2539.707	665.3848	-3.82	0.000	-3846.009	-1233.405
logpop	13793.13	3041.039	4.54	0.000	7822.881	19763.39
_cons	40804.15	57943.55	0.70	0.482	-72952.23	154560.5

If the community type is metropolitan, then commute times to work will be lower.

As aforementioned in the regression analysis on the proportion of high income earners with housing prices within communities, mean_commute_time represents the mean travel time to work in minutes for workers 16 years and older (see Appendix B).

The regression model suggests that for each percentage increase in the proportion of high income earners within a central county of a metropolitan area, mean commute times to work increase by less than a minute. However, please note that this effect increases for each percentage point that the proportion of high income earners are located within an urban core area. The relationship between mean commute times to work and the proportion of middle income earners within central counties of metropolitan areas indicates that for each percentage increase in the proportion of middle income earners, mean commute times increase by less than a minute. When looking at the mean commute time to work and the log unit of population, for each log unit of population increase, mean commute time to work increases by almost 0.69 minutes. To expand on this, the relationship between the log unit of population and mean commute time to work has the highest increase in commuting time observed in the regression model. The _cons section of the regression model is not statistically significant.

```
reg mean_commute_time high_income_2020 middle_income_2020 logpop if metrocentraldv == 1
```

Source	SS	df	MS	Number of obs	=	732
Model	5413.91954	3	1804.63985	F(3, 728)	=	102.48
Residual	12819.2978	728	17.6089256	Prob > F	=	0.0000
				R-squared	=	0.2969
				Adj R-squared	=	0.2940
Total	18233.2174	731	24.9428418	Root MSE	=	4.1963

mean_commute_time	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	.3231067	.0220991	14.62	0.000	.2797213	.3664922
middle_income_2020	.1016681	.0347013	2.93	0.003	.0335415	.1697947
logpop	.6851525	.1585971	4.32	0.000	.3737902	.9965148
_cons	6.072109	3.021888	2.01	0.045	.1394537	12.00476

If the community type is suburban, then housing prices will be higher.

Renter_housing_median_2020 represents the median gross rent within a county (see Appendix B). The variable metroouterringdv is a dummy variable of the outlying counties within a metropolitan statistical area and is representative of the suburban communities connected to an urban core (see Appendix B).

Consistent with the regression findings within central counties in metropolitan statistical areas, median gross rent increases when there is a higher proportion of high income earners and when there are higher population levels. Specifically, for each increase in percentage of high income earners within outer ring counties of a metropolitan community, median rent prices increase by \$20. This finding aligns with the prices of central counties of metropolitan communities, but the central counties have an increase of an additional \$8 for each percentage increase of the proportion of high income earners. The relationship between median rent prices and the log unit of population is slightly more pronounced in central counties compared to outer ring counties within a metropolitan statistical area, as outer ring counties have an increase in median rent prices of \$44 compared to central counties' increase in median rental prices of \$52. To speculate on the relationship between median rent prices and its relationship to suburban

areas based on qualitative interview findings, urban core areas have higher population levels than suburban areas and likely have a greater demand for housing, and high demand for housing increases the price of housing in markets with constrained housing supplies. Findings on the impact of the proportion of middle income earners on median rent prices within suburban communities aligns with central county prices. For each increase in the percentage of middle income earners in suburban communities, median rental prices increase by \$3. The regression analysis on suburban communities indicates that the proportion of high income earners and population levels impact the median rent prices. When looking at the _cons section, the findings are not statistically significant.

```
reg renter_housing_median_2020 high_income_2020 middle_income_2020 logpop if metroouterringdv == > 1
```

Source	SS	df	MS	Number of obs	=	421
Model	6093946.7	3	2031315.57	F(3, 417)	=	184.82
Residual	4583065.15	417	10990.5639	Prob > F	=	0.0000
Total	10677011.8	420	25421.4568	R-squared	=	0.5708
				Adj R-squared	=	0.5677
				Root MSE	=	104.84

renter_housin~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]
high_income_2020	20.15609	1.14891	17.54	0.000	17.89772 22.41447
middle_income_2020	3.277795	.8661436	3.78	0.000	1.575243 4.980347
logpop	44.01372	5.596899	7.86	0.000	33.01206 55.01537
_cons	-44.19285	71.19987	-0.62	0.535	-184.1482 95.76254

Please recall that the variable owner_housing_median_2020 represents the median value of owner-occupied housing units within a county (see Appendix B).

The regression analysis testing the relationship between the median value of owner-occupied housing units and the characteristics of residents within outer ring counties of a metropolitan statistical area illustrates a positive relationship with the proportion of high income earners, the proportion of middle income earners, and the log unit of population. Specifically, for each increase in the percentage of high income earners within a suburban community, median housing values increase by \$10,692, which is slightly lower than the relationship present within

central counties within metropolitan areas. When analyzing the impact that the proportion of middle income earners within suburban communities has on median home values, the regression analysis indicates that for each percentage increase in the proportion of middle income earners, median housing values increase by \$1,358. To speculate on the regression findings, the relationship between median values of owner-occupied housing and the proportion of middle income earners may indicate that more middle income earners live within suburban communities, the more affordable the place is to live (Galster and Lee, 2021; Blumenberg and King, 2021). For each increase in log units of population within suburban communities, owner-occupied housing values increase by about \$5,149 compared to the central counties of metropolitan communities with an increase in home values by \$13,793.

```
reg owner_housing_median_2020 high_income_2020 middle_income_2020 logpop if metroouterringdv == 1
```

Source	SS	df	MS	Number of obs	=	421
Model	1.2739e+12	3	4.2464e+11	F(3, 417)	=	293.51
Residual	6.0330e+11	417	1.4468e+09	Prob > F	=	0.0000
Total	1.8772e+12	420	4.4696e+09	R-squared	=	0.6786
				Adj R-squared	=	0.6763
				Root MSE	=	38036

owner_housing~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	10692.27	416.8434	25.65	0.000	9872.897	11511.65
middle_income_2020	1358.248	314.2512	4.32	0.000	740.5343	1975.962
logpop	5149.561	2030.647	2.54	0.012	1157.98	9141.142
_cons	-70580.88	25832.49	-2.73	0.007	-121359	-19802.75

If the community type is suburban, then commute times to work will be higher.

Please recall that mean_commute_time refers to the mean commute time to work in minutes for workers that are 16 years or older (see Appendix B).

The regression analysis findings indicate that there is a negative relationship between middle income earners and mean commute time to work within suburban communities, as for each percentage increase in the proportion of middle income earners within a suburban

community, mean commute times to work decrease by 0.09 minutes. Additionally, the _cons section of the regression model illustrates that mean commute times increase by 34 minutes, which could be interpreted as the communities left out of the regression model, which includes rural communities. Regression findings on the proportion of high income earners and the log unit of population as it relates to the mean commute time to work in minutes within suburban communities is not statistically significant.

```
reg mean_commute_time high_income_2020 middle_income_2020 logpop if metroouterringdv == 1
```

Source	SS	df	MS	Number of obs	=	421
Model	149.647601	3	49.8825337	F(3, 417)	=	2.40
Residual	8684.62084	417	20.8264289	Prob > F	=	0.0678
				R-squared	=	0.0169
				Adj R-squared	=	0.0099
Total	8834.26844	420	21.0339725	Root MSE	=	4.5636

mean_commute_time	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	.0790839	.050013	1.58	0.115	-.0192252	.177393
middle_income_2020	-.0936395	.037704	-2.48	0.013	-.1677531	-.019526
logpop	-.0624563	.2436379	-0.26	0.798	-.5413679	.4164553
_cons	34.06818	3.099393	10.99	0.000	27.9758	40.16056

If the community type is rural, then housing prices will be lower.

Please recall that the variable renter_housing_median_2020 refers to the median gross rent within counties (see Appendix B). Next, the proportion of high income earners is captured by the variable high_income_2020, which is a combination of the percentage of households that earn \$150,000 to \$199,999 and \$200,000 or more in total income and benefits within a county in the year 2020, and the data is adjusted for 2020 inflation (see Appendix B). The proportion of middle income earners within a county is represented by the variable middle_income_2020 and was calculated by combining the percentage of earners within the following income brackets: \$35,000 to \$49,999, \$50,000 to \$74,999, \$75,000 to \$99,999, and \$100,000 to \$149,999 (see Appendix B). The variable logpop is a base ten log of the total population within a county in the

year 2020 (see Appendix B). The variable rural is a dummy variable that is defined by communities that are not part of a micropolitan statistical area or a metropolitan statistical area's central counties and outer ring counties (see Appendix B).

Consistent with the findings from central and outer ring counties of metropolitan areas, the effect of the proportion of high income earners and the population level within a community impacts the median gross rent within rural communities. For each percentage increase in the proportion of high income earners within rural counties, the median rent prices increase by \$20, and this is consistent with metropolitan central county communities observing an increase of \$28 and outer ring communities with an increase of \$20. Findings that involve the impact of middle income earners on median rent prices reflect similar increases, as for each percent increase of middle income earners within rural communities, median rent prices increase by about \$3. Similarly, central counties of metropolitan areas have an increase of \$2 for each percentage increase in middle income earners, and outer ring counties have an increase of \$3. The largest variation across metropolitan areas and rural communities is regarding the impact population levels have on median rent prices. Specifically, for each increase in population units within rural communities, the median rent prices increase by \$25. When looking at central counties within metropolitan communities, median rent prices increase by \$52 for each increase in population units, and suburban communities observe an increase in \$44. The findings reflect that as the higher the amount of people are located within an area, the demand for multifamily housing for rent increases, which raises prices. To speculate on the regression findings, rural communities do not have high population density when compared to metropolitan areas, so this community type does not have a high demand for multifamily, renter housing, and there is a greater abundance of single-family homes instead.

```
reg renter_housing_median_2020 high_income_2020 middle_income_2020 logpop if rural == 1
```

Source	SS	df	MS	Number of obs	=	1,374
Model	11386102.9	3	3795367.65	F(3, 1370)	=	333.46
Residual	15592904	1,370	11381.6817	Prob > F	=	0.0000
				R-squared	=	0.4220
				Adj R-squared	=	0.4208
Total	26979006.9	1,373	19649.6773	Root MSE	=	106.68

renter_housin~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	20.41534	.9766895	20.90	0.000	18.49937	22.33131
middle_income_2020	3.704172	.3254487	11.38	0.000	3.06574	4.342604
logpop	25.76118	3.1172	8.26	0.000	19.64618	31.87618
_cons	92.74092	36.18867	2.56	0.010	21.74972	163.7321

The variable owner_housing_median_2020 refers to the median value of the owner-occupied housing units within a county (see Appendix B).

When looking at impacts on the median value of owner-occupied housing stock within rural communities, values increase by about \$10,529 for each percentage increase of the proportion of high income earners within a rural county. This finding aligns with the relationship between the proportion of high income earners and median housing values within a suburban community, as values increase by \$10,692 for each percentage increase of high income earners. Within central counties of metropolitan areas, the relationship between high income earners and median owner-occupied housing values is slightly higher than suburban and rural communities, as values increase by \$12,702 for each percentage increase of high income earners. Thus, the proportion of high income earners is found to increase median owner-occupied housing values by upwards of \$10,000 depending on the community type. When looking at the impact that the log unit of population has on owner-occupied housing values, for each increase in the log unit of population, values increase by about \$12,550. In addition, central counties of metropolitan communities observe a similar increase, as for each percentage increase in population units, median home values increase by \$13,793. However, suburban communities illustrate that for each increase in population units, the median value of owner-occupied housing units increases by

only \$5,149. This finding indicates that there is a greater demand for owner-occupied housing over rental housing in rural communities, which may be due to the greater availability of land. The regression findings on the proportion of middle income earners within rural communities are not statistically significant.

```
reg owner_housing_median_2020 high_income_2020 middle_income_2020 logpop if rural == 1
```

Source	SS	df	MS	Number of obs	=	1,377
Model	1.8516e+12	3	6.1720e+11	F(3, 1373)	=	261.95
Residual	3.2350e+12	1,373	2.3562e+09	Prob > F	=	0.0000
Total	5.0867e+12	1,376	3.6967e+09	R-squared	=	0.3640
				Adj R-squared	=	0.3626
				Root MSE	=	48541

owner_housing~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	10529.64	445.8873	23.62	0.000	9654.949	11404.34
middle_income_2020	259.2789	149.2109	1.74	0.082	-33.42705	551.9848
logpop	12550.58	1411.144	8.89	0.000	9782.351	15318.82
_cons	-71613.98	16418.8	-4.36	0.000	-103822.6	-39405.33

If the community type is rural, then commute times to work will be higher.

As outlined in previous regression models, mean_commute_time refers to the mean commute time to work for workers that are 16 years and older (see Appendix B).

According to the regression model, for each percentage increase in the proportion of high income earners within rural communities, mean commute times to work decrease by 0.22 minutes. In addition, for each percentage increase in the proportion of middle income earners, mean commute times to work decrease by 0.1 minutes. To speculate on the regression findings, the higher the proportion of high income earners within rural communities, the more likely it is that there are retail, essential services, and other economic activities located within a close proximity. An additional speculation is that high income earners and possibly middle income earners have the ability to work from home, so there are lower commute times. For each increase in the log unit of population within rural communities, commute times increase by about 2

minutes. Lastly, when looking at the `_cons` section of the regression analysis, there is an increase in about 6 minutes within rural communities. To speculate, the proportion of low income earners within a community is included in the `_cons` section, which may indicate that low income earners are impacted most by high commute times (see Appendix B).

```
reg mean_commute_time high_income_2020 middle_income_2020 logpop if rural == 1
```

Source	SS	df	MS	Number of obs	=	1,380
Model	14188.7887	3	4729.59623	F(3, 1376)	=	157.43
Residual	41339.4202	1,376	30.0431833	Prob > F	=	0.0000
				R-squared	=	0.2555
				Adj R-squared	=	0.2539
Total	55528.2089	1,379	40.2670115	Root MSE	=	5.4812

mean_commute_time	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
high_income_2020	-.2225313	.0499857	-4.45	0.000	-.3205878	-.1244748
middle_income_2020	-.104389	.0166916	-6.25	0.000	-.1371327	-.0716453
logpop	2.570023	.1585099	16.21	0.000	2.259076	2.88097
_cons	6.469628	1.847922	3.50	0.000	2.844577	10.09468

Political Ideology of Communities

If a community's political ideology is liberal-leaning, then there will be a greater availability of multifamily housing stock.

The variable `multi_family_unit_2020` refers to the percentage of housing units that have 2-20 or more units in the structure (see Appendix B). Next, the variable `dem2partyvt` represents the partisanship makeup of a community based on county-level 2020 U.S. election voting outcomes for Joe Biden and Donald Trump, and the variable specifically measures the percentage of votes Joe Biden received compared to Donald Trump (see Appendix B). The proportion of high income earners variable `high_income_2020` was derived from the combination of the percentage of households that make \$150,000 to \$199,999 and \$200,000 or more in total income and benefits within a county in the year 2020, and the data is adjusted for 2020 inflation (see Appendix B). In addition, the proportion of middle income earners within a

county variable `middle_income_2020` was calculated by combining the percentage of earners within the following income brackets: \$35,000 to \$49,999, \$50,000 to \$74,999, \$75,000 to \$99,999, and \$100,000 to \$149,999 (see Appendix B). The variable `logpop` is a base ten log of the total population within a county in the year 2020 (see Appendix B). `Metrocentraldv` is a dummy variable of the central counties within a metropolitan statistical area, and `metroouterringdv` is a dummy variable of the outlying counties within a metropolitan statistical area (see Appendix B). The variable `microdv` is a measure of the micropolitan statistical areas (see Appendix B). Rural communities are represented by the `_cons` section of the regression model (see Appendix B)

The regression model indicates that as the percentage of votes in a county for Joe Biden increases, there is also an increase in the amount of multifamily units within a community. Specifically, for each percentage of votes Joe Biden received during the 2020 U.S. Presidential Election, the multifamily housing stock increased by nearly 0.2%. The relationship between the percentage of multifamily housing within a county and the percentage of votes Joe Biden received has a strong correlation, which signals that liberal-leaning locations have more multifamily housing units. To speculate, counties that are liberal-leaning in their political ideological tilt have a greater number of policies to encourage the development of multifamily housing units. In addition, for each percentage increase of the proportion of high income earners within a county, the percentage of multifamily housing stock increases by 0.13%. When looking at each percentage increase of the proportion of middle income earners within a community, the percentage of multifamily housing stock increases by about 0.4%. A positive correlation is also represented through the relationship with the log unit of population with the percentage of multifamily units within a community as well, as for each increase in the log unit of population,

the multifamily housing stock increases by 1.4%. Next, the regression analysis indicates that central counties of metropolitan areas have an increase of multifamily housing stock by nearly 4%, which makes sense due to the high population density found within urban core locations. Conversely, outer ring counties of metropolitan areas have a negative relationship with the proportion of multifamily housing units, as the multifamily housing stock decreases by nearly 2%. To speculate on these findings, residents of suburban communities have a preference for single-family homes. Micropolitan communities observe an increase in multifamily dwellings by 2%. Lastly, when looking at the _cons section of the regression analysis, which includes rural communities, there is a decrease in the percentage of multifamily housing stock by nearly 14%. To speculate, rural communities have an abundance of land for single-family homes, so there is a lower need for multifamily housing.

```
reg multi_family_unit_2020 dem2partyvt high_income_2020 middle_income_2020 logpop metrocentraldv
> metroouterringdv microdv
```

Source	SS	df	MS	Number of obs	=	2,983
Model	116226.304	7	16603.7577	F(7, 2975)	=	460.81
Residual	107194.388	2,975	36.0317272	Prob > F	=	0.0000
				R-squared	=	0.5202
				Adj R-squared	=	0.5191
Total	223420.692	2,982	74.9231026	Root MSE	=	6.0026

multi_family_~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]
dem2partyvt	.1944033	.0086957	22.36	0.000	.1773531 .2114536
high_income_2020	.1345718	.0234898	5.73	0.000	.0885139 .1806296
middle_income_2020	.0457362	.0179247	2.55	0.011	.0105902 .0808822
logpop	1.412996	.1211784	11.66	0.000	1.175394 1.650598
metrocentraldv	3.941349	.4522977	8.71	0.000	3.054501 4.828197
metroouterringdv	-1.988883	.362596	-5.49	0.000	-2.699847 -1.277918
microdv	2.373819	.3198226	7.42	0.000	1.746723 3.000915
_cons	-13.69387	1.505825	-9.09	0.000	-16.64643 -10.7413

When analyzing the relationship between the percentage of multifamily housing units within a community with the partisan tilt in Colorado, the state observes an increase in multifamily housing stock by 0.31% for each percentage of votes cast for Joe Biden in the 2020 U.S. Presidential Election, which is slightly higher than the findings from the nationwide regression analysis. For each percentage increase of the proportion of high income earners within

a community, the number of multifamily housing units increases by 0.43%, and this is higher compared to the increase in multifamily housing units by 0.13% derived from the nationwide regression analysis. Next, outer ring communities of metropolitan areas in Colorado indicate that there is a decrease in multifamily housing units by 15 units, which is much higher than the decrease in nearly 2 units from the nationwide regression analysis. Thus, suburban communities have a preference for single-family housing stock. The regression results for the proportion of middle income earners within a county, the log unit of population, central counties of metropolitan statistical areas, micropolitan counties, and the _cons section are not statistically significant.

```
reg multi_family_unit_2020 dem2partyvt high_income_2020 middle_income_2020 logpop metrocentraldv
> metroouterrindv microdv if statefip == 8
```

Source	SS	df	MS	Number of obs	=	64
Model	6257.88717	7	893.983882	F(7, 56)	=	15.14
Residual	3307.29732	56	59.0588807	Prob > F	=	0.0000
Total	9565.18449	63	151.828325	R-squared	=	0.6542
				Adj R-squared	=	0.6110
				Root MSE	=	7.685

multi_family_~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]
dem2partyvt	.3159916	.0634532	4.98	0.000	.1888795 .4431037
high_income_2020	.4342747	.1974304	2.20	0.032	.0387741 .8297753
middle_income_2020	.171454	.1601492	1.07	0.289	-.1493635 .4922714
logpop	1.29375	1.131114	1.14	0.258	-.9721446 3.559645
metrocentraldv	-4.095439	5.690416	-0.72	0.475	-15.49471 7.303835
metroouterrindv	-15.3495	4.696758	-3.27	0.002	-24.75823 -5.940759
microdv	3.904605	3.389642	1.15	0.254	-2.885665 10.69487
_cons	-24.21109	14.33121	-1.69	0.097	-52.91995 4.497765

In addition to the analysis on the availability of multifamily housing stock within a community, a regression analysis was conducted to see the impact of the availability of single-family housing stock with a community's political ideology. The variable single_family_unit_2020 refers to the percentage of one unit attached and one unit detached as part of the county's housing stock (see Appendix B). Next, the variable dem2partyvt represents the partisanship makeup of a community based on county-level 2020 U.S. election voting outcomes for Joe Biden and Donald Trump, and the variable specifically measures the

percentage of votes Joe Biden received compared to Donald Trump (see Appendix B). The proportion of high income earners variable `high_income_2020` was derived from the combination of the percentage of households that make \$150,000 to \$199,999 and \$200,000 or more in total income and benefits within a county in the year 2020, and the data is adjusted for 2020 inflation (see Appendix B). In addition, the proportion of middle income earners within a county variable `middle_income_2020` was calculated by combining the percentage of earners within the following income brackets: \$35,000 to \$49,999, \$50,000 to \$74,999, \$75,000 to \$99,999, and \$100,000 to \$149,999 (see Appendix B). The variable `logpop` is a base ten log of the total population within a county in the year 2020 (see Appendix B). `Metrocentraldv` is a dummy variable of the central counties within a metropolitan statistical area, and `metroouterringdv` is a dummy variable of the outlying counties within a metropolitan statistical area (see Appendix B). The variable `microdv` is a measure of the micropolitan statistical areas (see Appendix B). Rural communities are represented by the `_cons` section of the regression model (see Appendix B).

The regression model illustrates that in counties where Joe Biden did not perform well with Democrat votes cast during the 2020 U.S. Presidential Election, there is a higher proportion of single-family housing units within the county. Specifically, for each percentage of votes cast for Donald Trump, there is an increase in single-family housing units by nearly 0.09%. For each percentage increase in the proportion of high income earners, there is an increase in single-family housing stock by 0.3%. Next, for each percentage point increase of middle income earners within a community, there is an increase in single-family housing stock by 0.6%. There is a negative correlation between population, the central counties surrounding a metropolitan area, the outer ring counties within a metropolitan area, and micropolitan communities with the

percentage of single-family units that exist within a county. This indicates that locations with higher population density have a greater need for multifamily housing units. Specifically, for each log unit increase of population, there is a decrease of single-family housing units by nearly 1.6%. Next, central counties within a metropolitan area observe a decrease in the percentage of single-family housing stock by 1.5%, and outer ring counties have a decrease in the percentage of single-family housing stock by 2.1%. In addition, micropolitan communities have a decrease in single-family housing stock by nearly 2%. When addressing the `_cons` section and the rural counties that are included as part of this, there is an increase of single-family housing units by 57 units.

```
reg single_family_unit_2020 dem2partyvt high_income_2020 middle_income_2020 logpop metrocentraldv
> metroouterringdv microdv
```

Source	SS	df	MS	Number of obs	=	2,983
Model	86065.8671	7	12295.1239	F(7, 2975)	=	205.61
Residual	177902.868	2,975	59.7992834	Prob > F	=	0.0000
Total	263968.735	2,982	88.5207026	R-squared	=	0.3260
				Adj R-squared	=	0.3245
				Root MSE	=	7.733

single_family~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
dem2partyvt	-.0870002	.0112024	-7.77	0.000	-.1089654	-.065035
high_income_2020	.3086166	.0302611	10.20	0.000	.2492818	.3679513
middle_income_2020	.6029538	.0230917	26.11	0.000	.5576764	.6482312
logpop	-1.589677	.15611	-10.18	0.000	-1.895772	-1.283583
metrocentraldv	-1.551458	.5826796	-2.66	0.008	-2.693954	-.4089626
metroouterringdv	-2.140525	.46712	-4.58	0.000	-3.056436	-1.224614
microdv	-1.976685	.4120165	-4.80	0.000	-2.784551	-1.168819
_cons	57.39735	1.939902	29.59	0.000	53.59366	61.20104

The regression analysis conducted on the communities within the State of Colorado as it relates to the political ideological tilt and the percentage of single-family housing units finds that for each percentage of votes cast for Donald Trump, single-family housing units increase by nearly 0.3%, which is higher than the relationship observed within the nationwide regression analysis. Next, there is an increase in the proportion of single-family housing units within suburban counties within Colorado by nearly 16%. When looking at the increase in percentage of high income earners, the percentage of middle income earners, the log unit of population, the

central counties of metropolitan statistical areas, and micropolitan communities, the regression findings are not statistically significant.

```
reg single_family_unit_2020 dem2partyvt high_income_2020 middle_income_2020 logpop metrocentraldv
> metroouterringdv microdv if statefip == 8
```

Source	SS	df	MS	Number of obs	=	64
Model	4296.95334	7	613.850477	F(7, 56)	=	12.94
Residual	2656.49988	56	47.4374979	Prob > F	=	0.0000
				R-squared	=	0.6180
				Adj R-squared	=	0.5702
Total	6953.45322	63	110.372273	Root MSE	=	6.8875

single_family~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
dem2partyvt	-.282592	.0568685	-4.97	0.000	-.3965133	-.1686706
high_income_2020	-.0220297	.1769426	-0.12	0.901	-.3764883	.3324288
middle_income_2020	.0373815	.1435301	0.26	0.795	-.2501439	.3249069
logpop	-1.814186	1.013736	-1.79	0.079	-3.844943	.2165707
metrocentraldv	7.495846	5.099908	1.47	0.147	-2.720497	17.71219
metroouterringdv	15.66846	4.209364	3.72	0.000	7.236092	24.10083
microdv	-5.585983	3.037891	-1.84	0.071	-11.67161	.499644
_cons	101.4491	12.84402	7.90	0.000	75.71941	127.1787

If the community's political ideology is liberal-leaning, then there will be more affordable housing stock.

The variable `renter_housing_median_2020` represents the median gross rent for a county's occupied rental units (see Appendix B). Next, the variable `dem2partyvt` represents the partisanship makeup of a community based on county-level 2020 U.S. election voting outcomes for Joe Biden and Donald Trump, and the variable specifically measures the percentage of votes Joe Biden received compared to Donald Trump (see Appendix B). The proportion of high income earners variable `high_income_2020` was derived from the combination of the percentage of households that make \$150,000 to \$199,999 and \$200,000 or more in total income and benefits within a county in the year 2020, and the data is adjusted for 2020 inflation (see Appendix B). In addition, the proportion of middle income earners within a county variable `middle_income_2020` was calculated by combining the percentage of earners within the following income brackets: \$35,000 to \$49,999, \$50,000 to \$74,999, \$75,000 to \$99,999, and

\$100,000 to \$149,999 (see Appendix B). The variable logpop is a base ten log of the total population within a county in the year 2020 (see Appendix B). Metrocentraldv is a dummy variable of the central counties within a metropolitan statistical area, and metroouterringdv is a dummy variable of the outlying counties within a metropolitan statistical area (see Appendix B). The variable microdv is a measure of the micropolitan statistical areas (see Appendix B). Rural communities are accounted for through the _cons section of the regression model (see Appendix B).

For each percentage increase of votes cast for Joe Biden in the 2020 U.S. Presidential Election, median rent prices increased by \$2. Next, for each percentage increase in the proportion of high income earners within a county, median rent prices increase by \$25. However, for each percentage increase of middle income earners within a county, median rent prices only increase by \$3. For each increase in the log unit of population, median rent prices increase by \$36. Central counties of metropolitan areas have an increase in median rent prices by nearly \$18. When looking at the _cons section and the rural counties included in it, there is a decrease in median rent prices by \$77. Regression findings for outer ring counties of metropolitan areas and micropolitan counties are not statistically significant.

```
reg renter_housing_median_2020 dem2partyvt high_income_2020 middle_income_2020 logpop
> metrocentraldv metroouterringdv microdv
```

Source	SS	df	MS	Number of obs	=	2,973
Model	119067144	7	17009592	F(7, 2965)	=	1363.26
Residual	36994606.3	2,965	12477.1016	Prob > F	=	0.0000
				R-squared	=	0.7629
				Adj R-squared	=	0.7624
Total	156061750	2,972	52510.6831	Root MSE	=	111.7

renter_housin~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
dem2partyvt	2.116471	.1620862	13.06	0.000	1.798658	2.434283
high_income_2020	25.14614	.4381462	57.39	0.000	24.28704	26.00525
middle_income_2020	3.288491	.3366576	9.77	0.000	2.628385	3.948597
logpop	36.85855	2.29891	16.03	0.000	32.35093	41.36618
metrocentraldv	17.66631	8.47239	2.09	0.037	1.053951	34.27867
metroouterringdv	-4.179981	6.752054	-0.62	0.536	-17.41917	9.059206
microdv	3.319034	5.996261	0.55	0.580	-8.438221	15.07629
_cons	-77.0368	28.15151	-2.74	0.006	-132.2353	-21.83833

Please note that Colorado counties were isolated from other U.S. counties by using the state FIPs code for the state, which is 8 (see Appendix B).

When measuring the effects of median rent prices in the State of Colorado in relation to the political tilt of a community, for each increase in the percentage of votes for Joe Biden, median rent prices increase by nearly \$3, and this is consistent with the nationwide regression findings. Next, when looking at each percentage increase of the proportion of high income earners, median rent prices increase by \$26, which aligns with the nationwide regression findings. However, median rent prices only increase by \$9 based on each percentage increase of middle income earners within a Colorado county, and this effect is higher than the nationwide regression analysis of \$3. Micropolitan counties in Colorado observe an increase in median rent prices by \$122. Regression findings for the log unit of population, central counties in metropolitan areas, outer ring counties in metropolitan areas, and the _cons section.

```
reg renter_housing_median_2020 dem2partyvt high_income_2020 middle_income_2020 logpop
> metrocentraldv metroouterringdv microdv if statefip == 8
```

Source	SS	df	MS	Number of obs	=	62
Model	5588970.2	7	798424.314	F(7, 54)	=	61.65
Residual	699404.899	54	12951.9426	Prob > F	=	0.0000
				R-squared	=	0.8888
				Adj R-squared	=	0.8744
Total	6288375.1	61	103088.116	Root MSE	=	113.81

renter_housin~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
dem2partyvt	2.963946	.9431369	3.14	0.003	1.07307	4.854822
high_income_2020	26.27999	2.928581	8.97	0.000	20.40854	32.15144
middle_income_2020	9.449453	2.407151	3.93	0.000	4.623405	14.2755
logpop	24.27913	17.33483	1.40	0.167	-10.4751	59.03336
metrocentraldv	72.72311	85.83582	0.85	0.401	-99.36735	244.8136
metroouterringdv	-68.34262	69.56937	-0.98	0.330	-207.8208	71.13557
microdv	122.0306	50.34702	2.42	0.019	21.09086	222.9703
_cons	-269.1179	217.0412	-1.24	0.220	-704.2593	166.0236

In order to account for housing prices of owner-occupied housing units compared to renter-occupied housing units, the variable `owner_housing_median_2020` represents the median value for owner-occupied housing units within a county (see Appendix B). Please note that the U.S. Census does not have a measure for median mortgage payments for owner-occupied units, and the median housing value for an owner-occupied unit relates to the price of mortgages. Next, the variable `dem2partyvt` represents the partisanship makeup of a community based on county-level 2020 U.S. election voting outcomes for Joe Biden and Donald Trump, and the variable specifically measures the percentage of votes Joe Biden received compared to Donald Trump (see Appendix B). The proportion of high income earners variable `high_income_2020` was derived from the combination of the percentage of households that make \$150,000 to \$199,999 and \$200,000 or more in total income and benefits within a county in the year 2020, and the data is adjusted for 2020 inflation (see Appendix B). In addition, the proportion of middle income earners within a county variable `middle_income_2020` was calculated by combining the percentage of earners within the following income brackets: \$35,000 to \$49,999, \$50,000 to \$74,999, \$75,000 to \$99,999, and \$100,000 to \$149,999 (see Appendix B). The

variable logpop is a base ten log of the total population within a county in the year 2020 (see Appendix B). Metrocentraldv is a dummy variable of the central counties within a metropolitan statistical area, and metroouterringdv is a dummy variable of the outlying counties within a metropolitan statistical area (see Appendix B). The variable microdv is a measure of the micropolitan statistical areas (see Appendix B).

According to the regression model, there is a positive correlation between the median value of a county's owner-occupied housing stock and the percentage of votes cast for Joe Biden in the 2020 U.S. Presidential Election. Specifically, for each percentage point increase of votes for Joe Biden, the median value of a county's owner-occupied housing stock increases by \$1,171. Next, for each percentage increase in the proportion of high income earners, median owner-occupied housing values increase by \$11,986. However, for each increase in percentage of the middle income earners within a county, median owner-occupied housing units increase by about \$1,351. Each log unit of population increase within a county is related to an increase in median owner-occupied housing values by \$6,737. Central counties of metropolitan areas report an decrease in median owner-occupied housing values by \$24,678, and outer ring counties have a decrease in values by \$8,558. When considering rural communities within the _cons section of the regression analysis, median owner-occupied housing values decrease. Findings from micropolitan counties are not statistically significant.

```
reg owner_housing_median_2020 dem2partyvt high_income_2020 middle_income_2020 logpop
> metrocentraldv metroouterringdv microdv
```

Source	SS	df	MS	Number of obs	=	2,979
Model	1.8234e+13	7	2.6049e+12	F(7, 2971)	=	891.65
Residual	8.6796e+12	2,971	2.9214e+09	Prob > F	=	0.0000
				R-squared	=	0.6775
				Adj R-squared	=	0.6767
Total	2.6914e+13	2,978	9.0376e+09	Root MSE	=	54050

owner_housing~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
dem2partyvt	1171.343	78.54137	14.91	0.000	1017.342	1325.344
high_income_2020	11986.18	211.638	56.64	0.000	11571.21	12401.15
middle_income_2020	1351.656	162.5249	8.32	0.000	1032.983	1670.329
logpop	6737.074	1102.588	6.11	0.000	4575.16	8898.988
metrocentraldv	-24678.77	4088.924	-6.04	0.000	-32696.18	-16661.36
metroouterringdv	-8558.21	3266.336	-2.62	0.009	-14962.72	-2153.701
microdv	805.8466	2891.337	0.28	0.780	-4863.38	6475.073
_cons	-124476.6	13597.63	-9.15	0.000	-151138.4	-97814.91

When comparing the nationwide regression results with the analysis of Colorado communities, owner-occupied housing values increase further in the state, as for each percentage of votes cast for Joe Biden in the U.S. 2020 Presidential Election, median values increase by about \$2,608 compared to the increase of \$1,171 nationally. As the percentage of the proportion of high income earners within a county increases, median owner-occupied housing values increase by nearly \$13,200, which aligns with the findings in the nationwide regression analysis. Next, as the percentage of the proportion of middle income earners increases within a county, the proportion of high income earners increases by about \$5,274, which is higher than the median value increase nationally by \$1,351. Micropolitan counties have an increase in median owner-occupied housing values by \$44,197, according to the regression model. When considering the rural counties included in the _cons section of the regression model, median values of owner-occupied housing stock decreases, which makes sense due to the low property values associated with rural locations generally. Regression findings for the log unit of population, central counties of metropolitan areas, and outer ring counties of metropolitan areas are not statistically significant.

```
reg owner_housing_median_2020 dem2partyvt high_income_2020 middle_income_2020 logpop
> metrocentraldv metroouterringdv microdv if statefip == 8
```

Source	SS	df	MS	Number of obs	=	64
Model	1.1990e+12	7	1.7128e+11	F(7, 56)	=	78.66
Residual	1.2194e+11	56	2.1776e+09	Prob > F	=	0.0000
				R-squared	=	0.9077
				Adj R-squared	=	0.8961
Total	1.3209e+12	63	2.0967e+10	Root MSE	=	46664

owner_housing~2020	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
dem2partyvt	2608.585	385.2978	6.77	0.000	1836.741	3380.43
high_income_2020	13199.59	1198.828	11.01	0.000	10798.05	15601.13
middle_income_2020	5273.755	972.4507	5.42	0.000	3325.702	7221.808
logpop	1526.305	6868.301	0.22	0.825	-12232.56	15285.17
metrocentraldv	-64738.99	34553.09	-1.87	0.066	-133957.1	4479.161
metroouterringdv	-32311.85	28519.44	-1.13	0.262	-89443.14	24819.45
microdv	44197.11	20582.43	2.15	0.036	2965.55	85428.68
_cons	-298909.1	87021.3	-3.43	0.001	-473233.7	-124584.4

Discussion

The supply and availability of affordable housing stock are salient issues across the United States, and challenges associated with housing are experienced in different ways at the county level. Qualitative interviews expressed the immediate need for policymakers to find ways to address housing and workforce issues within local communities. According to the regression models within this research study, the proportion of high income earners and population levels are significant contributors to rising costs of renter and owner-occupied housing across metropolitan communities, suburban communities, and rural communities. When looking at Colorado specifically, the increase in median housing prices related to the proportion of high income earners is higher in the state than at the national level. The private housing market responds to the preferences of high income earners, which drives up housing prices and crowds out middle and low income workers that would like to live within communities closer to their place of employment (Galster and Lee, 2021; Blumenberg and King, 2021). Qualitative interviews noted that Colorado has a highly skilled workforce with a high proportion of high

income earners; however, it is critical that housing policies support all members of communities across the state. Thus, there must be a coordinated effort across local government entities to expand the affordability of housing and increase the number of and types of housing units available. As reflected in the qualitative survey, housing affordability is a challenge across all communities; however, affordability challenges are experienced in distinct ways locally. With this in mind, policies to address housing challenges must account for the unique supply and demand for both housing stock and workforce skills within a community.

The research also analyzed metropolitan central counties, suburban counties, and rural counties across the United States with their relationship to housing prices and mean commute time to work. Regression analyses indicated that the proportion of high income earners and population levels were significant driving factors for increasing median rent and the median value of owner-occupied dwellings. Workers who cannot find housing that is affordable for their income must reside further away from their place of employment, leading to higher commute times, most notably within suburban counties of metropolitan areas (Yao and Kim, 2022; Galster and Lee, 2021).

Not only do areas that have a liberal-leaning political tilt have a greater availability of multifamily housing stock compared to conservative-leaning areas, as the former also has higher median rent and owner-occupied housing prices. To expand on this, locations with a conservative-leaning political tilt are more affordable communities to live in. The regression models controlled for rural counties, so the quantitative findings do not support the idea that lower housing prices found in conservative-leaning areas are merely due to these communities being located in rural areas. Liberal-leaning counties may have a greater number of policies that encourage the expansion of the supply of multifamily housing units.

Understanding housing and workforce challenges within resort communities is an area of research that must be addressed, and my research falls short on conducting quantitative analysis on resort communities due to shortcomings with locating variables that accurately capture this community type. I would like to conduct additional research on resort communities in the future. Additional future research of interest includes an analysis of how housing and workforce conditions have changed over time, and I would like to conduct research using the same regression models for the years 2015 and 2010. In addition, I have an interest in gaining a better understanding of how land use and zoning policies restrict or expand opportunities for adding to the local housing stock and possible impacts to commute times. I hoped to control for local land use and zoning policies in my regression models; however, I was only able to locate statewide data, which falls short of capturing land use and zoning policies at the local level. For future research, the collection of land use and zoning data may come from local zoning boards or public interest groups. I would like to expand the qualitative research study participation to either encompass every Colorado county or to involve communities across the United States for future studies. An aspect of this research study that I personally enjoyed is related to local policies that expand the availability of workforce development programs, and I have an interest in conducting future research on this topic.

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Appendix A

Please note that the presence of chambers of commerce and local economic development organizations varies by communities, as some locations have a presence of both a chamber of commerce and a local economic development organization. I first conducted outreach for local economic development organizations within each community, and if I was unable to contact or locate the organization, I proceeded to contact the chamber of commerce.

The workforce survey specifically contacted staff members that supported the academic affairs arm of the community college in order to learn about the ways in which the institution identifies and supports the community's business needs in relation to worker skills in particular industries.

For the beta tester interviews, I provided a background on my study and expressed an interest in learning from their expertise on what types of policy issues housing authorities and workforce stakeholders would be equipped to answer based on their work experience. If the meeting was conducted over Teams or Zoom, I would share my screen to show the beta tester my lines of questioning, go through the survey questions together, and ask for their feedback on each question. For meetings over the phone, I would state that I am asking questions within a specific policy area and state the question I hoped to ask. Next, I would ask the beta tester their thoughts on the question and how they would approach answering the question I posed.

A point of feedback that a housing beta tester provided was to be aware that housing authorities may interpret the line of questioning on the rehabilitation of housing units in different ways. For instance, some communities understand rehabilitation to mean updating older, dilapidated housing units while others view rehabilitation as maintaining the habitability of units managed

by the housing authority. A separate beta tester suggested that I keep in mind whether a housing authority has enough Housing Choice Vouchers to address the housing needs for low income earners within the community.

Qualitative interviews with housing and workforce stakeholders lasted for about 15-30 minutes, depending on the extent to which the participants answered the survey questions. I provided a time warning around 20 minutes during the interview to let the participants know that our meeting would conclude shortly.

For the qualitative survey interviews, the first question asked was “In your work, what have you observed as the most important housing challenges that your community faces?” and “In your work, what have you observed as the most important workforce challenges that your community faces?” depending on whether the participant was a housing or workforce participant. If the survey participant addressed a policy area included in my survey instruments, I would ask about the challenges and opportunities related to the issue they mentioned. Conversely, if the survey participant did not address a policy area included in my survey instruments, I would ask “To what extent is [policy issue] a challenge within your community?”

Following the initial, open-ended question for housing survey participants on the challenges they have observed based on their work experience, I asked about issue-specific housing challenges and opportunities, and I started with asking lines of questions related to policy areas mentioned within their initial response. The first line of questioning involved the affordability of the local housing stock, and the specific lines of questioning included “Tell me about the challenges and

opportunities related to creating more affordable housing,” “Who is impacted most as a result of the housing issues in your community?” and “Tell me about how you see connections between housing and workforce availability.” Next, I asked about land use and zoning policies by asking “What are ways that would facilitate planning for more housing?” as well as “How is it decided if your community will seek redevelopment or will pursue new land construction?” and “What are the challenges and opportunities of zoning and land use planning?” Another line of questioning was regarding community opposition to housing projects, and I asked “What are the challenges and opportunities surrounding community actors as it relates to housing issues?” and clarified by asking “What is the nature of the opposition?” Next, I asked about the supply of housing and posed the question of “What are ways that may increase the supply of housing in your community?” and followed up by asking “What has the success been in implementing these efforts in your community?” In addition, I asked about funding limitations with the question of “What are some of the most successful and least successful funding strategies you have used?” I asked about efforts related to the rehabilitation of older housing units by posing the question of “What are some of the most successful and least successful ways your community has rehabilitated homes?” In addition, I asked about supportive services with housing projects, specifically “What policies have been the most successful and the least successful in your community and why?” Lastly, I asked about the Housing Choice Voucher, or Section 8, program with the question “Tell me about the Housing Choice Voucher program in your community. What challenges and opportunities are present?”

After asking the first question to invite the workforce survey participant to discuss what challenges they have observed, I followed up by inquiring about issue-specific workforce

challenges and opportunities, and I prioritized lines of questioning of policy areas that were mentioned in their initial response. The first area of interest for the workforce survey research is workforce availability, and questions asked if the policy area was mentioned in their initial response included “Tell me about the types of positions that are having challenges being filled and why, based on your experience,” “Who is impacted most as a result of the workforce issues in your community?” and “Tell me about how you see connections between housing and workforce availability. Next, I asked about workforce skills, and the specific question posed was “Tell me about the availability of workforce skills in your community. What challenges and opportunities are present?” I asked about business retention, and the lines of questions included “What are ways that retain businesses within your community?” and “What has been the success in implementing these efforts within your community?” Another question posed to workforce survey participants regarding the key industries located within their community by asking “What are the challenges and opportunities with the key industries located within your community?” Next, I asked about job growth, specifically asking “What are the challenges and opportunities related to creating jobs or increasing the number of workers in your community?” In addition, I asked about transportation and posed the question of “Tell me about the challenges and opportunities related to transportation in your community as it relates to workforce issues.” Lastly, I asked about housing, specifically “Tell me about the challenges and opportunities related to affordable housing in your community.”

Following the conclusion of each survey interview, I emailed participants within a week of our meeting time to thank them for taking the time to participate in my study and expressed that I am

available to set up an additional interview if they had any outstanding insights they would like to share with me.

Appendix B

The variable `renter_housing_median_2020` is derived from the county-level data from the U.S. Census American Community Survey Selected Housing Characteristics 5-Year Estimates Data Profile from the year 2020, and the specific variable used is `dp04_0134e`, which measures the gross median rent for occupied housing units that pay rent.

The variable `owner_housing_median_2020` is taken from the U.S. Census American Community Survey Selected Housing Characteristics 5-Year Estimates Data Profile from the year 2020.

`Owner_housing_median_2020` is renamed from the ACS variable `dp04_0089e`, which represents the median value of owner-occupied housing units within a county. Please note that the U.S. Census does not have a measure for median mortgage payments for owner-occupied units, and the median housing value for an owner-occupied unit relates to the price of mortgages.

The proportion of high income earners is derived from the county-level data from the U.S. Census American Community Survey Selected Economic Characteristics 5-Year Estimates Data Profile from the year 2020. In the ACS dataset, the specific variable that measures the percentage of earners in the \$150,000 to \$199,999 income bracket within a county is `dp03_0060pe`, and the specific variable that measures the percentage of earners in the \$200,000 or more income bracket within a county is `dp03_0061pe`.

The proportion of middle income earners for the variable `middle_income_2020` is derived from the county-level data for the U.S. Census American Community Survey Selected Economic Characteristics 5-Year Estimates Data Profile from the year 2020. In the ACS dataset, the specific variables for the percentage of earners within income brackets include the following:

dp03_0056pe for \$35,000 to \$49,999, dp03_0057pe for \$50,000 to \$74,999, dp03_0058pe for \$75,000 to \$99,999, and dp03_0059pe for \$100,000 to \$149,999.

I created a variable to represent the proportion of low income earners within a county, which is low_income_2020 from the U.S. Census American Community Survey Selected Economic Characteristics 5-Year Estimates Data Profile from the year 2020. In the ACS dataset, low income earners include the percentage of people within the following income brackets:

dp03_0052pe for less than \$10,000, dp03_0053pe for \$10,000 to \$14,999, dp03_0054pe for \$15,000 to \$24,999, and dp03_0055pe for \$25,000 to \$34,999.

The variable logpop was taken from the county-level data for the U.S. Census American Community Survey Selected Demographic and Housing Characteristics 5-Year Estimates Data Profile from the year 2020. Specifically, the variable logpop is derived from the variable dp05_0001e, which is an estimate of the total population within a county. A base ten log of the variable was taken to account the variation of population density across the United States, as large metropolitan areas have a significantly higher number of residents than rural and other community types.

The variable metrocentraldv is derived from the U.S. Census data that designates counties as core based statistical areas (CBSAs), metropolitan divisions, and combined statistical areas for the year 2020. Information included in the metrocentraldv variable are the central counties within a metropolitan statistical area.

The variable metroouterringdv is derived from the U.S. Census data that designates counties as core based statistical areas (CBSAs), metropolitan divisions, and combined statistical areas for the year 2020. Information included in the metroouterringdv variable are the outlying counties within a metropolitan statistical area.

The variable `microdv` is derived from the U.S. Census data that designates counties as core based statistical areas (CBSAs), metropolitan divisions, and combined statistical areas for the year 2020. Information included in the `microdv` are the micropolitan statistical area locations designated in the U.S. Census dataset.

Rural communities are the communities not captured by the `metrocentraldv`, `metroouterringdv`, and `microdv` variables within the regression models for the proportion of high income earners and political ideology within communities. Thus, rural communities are measured with the `_cons` section of the regression models for the proportion of high income earners and the political ideology within a community. However, the hypotheses studying housing and workforce issues by isolating metropolitan, suburban, and rural communities in separate regression models uses the variable `rural`, which is derived from the U.S. Census data that designates counties as core based statistical areas (CBSAs), metropolitan divisions, and combined statistical areas for the year 2020. Rural communities are counties that are not defined as metropolitan central counties, metropolitan outlying counties, or micropolitan counties based on U.S. Census data.

The United States Census identifies geographic entities, such as counties and states, by using Federal Information Processing Standards (FIPs). Colorado's FIPs code is 8 ("American National Standards Institute (ANSI) and Federal Information Processing Series," 2022).

The variable `mean_commute_time` is derived from the U.S. Census American Community Survey Selected Economic Characteristics 5-Year Estimates Data Profile from the year 2020. Specifically, `mean_commute_time` is renamed from the variable `dp03_0025e`, which measures mean travel time to work in minutes for workers 16 years and older.

The variable `multi_family_unit_2020` is from the U.S. Census American Community Survey Selected Housing Characteristics 5-Year Estimates Data Profile from the year 2020. Out of the

total housing units within a county, the variable `multi_family_unit_2020` represents a combination of the following ACS variables: `dp04_0009pe` for percentage of the housing stock that has 2 units in its structure, `dp04_0010pe` for percentage of the housing stock that has 3 or 4 units in its structure, `dp04_0011pe` for percentage of the housing stock that has 5 to 9 units in its structure, `dp04_0012pe` for percentage of the housing stock that has 10 to 19 units in its structure, and `dp04_013` for the percentage of housing stock that has 20 or more units in its structure.

The variable `single_family_unit_2020` is taken from the U.S. Census American Community Survey Selected Housing Characteristics 5-Year Estimates Data Profile from the year 2020.

`Single_family_unit_2020` is a combination of the following ACS variables: `dp04_0007pe` for the percentage of 1 unit detached housing stock and `dp04_0008pe` for the percentage of 1 unit attached housing stock within a county.

The variable `dem2partyvt` is derived from David Leip's Atlas of U.S. Presidential Elections.

`Dem2partyvt` represents the percentage of votes Joe Biden received out of the total votes cast within a county for the 2020 Presidential Election. The `dem2partyvt` variable only represents the votes for two primary candidates for the 2020 Presidential Election, which was Joe Biden and Donald Trump as a 2 party voting system, and leaves out votes cast for third party candidates.

With this in mind, a negative correlation represents a majority of votes cast for Donald Trump, as votes for Joe Biden are on the numerator for the variable and total votes for the aforementioned candidates on the denominator.

Appendix C

The map of the State of Colorado that categorizes counties by community types was generated by using the following Map Chart website: <https://www.mapchart.net/usa-counties.html>. Map Chart allowed me to isolate a United States map to just look at Colorado and to view each county name. An alternative mapping software I considered using was Map Goose, which can be found at the following website: <https://mapgoose.com/us/colorado>; however, I preferred Map Chart due to the tool's feature that allows county names to be listed on the map.

To create the map's key, I used a Google Sheet document and took screenshots of each county color and placed it next to the corresponding type of community.

Please note that some of the names of Colorado counties could not be displayed on the map. The county labeled 1 refers to San Juan County, the county labeled 2 refers to the City and County of Broomfield, the county labeled 3 refers to the City and County of Denver, and the county labeled 4 refers to Gilpin County.