Constructing Communities: The Effect of Housing Policy on County Populations and Election Outcomes

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**Constructing Communities:**
The Effect of Housing Policy on County Populations and Election Outcomes

A thesis submitted in partial fulfillment of the requirement for the degree of Bachelor of Arts in Government from The College of William and Mary

by

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(Honors)

Paul Manna, Director

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Sarah Stafford
Abstract

Virginia is currently confronting a housing affordability crisis. Many municipalities across the state are becoming progressively inaccessible to low-income Virginians. As this crisis continues to escalate, Virginia localities and their communities are beginning to weigh their options to address this problem. Relaxing zoning density policies to allow denser, multi-unit housing construction is one proposed solution to increase municipalities’ housing stock and lower overall housing costs. This paper addresses the following questions. How would the adoption of this strategy affect the population composition of Virginia communities? Could these effects have ramifications for Virginia’s political voting outcomes? Through fixed effects regression analysis, this research finds that the effect of housing densification on increasing income and racial diversity in counties is statistically significant, though substantively weak. Still, housing densification’s role in affecting local political outcomes is amplified through its limited relationship to racial diversity, with increases in multi-unit housing associated with the partial closure of voting share margins between Democratic and Republican candidates in Senate and Presidential elections. However, for this closure in voting margins to be substantial, Virginia counties would have to see significant increases in their multi-unit housing stock, increases that are historically rare or unheard of in Virginia. A closer look at an extreme case of multi-unit housing growth in Falls Church, Virginia provides some insight as to what is perhaps inhibiting the relationship between zoning, housing patterns, and expected demographic composition to manifest: failure to accompany housing densification with active government controls on housing affordability. Falls Church’s unique characteristics and extreme change in housing patterns make generalizing this finding difficult. Further research is necessary to explore more representative Virginia municipalities.
Acknowledgements

First, I would like to thank my advisor, Professor Manna. Thank you so much for your support throughout this project and for constantly pushing me to reach higher. I can honestly say that upon entering William & Mary, I never imagined myself doing research let alone submitting an honors thesis. Your belief in me and my work have opened my eyes to a new world of things I am capable of.

I would also like to thank Professors McGlennon and Stafford for being a part of my committee. Given the intensity that is teaching and mentoring students during a pandemic, I am immensely grateful for your time and input.

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# Table of Contents

ABSTRACT .............................................................................................................................. 2

ACKNOWLEDGEMENTS ........................................................................................................ 3

TABLE OF CONTENTS .......................................................................................................... 4

1. INTRODUCTION .............................................................................................................. 5

2. LITERATURE REVIEW .................................................................................................... 7

3. THEORY AND HYPOTHESES ....................................................................................... 9

4. METHODOLOGY ............................................................................................................. 11

5. BACKGROUND ............................................................................................................... 15

6. RESULTS FROM REGRESSION ANALYSES ................................................................. 21
   6.1 Housing and Demographics ...................................................................................... 21
   6.2 Demographics and Voting Outcomes ........................................................................ 25

7. DISCUSSION .................................................................................................................. 28

8. CASE STUDY ANALYSIS ............................................................................................... 30
   8.1 Falls Church: An Overview ...................................................................................... 30
   8.2 Falls Church: What Happened and Analysis ............................................................ 35

9. CONCLUSIONS AND FURTHER RESEARCH ............................................................. 43

WORKS CITED .................................................................................................................... 46

APPENDICES ...................................................................................................................... 52

    Appendix A ..................................................................................................................... 52

    Appendix B ..................................................................................................................... 53
1. Introduction

The state of Virginia is confronting a housing affordability crisis. Five Virginia cities are amongst the top ten in the country among eviction rates in 2016, and the state lacks 148,720 homes for extremely low-income renters. Amidst housing costs that are only increasing, many Virginians are justifiably engaging in community conversations about who should bear the burden of this crisis, or even if it should be addressed at all (NLIHC 2019; Gordon 2020). Many proposed solutions center on relaxing low density or single-family zoning, namely zoning policies in which a municipality dictates that most of its land will be occupied by housing structures meant for one family alone rather than housing structures that can house multiple families like apartments. By relaxing low-density zoning and allowing the construction of more multi-unit homes, the belief is that the resulting increase in housing stock would help bring home and rent costs down (Ivory and Colton 2020). What are the effects of relaxing zoning laws on Virginia communities? Beyond possibly shaping communities, how could the adoption of this strategy affect local political outcomes?

Considering Virginia has already and must continue to act on its affordability crisis for the overall health of its economy and state citizens it is important to evaluate the possible effects of the different strategies available. As housing is inherently intertwined with where people live, the above questions are especially important because they strike at the core of local political landscapes across the country: constructions of community. Inevitably, where one lives determines who one is surrounded by and interacts with. These factors often shape culture, education, and even political party affiliation or ideology. As Virginia tackles its housing affordability crisis, likely with at least some municipalities adopting the relaxation of low-density zoning as a strategy, there might soon be a significant restructuring of several Virginia
communities, which could have real political effects. In the United States, the importance of zoning’s spatial construction of community is heightened by the fact that the lines demarking electoral districts for local, state, and national elections are fundamentally tied to geography.

Further, within this larger discussion of housing affordability, this study helps address Virginia’s problematic history with zoning. Zoning is infamous for its exclusionary nature in segregating people by income and race, but there is limited research on how zoning can and has shaped local politics by bringing about or shielding certain areas from demographic change (Rothstein 2017). Research in this area is vital to not only to an understanding of present solutions to housing affordability in Virginia but also to an understanding of how we can ground these solutions within Virginia’s history and their implications outside of housing affordability specifically.

Though this study is an important regional discussion for Virginia, it could also contribute to wider national conversations. Zoning is a prevalent tool in land use management across the country (Schuetz 2019). As the United States is experiencing both an increase in income segregation and a persistence of racial segregation, it is critical that scholars look to explore such possible sources like low density zoning (Fry and Taylor 2012; Williams and Emamdjomeh 2018). It is all the more important to factor in political effects as systemic injustices against racial minorities throughout the United States, particularly Black citizens, are pervasive throughout American history. With historical phenomena such as literacy tests and modern-day instances of gerrymandering, it is worth exploring how zoning could be or might be another way through which localities may undermine minority voices in politics by spatially segregating them from affluent, White citizens. Through addressing zoning’s effects on communities in the context of housing affordability, particularly in the relaxation of zoning
policies, this study can approach whether zoning today does have these effects and how they might be undone.

2. Literature Review: The Relationship between Zoning and Population

Zoning ordinances serve the purpose of “segregat[ing] uses” for land (Lamar 2015). Municipalities often employ zoning to designate certain areas for residential buildings or commercial usage as well to regulate building codes and aesthetics. This study focuses primarily on zoning to control residential areas.

Zoning arose in the United States during the early 20th century in the aftermath of Reconstruction out of fear of racial integration and, more particularly, of “racial amalgamation” (Hayward 2013). Initially, zoning ordinances were overt exclusions of Black citizens from White spaces with different classifications identifying land meant for Black and White neighborhoods. After 1926, counties eventually evolved their zoning strategy to Euclidean zoning, or the modern-day version of zoning that marks areas for specific uses such as residential or commercial zones (Rothstein 2017). Though these ordinances made no direct mention of race, they continued the legacy of racial zoning through segregating citizens by income. Virginia counties did this by instituting low density zoning and reducing the amount of affordable housing available within their borders. During this time of transition to Euclidean zoning after 1926, Black and other minority citizens confronted many challenges in acquiring wealth and were at a significant economic disadvantage relative to White citizens (Schermerhorn 2019). Thus, zoning that meant increases in housing costs like low-density zoning policies inherently meant racial segregation.

However, though over 800 counties adopted zoning soon after 1926, zoning did not make substantial headway into American cities until the early 1970s (Rothstein 2017; Fischel 2001).
With the Fair Housing Act of 1968, which prohibited discrimination in housing policy, and the rise of the interstate highway system, municipalities took it upon themselves to more strictly regulate their land usage as a reaction to the possibility of demographic shuffling and to protect housing value from arising industrial zones and developments (Fischel 2001). Since then, zoning has become ubiquitous, with most cities and counties in the United States regulating their land through zoning (Schuetz 2019). The origin of zoning and its prevalence today hints at a deep interconnection between land use policy and the maintenance and shaping of local populations.

Therefore, the existence of evidence for the role of zoning policy in forging communities as they are known today is unsurprising. For example, Rothwell and Massey (2010) sought to account for the significant socioeconomic segregation that occurred in the United States after 1970. They find that there is a strong relationship between restrictive “density” zoning, or zoning that controls how many units of residence a municipality permits on a given area of land, and income segregation, or the spatial segregation of people defined by their economic class. More specifically, they find that areas governed by more restrictive density zoning regulations, in that they greatly limit the number of permissible residential units on their lands, have a population that is more thoroughly segregated by class than do areas with more lenient density zoning regulations. This connection between restrictive zoning ordinances and income segregation seems intuitive. If fewer residential units, such as single-family homes, are the only ones a municipality permits in residential zones, then it is likely that the cost of those homes would be higher than smaller more dense housing units such as apartments on the same land assuming basic similarities in quality. Setting aside the differences in housing unit size in accounting for disparities in housing type prices, Adams et al. (2020) find that the limitation restrictive zoning places on the housing supply itself greatly increases housing prices as well. Through this cost,
zoning sorts people by what they can afford, restricting where low-income residents can live while allowing high-income residents much freer choice.

As per the Fair Housing Act of 1968, these ordinances are strictly barred from overt discrimination against protected classes such as racial and ethnic groups. In practice, however, there is additional evidence in the literature that suggests zoning contributes to racial segregation as well as income segregation. In another analysis of restrictive density zoning, Rothwell and Massey (2009) find a strong correlation between restrictive anti-density zoning policies and racial segregation, especially for Black residents. Through the mechanism of housing prices, counties often have the incentive to employ anti-density zoning policies to keep land and home values high. This results in a shortage of affordable housing available in an area, a shortage that disproportionately affects racial minorities that are often low-income. In this way, zoning not only discriminates by class but also helps lead to the construction of racially homogenous communities. In more historical studies, Dubin (1993) and Nelson (1996) found similar results consistent with Rothwell and Massey (2009), noting that higher cost housing segregates people based on race.

3. Theory and Hypotheses: The Relationship between Zoning and Voting

Previous literature strongly shows that zoning, particularly density zoning ordinances, play some role in segregating communities based on class and race. This is the mechanism by which I theorize that restrictive zoning ordinances affect voting outcomes in multiple ways. First, the spatial distribution of racial and income groups is likely to affect party voting outcomes. With county-wide voting in presidential elections for example, a county might vote one way or another depending on who is in it. If these areas are characterized by racial or income homogeneity, as segregation would imply, there is an expectation that these areas will vote
differently than areas with diversity based on race and class consciousnesses that influence political party affiliation, ideology and participation. For example, Mangum (2013) finds evidence for the relationship between racial identification and political party affiliation as well as for political ideology. Morton, Tyran, and Wengstrom (2011) find evidence for the relationship between income and party affiliation as well, with income capturing such factors as cognitive ability, educational attainment, and certain personality traits.

Scholars disagree on how racial diversity comes to affect voting outcomes. Matsubayashi and Rocha (2012) identify two ways in which racial diversity can influence electoral outcomes: the policy backlash hypothesis and the electoral constraint hypothesis. According to the policy backlash hypothesis, the presence of racial minorities, specifically Black citizens, “increases antagonistic attitudes toward minorities among whites” (p. 602) and therefore results in more conservative local decision making. On the other hand, the electoral constraint hypothesis suggests that the presence of minorities increases the number of liberal supporters within a municipality and can therefore result in liberal voting outcomes. Though Matsubayashi and Rocha find that both hypotheses come into play in determining diversity’s role in shaping electoral outcomes, many studies have found that racial diversity has more liberal effects on voting outcomes. In their analysis of elections between 1940 and 1970, Calderon, Fouka, and Tebellini (2019) found that counties that received Black migrants from the Great Migration led to increased support for the Democratic Party in a time when backlash was likely to be more prevalent.

In Virginia, I hypothesize that zoning affects county voting outcomes through the path outlined in Figure 1. I believe less restrictive zoning leads to a county having more multi-unit housing in addition to single family homes, the most prevalent type of housing in Virginia. These
areas with more multi-unit housing will be characterized by a higher degree of racial and income diversity than counties with more restrictive housing, namely with less multi-unit homes, by offering a wider variety of housing. This difference in racial and income diversity results in

![Path diagram](image)

**Figure 1.** Path diagram representing the hypothesized relationship between zoning and Democratic performance in Virginia elections.

different political outcomes between counties with different zoning strategies. Following the electoral constraint hypothesis, in which racial and income diversity should lead to more liberal outcomes, I hypothesize that the presence of racial and income diversity in less restrictive counties will result in better Democratic candidate performances in electoral races relative to those with more restrictiveness. As a result, relaxing restrictive zoning measures would ultimately result in more diverse communities and more liberal voting outcomes.

4. Methodology

Despite evidence supporting the claim that modern day zoning affects voting through its relationship with population composition in the literature, there are several limitations and oppositions to this research. My aim with this study is to contribute to the ongoing debates on zoning and political participation, while spotlighting regional effects of zoning particular to Virginia. My research centers on a fixed effects analysis of Virginia counties from 2000 to 2019, by focusing on changes in their voting patterns with respect to the evolution of their zoning policies over time. Each of 133 Virginia counties and independent cities are represented once
within four time periods, from 2000 to 2004, 2005 to 2009, 2010 to 2014, and 2015 to 2019, for a total of 532 observations. These time periods are constructed primarily around the American Community Survey (ACS) 5-year estimates for all Virginia counties (Social Explorer Tables). There is no 5-year estimate for the time period between 2000 and 2004 so I constructed one myself using regression estimation in a process outlined in Appendix B. Finally, I looked to interpret my quantitative results through a case study analysis of one of Virginia’s municipalities, the city of Falls Church.

Unfortunately, there is no extensive record of zoning plans over the past 20 years for all Virginia counties. To track zoning restrictiveness then, I focused on housing structure records kept by the U.S. Census and ACS. I used the 2000 Census as well as the 5-year ACS surveys from 2005 to 2019 to obtain the proportion of multi-unit housing, defined as housing units existing in structures with 10 or more housing units in total, among all other housing units available as a proxy for measuring zoning restrictiveness. By definition, I take restrictiveness in a county to mean that there is a smaller proportion of multi-unit housing available, something I believe to be stipulated by county zoning policies. However, the actual number of multi-unit housing units available, which is what I am capturing through this proxy, may differ somewhat from written zoning plans. Still, measuring restrictiveness in this way allows for the analysis of zoning’s actual effects as it would theoretically manifest itself if Virginia counties utilize it as a method of addressing housing affordability: the actual construction of multi-unit buildings.

I then modeled the relationship between this multi-unit housing measure with racial and income characteristics of each county, representing the left half of Figure 1, again pulling from the US Census and 5-year ACS surveys. I had two dependent variables: a racial diversity index and the Gini coefficient. I calculated racial diversity based on Simpson’s diversity index, a
measure that captures both the number of different racial groups present in a county and the proportion of residents that make up those groups (Kiernan 2020). The value ranges from 0 to 100, where 0 represents a complete lack of diversity in a county, where all residents are of one race, and 100 represents infinite diversity, where there are an infinite number of racial groups and members of those racial groups present. For income diversity, I use the Gini coefficient which is another index ranging from 0 to 100 whereby 0 indicates perfect equality in which all residents hold an equal share of county wealth and 100 indicates perfect inequality in which one resident holds all of the county wealth (U.S. Census Bureau 2016). Since most Virginia counties start off with single family homes as the most prevalent type of housing in 2000, I believe that an introduction of multi-unit level housing will introduce lower income residents to a county and thus increase the Gini coefficient, or income inequality.

I then tested the relationship between these population characteristics, racial diversity and income inequality, with voting, to examine the right half of Figure 1. For this analysis I used two dependent variables to measure voting outcomes: the share of votes for Democratic candidates in presidential elections and the share of votes for Democratic candidates in Senate elections. I looked at how counties voted from election to election, analyzing how the vote share going toward Democratic candidates shifts from year to year (Chyzh and Urbatsch 2019). For this, I combine the housing and demographics data provided by the US Census and ACS with MIT Election Data and Science Lab’s County Presidential Election Returns 2000-2016 (2018) dataset for presidential election results and Virginia’s Department of Elections’ 2000-2019 U.S. Senate-All General Elections (2020) dataset for Senate results.

Due to the division of the years 2000 to 2019 into four panels each representing 5-year periods, the political data assigned to each panel of counties is based on what elections fall
within those years. For the presidential elections, I assign the 2004 presidential election and the 2000 senatorial election to represent the time period 2000 to 2004. For the second time period between 2005 and 2009, I utilize the 2008 presidential election and the average results of the 2006 and 2008 senatorial races. For the third between 2010 and 2014, I use the 2012 presidential and senatorial elections and for the final time period from 2014 to 2019, I use the 2016 presidential election as well as the midpoint estimation of 2017 between the 2014 and 2018 senatorial elections. In 2002, the Democratic party did not run a candidate against Republican incumbent Senator John Warner, so it is omitted from the voting outcomes.

As I conduct this two-part analysis, connecting multi-unit housing to racial and income diversity and this diversity to Democratic performance, I will attempt to control for a few other variables. For the first part between housing and diversity, I control for factors likely to draw people into counties aside from multi-unit housing availability: employment opportunities, education rates, and the proportion of senior citizens over the age of 65. Aside from housing costs, people prioritize moving to where they can find employment that are safe and high-quality, characteristics often associated with high local education rates (Carmichael 2017). For these two factors, I use county unemployment rates to track employment opportunities and high school educational rates for the population over 25 to track educational attainment. People also might move to be with age in-groups or move to places that are senior age-friendly, something especially relevant at retirement age (Frost 2020). To capture this, I factor in the proportion of the county population that is over the age of 65 in my analysis. I use these same variables as controls in the second part of my analysis as economic conditions such as employment, education rates, and presence of a senior population all are factors that come into play in determining political outcomes as well (Prysby and Scavo 2014). I also factor in religiosity using
the number of congregations per 1000 people as a proxy since religiosity can also play a role in determining voting outcomes outside of the spheres of race and income (Theiss-Morse et al. 2012). I pulled religiosity variables from the Association of Statisticians’ of American Religious Bodies Religious Congregations and Membership Study, 2000 and Grammich et al’s (2018) U.S. Religion Census: Religious Congregations and Membership Study, 2010 datasets.

Finally, I follow the quantitative results of these analyses with a deeper multimethod qualitative look at Falls Church, VA. I traced the above theorized path diagram in Figure 1 through Falls Church’s zoning plans and its housing composition to its income and racial diversity, with a special focus on racial diversity. I then tied that to Falls Church’s election outcomes over the same time span. Falls Church is what Gerring (2008) would call an extreme case. Falls Church is a small city in northern Virginia with one of the most drastic changes in multi-unit housing over the past two decades. Its multi-housing unit stock grew by approximately 13 percentage points between 2000 and 2019, a growth that is almost five standard deviations away from the average growth in multi-unit housing around 1.11 percentage points. It also is one of the municipalities that needs to confront the housing affordability crisis the most, as it is located within an area of high demand due to its proximity to Washington D.C. and its land area covers only 2.046 square miles in total, so it is limited in its space for housing (Leslie 2020). Though this case might not be especially generalizable to the rest of Virginia counties as a result of these factors, the extremity in multi-unit housing growth in such a small space can still offer some important insights into how multi-unit housing directly impacts communities and can affect important demographic and political outcomes.

5. Background: A Look at Virginia Housing and Demographics
Before considering results from the fixed-effects regressions, this section offers additional context by exploring descriptive statistics for key variables in the analysis, starting with housing. Virginia’s housing patterns have not changed much from the first time period of analysis from 2000 to 2005 to the latest time period from 2014 to 2019. The majority of housing units in the latest time period, approximately 75%, are located in single unit housing structures like single family detached homes or single family attached homes. This number has stayed pretty consistent throughout the past two decades, with Virginia single family housing hovering a little above and below this 75%. Housing structures like duplexes, three-to-nine-unit buildings, mobile homes, and other unconventional housing structures together make up around 17% of all Virginia housing which has also remained fairly consistent. The focus of this research will lie primarily with housing structures that contain ten or more housing units, like apartment buildings. In this 20-year period, apartment building structures in Virginia have increased 1.15% from making up 6.04% of housing units in 2000-2004 to 7.154% in 2015-2019.

Though these statistics are important to contextualize Virginia’s housing patterns overall, it is important to note that they obscure the local changes happening within municipalities. Figure 2 is the distribution of multi-unit housing composition for all Virginia counties across all four time periods. Over 300 observations of Virginia counties over the course of 20 years have had between 0-5% of its housing in multi-unit housing structures. For a vast majority of counties across time, then, multi-unit housing supply has been very limited. The rest of the observations still cluster around the smaller proportions of multi-unit housing. Only very few counties have had their proportion of housing units in multi-unit housing structures exceed 30% in a time period and only a handful reaching the 50-55% range.
Figure 2. Distribution of the proportion of multi-unit housing across Virginia municipalities for all time periods.

In terms of racial diversity, White and Black residents comprise the overwhelming majority of Virginians. In the latest time period from 2015 to 2019, approximately 74.8% of Virginia’s population was White and 18.6% Black according to the ACS estimates. Other racial groups made up 6.6% of Virginia’s population. The White population was down in 2015 to 2019 from its 2000 to 2004 approximation of 76.5%, representing 1.7% decrease over the years. At the state level, it appears that Virginia still has a vast White majority and is diversifying slowly. However, this is not to say that Virginia has no diverse communities. On the contrary, Figure 3 depicts the distribution of the racial diversity index for Virginia municipalities across the four time periods. Though a majority of Virginia counties have had racial diversity indices under 40, indicating a low to middling level of racial diversity in many communities, 25% of the total observations have a racial diversity index of 50 or more. This means that there have been at least 133 instances across time in which a Virginia county has had a fairly diverse community, despite a minority population of non-White citizens in Virginia as a whole.
Virginia’s average income inequality has increased from the first time period to the fourth from 41 to 44. However, this preliminary figure hides a more diverse spread of Gini coefficients across all Virginia counties during each time period revealed by Figure 4. Within Virginia, the Gini coefficient has almost a 30-point range, moving between 33 to 60, revealing that Virginia is a mosaic of different pictures of equality and inequality. Some counties like Bath County in 2000 to 2004 with the minimum coefficient of 33.52, represent places that have low degrees of income inequality between residents. In the context of this research, I take this to mean that Bath County likely has little income diversity in which residents each have a similar amount of income. On the other hand, Virginia also has localities like Dickenson County in the 2014 to 2019 time period that have held Gini coefficients as high as 60.02, which reflects a high degree of inequality. This indicates that there is at least some degree of income variability whereby there are some residents that hold relatively low amounts of income compared to another group who holds a substantial amount more.
As far as voting outcomes, Virginia has seen a great shift in the past 20 years. In the year 2000, George W. Bush, the Republican presidential candidate, won Virginia by getting 52.57% of the vote over Al Gore’s 44.44% and in 2002 the Democratic Party did not run a candidate against the Republican incumbent in a Senate election (Leip). After the 2002 senatorial election, however, the Democratic party successfully gained ground in Virginia counties and started to win elections. Though the Senate race in 2006 was quite close between Democrat Jim Webb and Republican George Allen, with a margin of only 0.39% statewide, by 2008, this margin had grown to over 30% between Democrat Mark Warner and Jim Gilmore with Warner winning 65% of the vote (Clerk of the House 2020). In the 2012, 2014, and 2018 Senate elections, Democrats continued to win with margins of 6%, 1%, and 16% respectively. Since George W. Bush’s reelection in 2004, Democrats also saw gains in Virginia presidential elections, with the Democratic candidates winning the state in 2008 with a margin of 6%, 2012 with a margin of 4%, and 2016 with a margin of 5%.
In Figure 5, Democratic gains seem somewhat deflated with them only appearing to win under 50% of the vote on average across Virginia counties in presidential elections and less dramatic victories in the Senate as the margins in the overall state elections above imply. However, this is an indication of how statewide gains mask a much different story at the individual county level. At the county level, Democrats’ performance is much more varied, with margins being much closer or even losing local polls overall. Figure 5 does not account for population differences and treats counties equally in calculating average margins and thus it reflects how Virginia elections for Democrats are likely carried by a few counties that vote progressively, rather than a majority of counties overwhelmingly electing Democratic candidates. Municipalities like Arlington and Alexandria, both of which have populations over 130,000 people, are consistently Democratic strongholds. Among other northern Virginia municipalities, these areas are known to be the deciding factor for Virginia in favor of Democratic candidates (Tavernise and Gebeloff 2019). With such fluctuations in marginal wins in Senatorial elections and variability in margins at the county level in both presidential and senatorial elections, it is extremely important to analyze the factors that could be making the difference, including shifts in housing and population.
6.1 Results from Regression Analyses: Housing and Demographics

This next section considers the fixed effects regression models that the methodology section described. Descriptive statistics for all variables are reported in Appendix A. The results begin with models predicting county-level income inequality as measured by the Gini coefficient. The key hypothesis in Figure 1, recall, is that increases in multi-unit housing in a county’s housing stock will be associated with increases in income inequality. Table 1 represents four models predicting housing patterns’ effects on distributions of wealth. More specifically, I test the effects of a county’s proportion of housing units in housing structures with ten or more units on a county’s Gini coefficient while also controlling for other factors that might affect wealth distribution including the area’s unemployment rate; proportion of the population that has graduated from high school; and the proportion of the senior population over the age of 65.
### Gini Index and Housing

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Standard errors in parentheses * p<0.10, ** p<0.05, *** p<0.01

**Table 1.** Four models tracking the relationship between housing, economic conditions, education, and age of residents and income inequality.

Column 1 represents a pooled ordinary least squares (OLS) model in which all county observations across time are grouped together without factoring in individual county differences or time effects in constructing the model. Column 2 represents a clustered standard errors model in which I used OLS with regard to the different time periods but without factoring in individual county differences. Column 3 represents a random effects model in which I account for both individual county differences and time effects, but account for these effects in the model’s error rather than in the actual model parameters. Finally, Column 4 represents a fixed effects model in which I similarly account for both individual county differences and time effects but through the
model’s constant, rather than in its error. Through F-tests and Lagrange Multiplier tests, I determined that the OLS models in Columns 1 and 2 were not the best models to capture the data generating process. Through Hausman tests, I found that the fixed effects model accounted for individual county differences and time effects the best over random effects and all other models (Park 2011). Additionally, the fixed effects model has the best fit accounting for 71.3% of the variation in the Gini coefficient after adjustment. As a result, I will move forward with describing only the fixed effects model results. In each iteration of testing beyond this dependent variable of income wealth distribution, I continuously find that the fixed effects model suits the data generating process the best. Thus, I will similarly discuss only the fixed effects results for other sections of my results. However, I will continue to report the results of the other models.

Continuing with the results from Table 1, I find that my critical independent variable, the proportion of housing units in a county that are located in housing structures with 10 or more units, has a statistically significant relationship with the Gini coefficient at the 0.05 level. The parameter estimate on the housing variable of .209 means that for every 1 percentage point increase in multi-unit housing, there would be an increase of 0.209 in the Gini coefficient while holding other variables constant. Other statistically significant variables include education levels and proportion of the population that are over 65 years old. Ultimately, the statistical significance of housing structure type, which does not even directly account for actual housing unit costs, is worth noting. Depending on average changes at the county level in multi-unit housing, this relationship has the potential to have impactful ramifications on the distribution of wealth in counties and even on political outcomes.

Next, I move on to test my second hypothesis: increases in multi-unit housing are associated with increases in racial diversity. I find that the relationship between racial diversity
and housing patterns is somewhat larger than the one between income inequality and housing patterns. As I did with my Gini coefficient analysis, I am basing myself on the fixed effects model. There, I find that for a 1 percentage point increase in housing units in housing structures with 10 or more units, the racial diversity index increases by 0.257 points, reported in Table 2 Column 4. The relationship is statistically significant at the 0.01 level. The model accounts for 98% of the variation in the racial diversity factor index of a county after adjustment. Other factors like education, which may represent the quality or good standing of a locality, also has a statistically significant result at the 0.01 level, but its effect is relatively small. With a 1 percentage point increase associated with only a 0.101-point increase in the racial diversity index, the education variable’s magnitude is less than half that of multi-unit housing. Again, similar to the case with the Gini coefficient, the statistical significance of the relationship between housing pattern alone and racial diversity is noteworthy as it again does not directly measure the affordability of such housing.
Table 2. Table of fixed effects model for racial diversity

6.2. Results from Regression Analyses: Demographics and Voting Outcomes

Now having looked at the relationship between housing patterns and county demographics, I then turn to the relationship between these factors and voting outcomes. In the models outlined in Table 3, I test the effects of income diversity, again represented by the Gini coefficient, and racial diversity represented by the racial diversity index, on Democratic performance in Senate elections measured by their share of votes. Column 1 is a fixed effects model predicting Senate election outcomes without accounting for religiosity and with the full
sample of observations. Column 3 is a fixed effects model that does account for religiosity, but as a result is restricted to a subsample of observations. While religiosity may play a significant role in determining political voting outcomes, specific, county level religion variables were only available for Virginia counties at the exclusion of its independent cities. Thus, the model has a much lower observation count, 408, than the other model that includes all counties and independent cities, 532. Column 2 is a fixed effects model that does not account for religiosity but also uses the limited sample of municipalities for which religiosity variables were available in order to provide a comparison to Column 3.

<table>
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<tr>
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<th>(1) Fixed Effects Full Sample</th>
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Standard errors in parentheses * p<0.10, ** p<0.05, *** p<0.01

**Table 3.** Table of fixed effects models for share of Democrats’ votes in Senate elections
Here I find that of the two key variables of analysis, only racial diversity is statistically significant at least at a 0.05 level. The effect of racial diversity also seems to be strong in magnitude in Column 1, with only a 1-point increase in diversity level necessary to increase the share in votes for Democratic candidates in Senate elections by .422 percentage points. In the Senate model accounting for religiosity, diversity’s role in share of votes for Democratic candidates is even larger, whereby a 1 point increase in the diversity score is associated with a 0.535 percentage point increase in a Democrat’s share of votes. Column 2 corroborates this parameter estimate for racial diversity despite not factoring in religiosity. Religiosity itself did not really add much to model, but this may be due to the limited availability of observations across the four time periods.

Table 4 represents similar analysis on presidential elections, where Column 1 is a model using the full set of observations and Columns 2 and 3 operate on the subsample for which religiosity variables are available. Again, only racial diversity appears to be the statistically significant variable among those of interest. In Column 1, with the full set of observations, it is significant at the 0.05 level. Under this model, racial diversity’s effects on the share in votes for Democratic presidential candidates is weaker than in Senate elections, where an increase in the diversity factor by 1 point is associated with a 0.279 percentage point increase in the Democratic candidate’s performance. In the subsample models, racial diversity is statistically significant at the .1 level. Here, its effect on Democratic voting outcomes is even weaker, with both models finding that a 1-point increase in racial diversity is associated with an approximately 0.2 percentage point increase in a Democrat’s share in votes. In practice, these effects can be quite large, as racial diversity varies widely across Virginia counties.
### Table 4. Table of fixed effects models for share of Democrats’ votes in Presidential elections.

#### 7. Discussion of Results

Considering the weakness of income diversity in affecting voting outcomes, the majority of the discussion here will focus on housing patterns, its relation to racial diversity, and thereby its relation to voting outcomes. Beginning with the results I found in Table 2, I found that for a 1 percentage point increase in housing units in housing structures with 10 or more units, the racial diversity factor increases by 0.257. In reality, this is quite a substantial jump in multi-unit housing to make such a small difference. Supposing a county were to move from being at the
25th percentile of multi-unit housing composition, which would be about 1.27%, to the 75th percentile at 9.46%, that would be associated with only a 2.1-point increase in racial diversity. A move from the 50th percentile, or 3.22%, to the 95th percentile, or 21.2%, would mean a bigger increase in racial diversity by 4.6 points. When the average growth in multi-unit housing is only by 1.11 percentage points across this 20-year time period, such growth in multi-unit housing seems unlikely. However, with increases in multi-unit housing as high as 13 percentage points, substantial changes similar to those described here are not unheard of. Calling back to the original hypothesized path diagram in Figure 1, I find that the relationship between housing patterns and racial diversity is present but fairly weak given actual rates of multi-unit housing increases.

Following the path diagram, I find that due to the magnitude of racial diversity’s effect on Democratic performance, even the relatively weak relationship between multi-unit housing and racial diversity could be amplified in terms of its effect on voting outcomes. To reiterate, in the fixed effects model for racial diversity, I find that a 1 percentage point increase in multi-unit housing is associated with a .257-point increase in the racial diversity index. Using the most conservative estimates of racial diversity’s effects on Senate voting outcomes, I still find that a 1-point increase in the racial diversity index is associated with a .422 percentage point increase in a Democratic candidate’s share of votes in Senate elections. For Senate elections in the latest time period, the median margin of difference between Democratic and Republican performance in county elections is approximately 11.5 percentage points favoring Republicans since most counties tend to vote Republican despite the state overall tending to vote Democratic. Through its association with racial diversity in Virginia communities, a 10.6-percentage point increase in multi-unit housing could be associated with the closure of this gap by 1.15 points, or 10% of the
total gap, going off of the estimates specified above. Through a 27-percentage point increase in multi-unit housing, this gap could be closed by 2.875 points, or 25% of the total gap. Though such growth in multi-unit housing is historically rare in Virginia, this is not to say it is impossible. Considering many Virginia municipalities may soon need to significantly restructure their housing in response to the housing affordability crisis, these increases could be more likely in the future and affect voting outcomes in non-trivial ways.

Taking in the historical influence of zoning on racial and income diversity and Virginia’s lack of significant housing restructure since initial zoning policies, it is still surprising to find that the relaxation of such zoning policies in Virginia municipalities have not been associated with more significant effects. The fact remains that there are still great disparities between White people’s wealth and the wealth of others, with the typical White family holding 8 times the wealth of a typical Black family (Bhutta et. al 2020). Further, Virginia’s high eviction rates are highly associated with low-income, non-White residents (McCoy 2018). If relaxing zoning restrictiveness is supposed to address housing affordability, why did I not observe a greater association between more multi-unit homes and racial diversity? To answer this question, I now turn to a deeper look into one Virginia municipality, Falls Church, VA.

8.1 Falls Church: An Overview
The evolution of zoning and housing in Falls Church, VA, represents an extreme case of multi-unit housing growth. Between the years 2000 and 2020, the City of Falls Church had one of the largest increases in multi-unit housing among all of Virginia’s municipalities at a 12.8 percentage point increase. Although unusual for the state as a whole, Falls Church is still an interesting and relevant study in that it is a small community with “little vacant land” remaining in the city’s residential areas (City of Falls Church 2017). This lack of vacant space signifies that the growth in multi-unit housing came at the cost of existing single-family or alternative homes, rather than as a result of developing new land. Such a substantial change in such a small landscape could reveal potential relationships between housing and demographics, as even the smallest redevelopment could affect a large proportion of the city’s population.

Falls Church began the 2000s similarly to the wider Virginia area with a majority White population and with a relatively uniform housing stock dominated by single family homes.
Though its proximity to Washington, D.C. and the resulting unique economic and migration factors related to that make conclusions gathered from analyzing Falls Church somewhat limiting, it still allows for the basic analysis of what happens to a community when its homes go from relatively sparse and spread out to a new, more densified pattern.

Figure 7 below depicts the demographic and housing changes in Falls Church over time. In the first time period between 2000 and 2004, indicated by time period 1, Falls Church had a racial diversity score of approximately 30, a Gini index of 39 and only 32% of its housing units were in multi-unit structures. Moving beyond those time periods, both the racial diversity score and Gini coefficient grew, with racial diversity growing more dramatically from 30 to 37 by the third time period, or 2010 to 2014, than the Gini index, which only increased from 39 to 42. At the same time, multi-unit housing also grew significantly over this time period overall, specifically in moving between time periods 2 and 3, or from 2005 to 2014. In that time, multi-unit housing grew to 42% of housing units overall. After that point, interestingly, racial diversity and the Gini index diverge, with the Gini coefficient rising up to 44 and the racial diversity index decreasing to 35. At the same time, the city still maintained its multi-housing growth but at a slower pace, increasing only by 2 percentage points to 44%. 
The quantitative analysis and this qualitative case study assume that zoning restrictiveness and housing composition, namely proportion of multi-unit housing, are inherently related. Falls Church provides evidence for the inter-connection between zoning itself and housing composition and justifies looking at zoning more closely, as Figures 8 and 9 begin to show. According to Figure 8, the City of Falls Church designated approximately 67% of its buildings as single-family homes amongst all building types, including commercial buildings and other types of alternative housing. Figure 8 also indicates that multi-unit buildings were in the minority in 2005 among all building types at 8%. However, because Figure 8 represents proportions of residential buildings amongst all building structures generally rather than housing units, it is rather difficult to track onto the patterns identified in Figure 7. However, what we can gather from Figure 8 is that according to 2005 zoning designations for Falls Church, the city began the early 2000s with a zoning plan calling for a significant number of single-family structures and a smaller minority of multi-family buildings. This does track with Figure 7
estimates that Falls Church began in time periods 1 and 2 with a very low proportion of multi-

housing units.

Figure 9 is a much easier comparison to Figure 7 as it captures proportions of housing units among housing structures. It represents planned zoning designations by residential housing type at the tail end of 2009 into 2010 among residential buildings only. In Figure 7, under the transition between time period 2 and 3, Falls Church begins to demonstrate a shift in its housing composition from an overwhelming majority of single-family units to a more diverse housing stock. Figure 9 reflects this change, as multi-unit housing represented over a quarter of total housing in 2009. Generally, the City of Falls Church claims that their land use patterns and zoning maps are “close to a mirror image” of each other (City of Falls Church 2017). Beyond these two figures they consistently provide evidence to support this fact throughout time.

**Figure 8.** 2005 Falls Church zoning designating the number of residential building types as percentages among all building types, including residential and business buildings. Adapted from Northern Virginia Regional Commission (2004).
Finally, Figure 10 captures the Falls Church political outcomes. From time period 1 to time period 4, Democratic candidates gained significant ground. Though their performance in Falls Church was strong to begin with, garnering approximately 65% of the vote in the first period in the presidential election, Democrats still went from having a fair lead over Republicans in the early 2000s, to dominating elections by the 2010s. However, this transition was not a linear one for Falls Church, with Democrats performing better overall in elections during the second time period’s elections than in the third time period when multi-unit housing was on the rise. This evolution of Democrats’ performance in Falls Church does reflect a larger transition in Virginia politics toward generally favoring Democratic candidates, especially considering that Falls Church is among the populous northern Virginia counties that generally weigh elections in Democrats' favor (Seabrook 2009). Considering the described patterns of drastic housing shift, it is worth tracking whether this shift connects in some way to Falls Church’s voting outcomes.
8.2. Falls Church: What Happened and Analysis

Overall, the statistics for Falls Church seem to reflect the results of the quantitative analysis. Superficially, the densification, or increase in multi-family housing units, is associated with an overall increase in racial and income diversity. During the same four time periods, Democrats’ performance in Falls Church improved. However, it is quickly evident with Figures 7 and 10 that the story is much more complicated than that, as the growth in multi-unit housing does not quite track with increases in racial diversity. For example, from time period 3 to 4, where one would theoretically expect diversity growth after the substantial addition of multi-unit homes that occurred in between time period 2 to 3, such a growth did not occur, and yet Democratic performance continued to improve.

In Figure 10, growth in both racial diversity and multi-unit housing from time period 2 to 3 does technically track to better Democratic performance after the third time period, but the magnitude of growth in Democratic performance across all four time periods greatly exceeds the
smaller increase in racial diversity. Across the 20-year time span, Democrats’ Senate election vote share increased by 10 percentage points in Falls Church. Falls Church’s racial diversity index only increased in the city by approximately 5 points from 30 in the first time period to 35 in the last, meaning it should be associated with only a 2.1 percentage point increase in Democratic candidates’ Senate election vote share based off of the results reported in Table 3.

This suggests that despite the quantitative findings that racial diversity is associated with better Democratic performance, the magnitude of its relationship is not sufficient to account for such a drastic improvement in Democratic performance in Falls Church. Ultimately, this confirms the quantitative findings that the relationship between housing and demographics is a relatively weak one and perhaps suggests that neither are central to changes in voting outcomes, at least for Falls Church.

In the first time period, Falls Church residents who are White had a median income of $90,085 and non-White Falls Church residents, weighted by racial group population, had a median income of $59,879. This disparity did not disappear in the later time periods. From 2015 to 2019, White residents still had a median income over $67,000 greater than non-White residents. With observed income disparities between White residents and other residents in the area, why did changes in housing, namely densification, not lead to greater increases racial diversity in Falls Church? Primarily, the answer lies in that housing densification in Falls Church was not accompanied by increased housing affordability. In fact, according to the Falls Church’s Consolidated Plan for FY 2011-2015, “there are very few affordable for-sale units in the City of Falls Church.” This is true of 2004, before most of the multi-unit structure growth in Falls Church, but affordability still did not happen after, as a 2019 report states that “Falls Church… is experiencing rapidly rising housing costs” (Heffernan et al. 2019). The simple densification of
housing in a municipality is not enough to account for changes in racial and income diversity, for both of those to occur, there must be a more active municipal effort toward housing affordability.

In its 2005 zoning plans, Falls Church stipulated that residential land use within the city would remain fairly constant “with the exception of… medium- to high density development in redevelopment projects” (City of Falls Church 2017). According to this plan, the city should increase multi-unit residential housing buildings among all building types by 6 percentage points from the 2005 levels shown Figure 8. With such increases in density in mind, Falls Church moved forward and by 2015 had done much to accomplish its 2005 goals, with multi-unit housing encompassing 26% of housing overall. However, the city failed to center affordability in these plans. The 2007 City of Falls Church Affordable Housing Assessment Study found that the City would lose up to 754 affordable multifamily rental housing units by 2010 through the possible rehabilitation of affordable rental properties” (LaSalle 2007). According to its 2010 Housing plans for 2011-2015, this proved to be the case, as Falls Church’s “affordable for-sale housing supply ha[d] significantly decreased since 2001” (Northern Virginia Regional Commission 2004). In the present day, Falls Church continues to suffer a lack of affordable housing as it confronts still more increases in housing costs (Heffernan et al. 2019).

Despite what these trends imply, the city did and still does have affordable housing programming in place in addition to national programs like Section 8 vouchers. In 2002, Falls Church introduced the Affordable Dwelling Unit (ADU) program through a zoning ordinance in which the city offers density bonuses to developers in exchange for ensuring that a designated proportion of the units they construct will maintain its price below market value for a period of time. Developers of many types of buildings can take advantage of this program though many of
them were multi-unit housing developers specifically. For example, Pearson Square, Northgate, West Broad Residences, and Tinner Hill are all large multi-unit apartments under the ADU program (Heffernan et al. 2019).

Notably, the ADU approach is primarily based in the city’s “dispersed” plan for affordable housing in which affordable housing is scattered throughout the city rather than concentrated in designated buildings. Prior to the surge in multi-unit structures in 2010, one common comment from a Falls Church Community forum was along the lines of this one: “many families of one particular race/income live in one specific apartment complex in the City of Falls Church” (Northern Virginia Regional Commission 2004). This comment came from a desire in the low-income community to have a wider availability of affordable housing beyond just historically affordable sections. Concentration of affordable housing in only certain parts of the city reduces choice for low income and often minority individuals deciding where to live. In this sense, affordable housing in Falls Church through the dispersed approach should theoretically make Falls Church a very attractive place to relocate for low-income individuals as they have a wider variety of choices. However, since housing costs have only continued to increase overall and income and racial diversity growth have stalled, programs and others like these clearly did not have this effect.

It seems, then, that zoning had no real effect on the income or racial diversity that would have occurred had low-income individuals entered the municipality. The reason is that in taking this passive, density-bonus based dispersed approach, Falls Church failed to really produce the affordable housing units many of its citizens demanded. In 2008, after the city had approved a controversial affordable multi-unit housing structure, Councilman Hal Lippman spoke on the insufficiency of the dispersed affordable housing approach: “the ‘dispersed approach’ to
affordable housing, imbedding a small number in each new large-scale mixed use or residential project, produced only 38 new affordable units in the City, despite the boom in such projects since 2001” (Benton 2008). Lippman was not wrong. Most of these projects were luxury apartment buildings that only served to increase rent prices and did not often take advantage of the ADU program or other affordable housing initiatives (Sturtevant 2018). Overall gross median rent in the city increased by approximately $800 in 2019 dollars from the first time period, 2000 to 2004, to the fourth, 2014 to 2019 after accounting for inflation.

Superficially, one could interpret the controversy surrounding Falls Church’s 2008 approval of a multi-unit structure as the result of a deeply important tradeoff facing many municipalities in confronting housing affordability through zoning: “the pressure for continued economically-driven development, on the one hand, and the need for a serious consideration of the affordable housing question on the other” (Benton 2008). However, community input on the incident reveals that the conversation surrounding densifying the city, and more specifically densification with affordability, also brought up questions on demographic change.

Starting in 2006, when conversations around the dispersed approach to affordable multi-unit housing arose, it was clear who the main opponents to the concentrated approach were and the Council, the decision-making body for Falls Church, knew it. “The Council knows that all the heartburn it experienced over its differences with affordable housing advocates in the recent past derived not from those advocates, but from the pressures of the wealthy residential neighborhoods of this community against allowing affordable housing in” (Benton 2006). Similarly, the Council was almost swayed in 2008 by calls for an “economically gated community” on the grounds that the city of Falls Church “can’t be all things to all people” as it narrowly voted 5-4 to approve the multi-unit affordable housing building (Benton 2008). With
such fears of the introduction of low-income residents to the overall affluent, White Falls Church community, dense housing construction went on, for the most part, without any active controls on housing cost or pricing for residents. Since then, not much has changed in Falls Church in terms of changing its affordable housing approach (Sturtevant 2018). Though densification overall has not significantly increased the population of low-income residents, the 2008 incident does point to a deep tie between densification and demographic change that local communities factor in when discussing zoning and affordability policy.

Due to Falls Church’s continued dispersed approach and community fears, densification is occurring in the area, but demographic change is slow. As a result, the voting outcomes described in Figure 10 are likely not due to zoning’s effects on housing composition and racial and income diversity. The urbanization of northern Virginia municipalities and increased levels of education are likely spearheading Falls Church’s increased support for Democratic candidates in recent years (Seabrook 2009; Tavernise and Gebeloff 2019). In Falls Church, specifically, it seems that Falls Church affluent and educated suburbs within local townhome communities seem to the greater source of votes for Democratic candidates in recent years, rather than the lower income occupants of multi-unit housing (Bowman 2018).

All of this is not to say that Falls Church’s residential zones have nothing to do with its demographic composition at all. Over the past 20 years, Falls Church has “seen a surge in households that have incomes between $50,000 and $100,000 (Sturtevant 2018). It has also seen a 5-point increase in its racial diversity index. Though Falls Church is diversifying rather slowly compared to the surrounding areas, it is worth noting where this diversification is occurring.

Figure 11 presents three maps of the City of Falls Church depicting the municipality’s zoning code in Figure 11A, its median household income levels by block group in Figure 11B, and the
density of its White population by block group in Figure 11C. The areas in which the 2019 zoning map in Figure 11A specifies as higher density tracks quite well to areas that Figures 11B and 11C point to where average income is lowest in the county and where White citizens live the least. For example, the multi-unit housing buildings on Rowell Court, Hillier Street, and Rees Place, identified in dark brown in the center of Figure 11A below, correspond to the lighter shaded areas in 11B where Falls Church has a median income level between $50,000 and $75,000. Additionally, these areas also have the lowest shares of White residents among the City, being only 44-61% White according to 11C.
Figure 11. The Interconnection between Falls Church’s Zoning, Household Income Levels, and White Population

A. 2019 Falls Church Zoning map. Deep brown and black represent multi-unit housing (Community Planning 2019)

B. 2019 map of Falls Church depicting average household incomes by block group. Deeper colors indicate higher income. (Statistical Atlas 2019)

C. 2018 map of Falls Church depicting the proportion of White people living in each block group in Falls Church, VA. (Statistical Atlas 2019)
These maps still indicate that there is something deeper to zoning, housing patterns, and demographics, despite findings that they are weakly associated. Coupled with Falls Church’s community fears and its dispersed approach to affordable multi-unit housing, it seems that Falls Church’s housing densification did not have my theorized substantial impact on diversity indicated in Figure 1 as a result of Falls Church’s failure to accompany densification with more active attempts at affordability than passive density bonus programs. This insight could help to partially explain why my quantitative results did not reveal a strong association between the relaxation of zoning restrictiveness and increases in diversity. Without local government controls on affordability, increases in housing supply can only do so much in terms of bringing on affordability itself, especially in areas like northern Virginia that have high demands for housing.

9. Conclusions and Further Research

My initial questions into this subject centered on zoning’s relevance as a possible solution to Virginia’s housing affordability crisis. I sought to look at the past two decades of zoning policy and housing composition to come up with ideas as to how zoning might come to affect Virginia communities and politics in the future should densification become a dominant strategy to address housing issues. Ultimately, zoning policy has substantial effects on population composition and voting only if densification occurs on a massive scale currently rare to Virginia counties, needing a growth of 10 to 27 percentage points to result in sufficient levels of racial diversity to sway county-level Senate election results and even greater shifts to affect presidential election tallies in the state’s counties. In a future where Virginia counties do prioritize densification to address affordability, perhaps such effects are possible but considering that median growth of multi-unit housing over the course of 2000-2019 was 0.48 percentage points, this seems unlikely.
Ultimately, my theorized path diagram outlined in Figure 1 did, in part, hold up in my quantitative look at all Virginia municipalities but my in-depth discussion on Falls Church revealed that is perhaps too simplistic. Relaxing zoning policies and ensuing housing densification alone is not enough to yield substantial changes in population on a wider, more systematic level at current Virginia levels of multi-unit housing. As a result, relaxing zoning restrictiveness does not inherently cause demographic changes as they have emerged in the state between 2000 and 2019 and thus, on its own, cannot help explain voting outcomes in meaningful ways. Falls Church provides an excellent example of how densification policies do not result in substantial demographic change. Tracing through its housing policies and programs suggests that perhaps the reason densification did not result in demographic change within its borders was because Falls Church failed to prioritize affordability in the construction of its multi-unit buildings. The generalizability of this Falls Church’s specific story explaining the quantitative results of this analysis is limited due to its extreme and unusual nature, more research is required in order to determine if the failure to center affordability in the construction of multi-unit homes weakens densification’s effects on local populations in Virginia generally and not just within Falls Church.

These results still have important ramifications on overall discussions relating to zoning and housing affordability. Previous literature discussions on zoning often take its effects on demographics for granted. As noted in my discussions of the quantitative results, this research reveals that zoning’s modern relationship to population composition is more complicated as relaxing zoning density laws that have historically segregated communities by race and income do not apparently do much to introduce income or racial diversity into Virginia’s municipalities. Additionally, as many counties move forward with discussions of housing affordability, it is
important to acknowledge that zoning densification and its increases in housing stock can only do so much help lower housing costs, particularly in areas of such high demand like Falls Church. As discussions on how to approach housing affordability continue, it would be prudent for Virginia’s local governments to consider the effects of their strategies thoroughly.

Further research into zoning and demographics is still necessary. Primarily, it is worth investigating what the interaction between densification and government controls on housing affordability would lead to. If Falls Church, for example, had prioritized affordability in its construction of multi-unit homes more, its story over the past 20 years might look a lot different. It is apparent that zoning alone does not necessarily result in housing affordability in Virginia but that perhaps it, in combination with other policies, could lead to a significant restructuring of the state by providing more housing opportunities to low-income residents.
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Social Explorer Tables: ACS 2019 (5-Year Estimates)(SE), ACS 2019 (5-Year Estimates), Social Explorer; U.S. Census Bureau

Social Explorer Tables: ACS 2014 (5-Year Estimates)(SE), ACS 2014 (5-Year Estimates), Social Explorer; U.S. Census Bureau

Social Explorer Tables(SE), C2000, U.S. Census Bureau and Social Explorer

Social Explorer Tables(SE), C2010, U.S. Census Bureau and Social Explorer


[https://statisticalatlas.com/place/Virginia/Falls-Church/Overview](https://statisticalatlas.com/place/Virginia/Falls-Church/Overview).


### Appendix A: General Variable Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini Coefficient</td>
<td>532</td>
<td>42.67281</td>
<td>4.335496</td>
<td>31.9</td>
<td>60.02</td>
</tr>
<tr>
<td>Racial Diversity Index</td>
<td>532</td>
<td>33.0221</td>
<td>16.91804</td>
<td>0</td>
<td>60.87152</td>
</tr>
<tr>
<td>Proportion of Multi-Unit Housing</td>
<td>532</td>
<td>6.688817</td>
<td>8.728358</td>
<td>0</td>
<td>53.80688</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>532</td>
<td>6.098201</td>
<td>2.881397</td>
<td>.2457002</td>
<td>33.5002</td>
</tr>
<tr>
<td>Education</td>
<td>532</td>
<td>81.80567</td>
<td>7.758232</td>
<td>56.49253</td>
<td>98.88309</td>
</tr>
<tr>
<td>Senior Population</td>
<td>532</td>
<td>16.28898</td>
<td>5.031888</td>
<td>4.714114</td>
<td>38.88385</td>
</tr>
<tr>
<td>Congregations per 1000 people</td>
<td>408</td>
<td>2.118561</td>
<td>1.251296</td>
<td>.4291345</td>
<td>9.047824</td>
</tr>
<tr>
<td>Presidential Democratic Share in Votes</td>
<td>532</td>
<td>44.0553</td>
<td>13.48529</td>
<td>14.43135</td>
<td>89.78502</td>
</tr>
<tr>
<td>Senate Democratic Share in Votes</td>
<td>532</td>
<td>48.74564</td>
<td>12.75828</td>
<td>22.07212</td>
<td>89.64226</td>
</tr>
</tbody>
</table>
Appendix B: 2000-2004 Estimation

There is no 5-year American Community Survey (ACS) that I could use for the time period between 2000 and 2004. Though the Census Bureau did at one point have this 5-year survey, they have since archived it due to reported issues with the dataset. As a result, I created my own 5-year dataset using the available ACS from 2005 to 2019 in addition to the 2000 Census. Using linear regression based on the available data, I estimated values for my variables of interest for 2001, 2002, 2003, and 2004. I then averaged the values for each year to create the 5-year period estimates for each county. The figures below represent the linear regressions for five variables for five Virginia municipalities I selected at random using a random number generator. As depicted in the figures, the linear estimations for the Gini coefficient, the White population, the unemployed population, the senior population, and the high school educated population do track well with the observed values in the available ACS estimates.

However, this estimation does incorporate error into my quantitative analysis. For each of these variable estimations, I have at most four values to base the linear model off of: the values inputted in the 2000 Census, the 2005 to 2009 ACS, the 2010 to 2014 ACS, and the 2015 to 2019 ACS. As a result, the real period estimates of an ACS survey that would have occurred between 2000 and 2004 might differ from the period values I created. This is especially problematic for the Gini coefficient, in which I could only use three values to base the linear models off of because the 2000 Census did not report county Gini coefficients. With more time, I would have ideally used some version of multiple imputation, such as King et al. (2001) to incorporate a more sophisticated estimation procedure.
Appendix B: 2000-2004 Estimation

Gini

White Population

Unemployed Population

Senior Population

High School Education

Albemarle County

Grayson County

Prince William County

Falls Church City

Galax City