Balancing the Scales
The Impact of the Built Environment on the Socioeconomic Diversity of Metropolitan Boston
By Michael Kaplan
The question that this thesis ponders is: Is there a physical neighborhood form that promotes more integrated communities by supporting the different living preferences and resources of diverse racial and class groups? Though there are many factors that influence the socioeconomic diversity of a neighborhood, this study tests the hypothesis that a balanced urban environment—one that includes the characteristics of both city and suburb—is the most conducive neighborhood design to generate diverse communities. Residents' preferences for neighborhood style, location, and housing vary depending on need, resources, culture, and place in life. The city and the suburbs both offer different locations, housing options, and urban design that appeal and are available to different types of individuals. A balanced urban environment is one that spans both realms and offers a lifestyle that merges these two preferences together. A community that is able to provide a wider range of both urban and suburban options is likely to be more attractive, both financially and emotionally, to a broader spectrum of people, and thus more likely to be more socioeconomically diverse.

Using metropolitan Boston as a case study, this thesis mapped socioeconomic diversity, defined as an equal mix of races and income classes, in the region. The author then visited the top eleven most diverse neighborhoods and identified two distinct neighborhood styles, the streetcar suburb and the affordable suburb, that promoted diversity. The observations from this fieldwork sparked three theories to explain why certain communities are more diverse than others: The Second Best Location Theory, the Affordable Walkability Theory, and the Personal Urbanism Theory. The observations also became the foundation for the thirteen variables that were developed to test these three theories empirically through a hedonic regression: distance to CBD; distance to transit; public transit usage; lot size; building density; density per dollar; walk score; walk score per dollar; presence of single family and small multifamily homes; and housing mix, size and tenure.

The results of the regression confirm that diverse communities exhibit a balance of physical factors, including multiple transportation options, moderate density, multiple housing choices, including both single family and detached multifamily homes, as well as a roughly equal proportion of renters and owners, which is influenced by the presence of a mix of housing types. Location to train stations was insignificant, leading to the discovery that bus service is more associated with diverse communities than rapid transit. Additionally, the built environment was much more significant in explaining diversity in the suburbs than in the city, while the diverse communities in the city are likely caused by gentrification taking place around transit nodes. A hierarchy of the influence of urban form factors on diversity was also discovered, with small lots, a moderate density level, and public transit critical in setting a foundation for a mix of housing types and the presence of average sized homes.

This study concludes by providing recommendations to improve the diversity of communities, including densifying suburban development, increasing bus service in the suburbs, preserving existing streetcar suburbs in cities, instilling more community control over public spaces in the city, and attempting to change the development of metropolitan regions to follow the balanced pattern of the dense urban suburbs.

Thesis Supervisor: Terry Szold
Title: Adjunct Professor, Department of Urban Studies and Planning
I would like to thank everyone who helped me make this thesis happen. My advisor Terry Szold was instrumental in supporting me through the early days when I struggled to define my topic and was a constant source of encouragement throughout the process. My reader Albert Saiz led me through the regression analysis and gave very insightful feedback that helped make the final product more effective. It was also serendipitous that Emily Talen, an expert on urban form and diversity, was a visiting professor at MIT during this semester, as her knowledge and experience steered me in the right direction.

I would also like to thank all my classmates and professors who influenced my education over the past two and a half years, especially professors Eran Ben-Joseph and Dennis Frenchman. The Real Estate Club III, fellow holdovers from the 2013 class, injected humor into my life when all I could think about was the burden of my thesis, and my roommate Zac Shore helped set thesis goals that we had to jointly meet before we were allowed to enjoy an episode (or two) of Game of Thrones. (He also contributed to a lot of anxiety as he made daily announcements about the number of days until our theses were due.)

I would like to especially thank Bill and Joan Porter for encouraging and helping me to go to graduate school and for everything they have done for me over the years. Nama, my warm, cuddly writing partner was always there to sit on my lap and distract me from the task at hand. And of course, immense thanks go to my parents, Tina and Richard Kaplan, for their continuous love and support, and for always encouraging me to value life over work.

Finally, this thesis could not have been completed without Karen Tang, both literally and figuratively. If it wasn’t for you editing my entire paper and giving me critical, unbiased feedback, it probably would have been terrible. You also supported me through this process, visited me often, and gave me your love. You are not just my partner in this thesis, but in everything I do. I love you.
Table of Contents

<table>
<thead>
<tr>
<th>Chapter 1</th>
<th>Introduction</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Benefits of Diverse Communities</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>II. Doubters of Diversity</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>III. Drivers of Diversity</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>IV. Hypothesis</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 2</th>
<th>Literature Review</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Housing Mix and Diversity</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>II. Housing Tenure and Diversity</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>III. Density and Diversity</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>IV. Urban Design and Diversity</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>V. Designing for Diversity</td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 3</th>
<th>Methodology</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Defining Diversity</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>II. Calculating Diversity</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>III. Measuring Diversity</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>IV. Site Visits and Regression</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>V. Data</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>VI. Case Study: Boston</td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4</th>
<th>Anatomy of a Diverse Neighborhood</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Streetcar Suburb Observations</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>II. Affordable Suburb Observations</td>
<td>64</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 1
Introduction
The end of segregation is upon us. So said well-regarded economists Ed Glaeser and Jacob Vigdor, who proclaimed the end to a dark chapter in American history. In studying 2010 Census data, they found that cities were the most integrated they had been since 1910, and that segregation had been significantly declining since the 1970’s.¹ “In 657 out of 658 housing markets tracked by the Census Bureau, segregation is now lower than the average level of segregation marked in 1970…. No housing market in the United States today features an isolation level as high as the national average in 1970.”² Ghettoization was also on the decline. Defining a “ghetto” as a neighborhood where 80% of residents are black, they found that only 20% of blacks lived in a ghetto, compared to 50% fifty years ago.³ But it was not just conservatives who were proclaiming victory. The Census Bureau said that the United States had truly reached a “plurality nation.”⁴ The New York Times touted that “by the end of this decade … no single racial or ethnic group will constitute a majority of children under 18.”⁵ After our long journey, it seems our country has finally become integrated. Or so we thought.

But despite what these numbers tell us, a deeper look into race relations in this country finds that segregation still persists. William Frey found that, “the average black resident still lives in a neighborhood that is 45 percent black and 36 percent white. At the same time, the average white lives in a neighborhood that is 78 percent white and 7 percent black.”⁶ Additionally, “the average black family earning more than $60,000 a year lives in a neighborhood with a higher poverty rate and lower educational attainment than the average white family earning less than $30,000.”⁷ This trend is not limited to just African Americans, as Hispanics “comprise only 15 percent of the population, [but] fully 45 percent of their neighbors are also Hispanic.”⁸ Ultimately, many demographers find that “Americans still live primarily among people who are like them.”⁹

In fact, segregation has actually become more pervasive in recent years. “In nineteen of the top twenty-five U.S. population centers, Latinos were more likely to live apart from other groups in the year 2000 compared to 1990. The same is true for Asians, who were more likely to live apart from other races in twenty-one of the twenty-five centers in the year 2000 compared to 1990.”¹⁰ Furthermore, “as suburbs became more racially and ethnically diverse in the 1990’s, minority segregation in the suburbs increased.”¹¹ Jonathan Kozol, in his book Shame of a Nation, found that “the percentage of black children who now go to integrated public schools is at its lowest level since 1968,”¹² and a study by the Civil Rights Project at UCLA shows that segregation is increasing in public schools across the country.¹³ Despite the gains in the country’s overall diversity of population, race still matters.

¹ Glaeser and Vigdor 2012
² Glaeser and Vigdor 2012, page 1 and 2
³ Roberts 2012
⁴ Cooper 2012
⁵ Cooper 2012
⁶ Roberts 2012
⁷ Briggs 2005, page 26
⁸ Frey 2010
⁹ Morello and Keating 2011
¹⁰ Day 2003, page 85
¹¹ Briggs 2005, page 26
¹² Karnasiewicz 2005
¹³ Cutler 2009
More critically, racial segregation remains intrinsically linked to another major issue facing this country: the income gap. The chasm between the rich and the poor is vast, and growing. “The United States has the distinction of having the greatest income and wealth disparities of any advanced industrial society.”

Well known accounts in the workplace also tell the tale of an increased income gap in the United States. “In 1978, the average CEO made 37 times what the average worker made; by 2000, the average CEO made 310 times what the average worker earned.” It got even worse after the Great Recession of 2008—Pulitzer Prize winning journalist David Cay Johnston showed that the incomes of the top 10% accounted for 149% of the income growth from 2009 to 2011, leaving the bottom 90% of wage earners with declining incomes. From the longer period between 1966 and 2011, the bottom 90% of average incomes gained a nominal total of $59—a mere .2%—while the top 10% earners grew 84% over that same stretch. Additionally, Pendall and Carruthers found that the U.S. Gini coefficient, which measures economic inequality with 0 being perfect equality and 100 being perfect inequality, rose from 38.8 in 1968 to 45.9 in 1997. Nobel Prize winning economist Robert Shiller, summing up this worsening situation, said that income inequality is the biggest problem that the United States faces in the future.

This income inequity manifests itself spatially in our metropolitan areas. A Stanford study showed that income segregation in communities has increased from 1970 to 2000 across the country. During this same period, Pew found that income segregation increased in 27 of the 30 largest metros. Also during this stretch, “Massey and Fisher find that segregation of the rich and poor increased 34 percent among whites and 27 percent among blacks.” Bischoff and Reardon found that “the proportion of families living in poor or affluent neighborhoods doubled from 15 percent to 33 percent and the proportion of families living in middle-income neighborhoods declined from 65 percent to 42 percent.” From the results of these racial and economic studies, it is clear that we are still not a well-integrated society.

This physical separation between rich and poor, white and black, creates many issues that exacerbate the wealth disparity and social inequality. Segregation leads to extreme conditions on both ends of the spectrum, with high physical concentrations of wealth and poverty. The concentration of poverty, in turn, creates some of the largest issues we face in America today.

Quality education is one of the most effective ways to increase opportunity, but minority and lower income communities often feature schools that fall short of the standards of those in wealthier communities, hindering a lower income child’s future prospects for overcoming the disadvantages they already face. In a study of Massachusetts SAT scores, the wealthiest school districts had average scores of 594 to 621 out of a maximum of 800, whereas the poorest districts averaged from 403 to 469. The study found that “the

---

14 Dreier, Mollenkopf & Swanstrom 2004, page 19
15 Dreier, Mollenkopf & Swanstrom 2004, page 21
16 Johnston 2013
17 Pendall and Carruthers 2003
18 Christoffersen 2013
19 Fischer et. al. 2004
20 Fry and Taylor 2012
21 Briggs 2005, page 27
22 Bischoff and Reardon 2013, page 32
single best predictor of a child’s likelihood of academic success remains … the socio-economic status of his or her mother,” since better schools are in wealthier communities. Lower income neighborhoods have lower quality teachers, as well—a Department of Education study found that “schools with 75 percent low-income students had three times as many uncertified, out of field teachers” as those in high income areas. This stems from a lack of resources. “Tens of thousands of schools serving low-income students are being shortchanged because districts spend fewer state and local dollars on teacher salaries in those schools than on salaries in schools serving higher-income students.” The effect of income on educational quality also reaches the college level. “Researchers at Georgetown University have found that at the most competitive colleges, only 14 percent of students come from the lower 50 percent of families by income. That figure has not increased over more than two decades.”

In addition to the education gap, less wealthy communities face environmental hazards that can cause long lasting health issues. Poorer neighborhoods have lower quality construction and housing, which leads to issues such as lead poisoning, mold, cockroaches, and dust that impacts asthma. Minority neighborhoods are also often located in close proximity to industry, subjecting residents to worse air pollution than white neighborhoods. Concentrated poverty has also been shown to have negative effects on infant mortality and mental health. There are also fewer supermarkets and more fast food restaurants in lower income neighborhoods, which reduces residents’ access to healthy foods. In fact, the lack of quality food in their neighborhoods is a major contributing factor of African Americans’ high risk for obesity and diabetes. Finally, crime rates are higher in poorer neighborhoods, which also effects the wellbeing of residents, both mentally and physically. These health issues have a noticeable consequence on the lifespan of residents in lower income communities. A study by the Robert Wood Johnson Foundation showed that those living in poorer neighborhoods north of the French Quarter in New Orleans had a life expectancy 20 years shorter than those that live in the posh Garden District, separated by only a few miles. All these issues show how residential location impacts the future prospects and quality of life for most Americans.

I. Benefits of Diverse Communities

Creating socioeconomically diverse communities can mitigate many of the social ills caused by racial and class segregation. Diversity can improve social and economic prospects not only for lower income people, but also for wealthier ones as well. For example, one major cause of segregation is the perpetuation of negative stereotypes that often become self-propagating when living in neighborhoods with high levels of concentrated poverty. “Racial segregation nurtures the qualities in blacks that lead whites..."
to discriminate against them, fueling more segregation.” But when integrated, these stereotypes begin to disintegrate. A study of six integrated high schools found that “desegregation made the vast majority of the students who attended these schools less racially prejudiced and more comfortable around people of different backgrounds.” The reduction in crime is another benefit of mixing communities. Case and Katz found that youths living in low-income areas have a high probability of criminal activity, particularly because neighborhood peers have a strong influence on their behavior. But in balanced-income neighborhoods, where there are more positive role models, they are less likely to get involved in crime.

Other studies that show that low-income people have an equal chance at success when they live in wealthier neighborhoods, since they have access to a greater amount of high-quality services. The famous Gautreaux study in Chicago showed that many families became more successful after moving out of the inner city and into high quality suburbs. Women who were relocated to the suburbs were 25% more likely to have a job than those staying in the inner city, and there were “significantly less welfare receipt among women placed in neighborhoods with more educated residents.” Additionally, while the parents of participants who grew up in the city had a low amount of post-high school education (32% for the mothers, 12% for the fathers), the participants who moved to the suburbs reached 76%. Participants also described the benefits of living in safe, quiet communities with good schools for their children compared to the difficulties of living in the city.

There is also strong evidence to suggest that social segregation hurts the economy. For example, those living in poor communities, mostly minorities, are often “spatially mismatched” from their work, living far away from the majority of potential employers. Additionally, they are likely to earn less than whites due to the lower education and harmful environmental factors existent in segregated communities, continuing the cycle of concentrated poverty that produces the social ills.

Concentrated poverty also depresses property values, as it is more likely to lead to widespread abandonment of housing, which further worsens the condition of the area around it. “The presence of abandoned and boarded-up buildings is strongly associated with arson and a high incidence of residential fires. Once a few buildings have burned, neighborhoods no longer attract stable households and become a magnet for other social problems.” The problems then continue to spiral—businesses leave as the population reduces and becomes poorer, further inhibiting the attractiveness of the neighborhood and depriving access to goods and services to these lower income families. Consequently, fewer businesses are around to pay taxes, on top of the low property values, reduces tax revenue and eventually depletes the amount and quality of public goods in the neighborhood altogether. Without economies of scale or competition, the costs for

33 Dreier, Mollenkopf & Swanstrom 2004, page 30
34 Wells et. al. 2005, page 5
35 Case and Katz 1991
36 Kearns 2007
37 Mendenhall 2009, page 203
38 Mendenhall 2009
39 Glaeser and Cutler 1997
40 Massey and Denton 1993
41 Massey and Denton 1993, page 134
42 Massey and Denton 1993
43 Glaeser and Cutler 1997
public services in low-income communities actually go up—cities with mid-level poverty rates spend more per capita trying to alleviate that poverty than those with low poverty rates. \(^{44}\) Less wealthy cities also spend more on regular services, such as police or fire protection services, than richer jurisdictions.\(^{45}\)

Aside from reducing the negative effects of segregation, there are also measured economic benefits from diversity. Diverse societies are less prone to economic cycles and their economies have stronger performances during recessions. “Societies that manage a narrower gap between rich and poor enjoy longer economic expansions,” according to the International Monetary Fund. “Expansions fizzle sooner in less equal societies because they are more vulnerable to both financial crises and political instability.”\(^{46}\) In fact, economist James K. Galbraith found that rising inequality is actually a predictor for future financial crises, such as the most recent one in 2008.\(^{47}\)

Diversity at the regional level is also beneficial to the economic prospects of a neighborhood. Diverse neighborhoods have been shown to have higher population growth and higher property value increases in 2011-2012 than less diverse ones (.61% vs. .49% population growth, and 1.9% vs. 1.2% increase in median price per square foot).\(^{48}\) Richard Florida writes that much of this is explained through the innovation that is generated by a diverse population with wide-ranging ideas. Because of this, wages have also been shown to be higher for residents who live in diverse neighborhoods.\(^{49}\) But it is not just wages for lower income people that are higher; they are also higher on average for all residents, as wages go up in the whole metro area due to the increased productivity of a more cultural city, which itself is attributed to the influx of new ideas and diversity.\(^{50}\)

II. Doubters of Diversity

Those more skeptical about the benefits of diverse communities argue that diversity usually comes at the cost of assimilation into the dominant culture, which generally means conforming to white society. Without vibrant ethnic neighborhoods promulgating the culture, there is a potential loss of identity. Maintaining ethnic culture is “essential because it sustains group identity, ethnic heritage, and the support systems that go along with the preservation of cultural affiliation.”\(^{51}\) Strong ethnic neighborhoods actually have more power to fight for equality; they may lose that strength if they are dispersed.

Some studies also find that more disputes arise in diverse neighborhoods.\(^{52}\) Robert Putnam discovered that diverse communities have lower levels of trust amongst residents because there is less inherent shared understanding.\(^{53}\) This may arise because residents are not actually integrated even if they live in the same

\(^{44}\) Pack 1997, page 1996  
\(^{45}\) Pack 1997  
\(^{46}\) Lynch 2011  
\(^{47}\) Galbraith 2013  
\(^{48}\) Forbes 2012  
\(^{49}\) Longhi 2013  
\(^{50}\) Ottaviano and Peri 2004  
\(^{51}\) Talen 2008, page 45  
\(^{52}\) Skerry 2002  
\(^{53}\) Sailer 2007
community, and really do not have meaningful interactions.\textsuperscript{54} It may also be due to the lingering existence of latent racism. "In the end, the majority of whites articulated their objections to residential integration by invoking negative racial stereotypes."\textsuperscript{55} In fact, Ruming et. al. found that there is actually more oppression of minorities in diverse communities.\textsuperscript{56} Thus, while people often communicate their desires to live in a diverse community, they are usually more hesitant to do so when it is actually a decision laid before them. It seems that stable, diverse communities face many challenges and may be difficult to really achieve effectively.

Despite these drawbacks, many see diversity as beneficial to society and a goal toward which we should strive to accomplish. It may be difficult to achieve, but equity is seen by many as the moral high ground—simply the right thing to do. Diversity also gives a city life, bringing an energy and intrigue to the streets that often become the key attractions and decision factors for residential location choice. Additionally, most visitors do not come to a city to tour the sterile glass skyscrapers that are duplicated throughout every American and international city; they want to walk around the Chinatowns and the Little Italys and the Harlems that make a city interesting and unique. Fainstein says that "diversity underlies the appeal of the urban."\textsuperscript{57} Diversity is what defines a city, a place where different people can come together to engage, exchange ideas, and progress as a society.

\textbf{III. Drivers of Diversity}

While this thesis will focus on the impact of the built environment, there are many factors that influence the diversity of a neighborhood.\textsuperscript{58} Many different social, political, and economic forces manipulate and affect where people choose to or end up living in a metropolitan area. There is no silver bullet to create diverse neighborhoods, and it is likely a combination of all of the following factors that result in the social makeup of a community.

Political decisions, both land use and otherwise, have historically influenced the spatial demographics of a region. For example, federal housing policies after World War II guaranteed the mortgage insurance for new home loans, which greatly expanded the financing available for many to purchase their first home. As a result of this backing, it was actually less expensive to buy a new home in the suburbs than to renovate an old one in the city. This decision by the Federal Housing Authority, coupled with easy access to these new developments via the newly constructed federal highway system, essentially subsidized the development of the suburbs. This sparked the segregation of many communities on one end, as most white families were the only ones allowed or financially able to escape to the suburbs, due to exclusionary zoning and minimum lot requirements employed in these communities. On the other end, public housing projects in cities

\textsuperscript{54} Amin 2002, Bond 2011
\textsuperscript{55} Charles, in “Geography of Opportunity” page 66
\textsuperscript{56} Rumming et. al. 2004
\textsuperscript{57} Fainstein 2005, page 13
\textsuperscript{58} Chapter 2 of Talen’s \textit{Design for Diversity} has a good description of the many drivers of diverse communities.
clustered African Americans and poor minorities into high-rises that created many of the highly segregated neighborhoods we still see today.

Today, there are policies trying to reverse that trend and actually create diversity. Many cities now have inclusionary zoning regulations, which require new developments to set aside a number of units for affordable housing in a market rate building. Mixed income housing developments are also subsidized by the federal government to generate more successful public housing projects, while preventing a repeat of the disasters that came from the urban renewal policies of the 1960's. Other regulations, such as Section 8 housing vouchers, allows lower income residents to live anywhere in the region.

Historical location is also a major factor in influencing the background of a community. New immigrants often move to the neighborhood or city where their ethnic group has already established (usually based on port of entry), explaining phenomenon such as the large Somali population in Minnesota. Past employment clusters also affect who lives in a community, as most people used to live near where they worked. Older factory towns brought many diverse blue-collar workers together, many who went on to raise families in those communities and remained long after retirement. Older neighborhoods are also more diverse because they have older housing stock, which gets filtered down to lower income people. Gentrification reverses this filtering process, creating diversity by redeveloping older cities to appeal to today's younger generation, who desire to move back to the city and are willing to move into up-and-coming neighborhoods.

Personal preferences are also very important in determining where people choose to live. Most people, if they have the means, desire to live in a neighborhood with low crime rates and good schools. While many think that race is still an underlying issue, “there is little evidence that present racial composition influences neighborhood satisfaction, once socioeconomic status is taken into account.” The problem is that many still associate racial diversity with reduced housing values, higher crime and lower schools, since “the attractiveness of places has, over the nation’s history, been closely identified in the public mind with the race and class traits of the people who live in those places.” Because these quality-of-life indicators overlap with historical racial trends, people still prefer to live amongst themselves. Residents feel safe when they are nearest people similar to themselves, which has influenced the segregation patterns that dot our urban landscape today.

The urban form, the subject of this thesis, also has an impact on where we live. Winston Churchill’s famous quote describes this impact: “We shape our buildings, and afterwards our buildings shape us.” Form may follow function, but form lasts a long time and often continues to shape function long into the future.

---

59 Williams 2011  
60 Briggs 2005  
61 Ellen 2000, page 103  
62 Briggs 2005, page 6  
63 Gallagher 1993
Because of this, different neighborhood designs will produce different social outcomes. One example of this is housing. Just as the shape of a container influences the contents that can be stored inside it, so too does the shape, style and size of a house determine who likely lives inside it. A two-bedroom home is more likely to house a family of four than a one-bedroom due to size constraints. Additionally, since the size of a house has a direct effect on the home’s value, the financial means of an owner or renter will dictate what size house she can afford to live in. The tenure opportunities in a neighborhood also dictate who will live there, as younger people who are not yet settled are more likely to rent while the elderly are more likely to own. Furthermore, there is also a cultural component to housing choice. Different sized and shaped homes are more popular with different ethnic groups, who have unique preferences for styles of housing based on their background, as well as different family sizes, all of which will impact their housing choice. The type of housing that exists in a neighborhood influences the types of people, both racially and financially, who can live there.

The space around us also effects our way of life. “The architect who builds a house or designs a site plan, who decides where the roads will and will not go, and who decides which directions the houses will face and how close together they will be, also is, to a large extent, deciding the pattern of social life among the people who live in those houses.” Gans 64. Our cities influence who we are, and their design and layout can have a profound impact on our way of life.

The question that this thesis will try to answer is: Is there a physical form that promotes more integrated communities by supporting the different living preferences and resources of diverse racial and class groups?

IV. Hypothesis: A Balanced Urban Environment Generates Socioeconomic Diversity

My hypothesis is that a balanced urban environment—one that includes the characteristics of both city and suburb—is the most conducive neighborhood design to generate socioeconomically diverse communities. I define “balanced” as a built environment that straddles both the physical form and psychological dichotomy between the city and the suburbs. People’s preferences for neighborhood style, location, and housing vary depending on need, resources, culture, and place in life. The city and the suburbs both have different locations, housing options, and urban design that appeal and are available to different types of people. A balanced urban environment is one that spans both realms and offers a lifestyle that links these two preferences together. A community that is able to provide a wider range of both urban and suburban options is likely to be more attractive, both financially and emotionally, to a broader spectrum of people, and thus more likely to be more socioeconomically diverse.

64 Gans 1968, page 152
A neighborhood in balance has a variety of housing options. As described above, the form of the house shapes the people who live in them. Therefore, a neighborhood with more housing options, both in size, style, and tenure, is more likely to meet the financial and cultural needs of a wider range of people, and thus, more likely to attract a diverse group of residents. A neighborhood in balance is located in the semi-urban environment between the city and suburbs. In these communities, people are still able to own a car, but there is also accessibility to public transit. Because people of different incomes and backgrounds have different jobs in different places within the region, a neighborhood that is centrally located within the various centers of employment and offers multiple commuting options is more likely to support a diverse population. Additionally, these semi-urban environments create enough density for there to be urban vitality, but still maintain the peacefulness that many desire from the suburbs. This urban form balances the communal nature of the city with the private, individual nature of the suburbs, which meets the locational needs for a wider variety of residents. Finally, a balanced urban environment is also more flexible to changes over time. As populations change and preferences evolve, our desires and needs for our built environment changes. The neighborhood design that can adapt the most efficiently and economically will likely be able to support both these new and old groups.

The next chapter will review the previous research on the subject of urban form and diversity, followed by a chapter on the methodology of this mixed-methods study. Next, chapter four will examine the built environment of the socioeconomically diverse communities in the Boston area to see if there are any similarities that exist amongst the neighborhoods that were visited, and chapter five will present my three theories of a balanced urban environment. Chapter six will then describe the rationale behind the variables chosen for the regression, and chapter seven will present the results of the regression. Finally, I offer my findings and conclusions in chapter eight and my recommendations for how to create more diverse neighborhoods in the future. Through this course this thesis will test, both observationally and empirically, to see if a balanced urban environment is indeed more likely to support diverse communities.
This chapter will present an overview of the existing literature written on the impact of the built environment on the socioeconomic makeup of neighborhoods. While there have been few comprehensive studies on the urban fabric and diversity, there is research of the influence of certain aspects of physical form, including mixing housing types, mixing of owners and renters (tenure), and density. Additionally, there have been recent studies on the effect of good urban design—neighborhoods that are walkable, mixed use, and have access to public transit—on the social makeup of communities. This thesis builds off this previous research and hopes to expand the knowledge in the field.

I. Housing Mix and Diversity

Housing mix is one important factor in influencing socioeconomic diversity because people of different cultures and income brackets need and demand different sizes and forms of housing. “Housing-unit diversity is itself important in matching supply and demand, or matching unit-type with household-type.” The theory says that if there is a wider range of housing options, then it is likely that there will also be a more diverse range of residents. The New Urbanist movement, which advocates using traditional neighborhood developments to create well-designed communities that are more inclusive, champion housing mix as one of its main principles. In the Charter of the New Urbanism, they state that “a broad range of housing types and price levels can bring people of diverse ages, races, and incomes into daily interaction, strengthening the personal and civic bonds essential to an authentic community.”

Mixed housing types are also a major strategy utilized in Europe, as “housing diversification is the core of urban renewal policy.”

There have been a few studies on the impact of housing mix on the social makeup of a community, but they are mostly based on observations from case studies and are not empirical. An investigation by Cabrera and Najarian found that a newly built New Urbanist neighborhood created more diversity when compared to a standard subdivision layout also built nearby. Grant and Perrott also established that a mix of housing types attract minorities to a community, but they question whether these neighborhoods will remain stable. Nyden et. al. answer that question. After observing fourteen stable diverse neighborhoods from around the country, they concluded that varying the housing types was a viable way to maintain diverse neighborhoods. “It is the availability of housing affordable to new immigrants along with stable middle-income market housing that provides a foundation for economic diversity and racial/ethnic diversity.” Aurand also revealed that a mix of housing types is strongly associated with the presence of more affordable housing, which would have an impact on the potential diversity of those neighborhoods.

---

1. Paulsen 2012, page 409
2. Charter of the New Urbanism 2001
4. Cabrera and Najarian 2013
5. Grant and Perrott 2009
6. Nyden et. al. 2010, page 301
7. Aurand 2010
Studies have also concluded that communities with homogenous housing styles are less diverse. First, Paulsen showed that suburbs, especially in the Northeast United States, have less housing mix because they are usually made up of detached single family homes, while most of the multifamily homes are in the cities. Building off this and the fact that “there is a clear relationship between what types of units are available and which types of households occupy those units,” then places with more single family homes will be less diverse. Pogodzinski and Sass demonstrated this, finding that when there is a greater amount of detached single family homes, there is less diversity, since higher income levels of residents is positively correlated to more single family homes in that area.

There are those who are skeptical about the benefits of housing mix on diversity. Musterd and Andersson’s empirical study tested the effects of mixed housing types on the population in Sweden. Overall, they did not find a strong relationship between housing mix and social mix. However, the areas with more heterogeneous housing styles did have larger immigrant populations—but at such a high proportions that they were found to be homogenous in diversity—so there may indeed be some relationship to increased levels of affordable housing. Additionally, there is no guarantee that mixing housing types, even if they do associate with more diversity, will actually create an integrated environment. “Residents tend to interact more with other residents who are similar in terms of race, language, family composition, and social standing.” Cabrera and Najarian found that there were not many interactions amongst the diverse population; they tended to stick to people like them. “Homophily, which has been shown to have a major impact on an individual’s social network, is an issue that urban design has been unable to overcome, even when diversity has been achieved at the macro level.”

II. Housing Tenure and Diversity

Another influence on the diversity of a neighborhood is the tenure status of the occupier of the homes. People with different levels of income will usually have different tenure—residents with lower incomes have less money for a down-payment, so they are more likely to rent, while people with higher net worth are more likely to own. Mixed tenure, then, is another “correlate of social mix and one potential tool for the ultimate goal of improved social outcomes.” Additionally, since Blacks and Hispanics earn less, on average, than Whites, the rent/own breakdown is also likely to fall down racial lines. “Fewer than 45% of Blacks and Hispanics nationally own dwellings, compared to nearly 70% of White non-Hispanics…. Therefore, one would expect to find higher concentrations of Blacks and Hispanics in places with higher proportions of multifamily, rental, and affordable rental units.” If minorities and lower income people are more likely to

8 Paulsen 2012
9 Paulsen 2012, page 428. Paulsen shows empirically that the amount of bedrooms in a building is correlated to how many people live in the home.
10 Pogodzinski and Sass 1993
11 Musterd and Andersson 2005
12 Tach 2009, page 275
13 Love of the same
14 Cabrera and Najarian 2013, page 438
15 Kleinhans 2004, page 368
16 Pendall 2000
17 Pendall 2000, page 127
rent and Whites and higher income people are more likely to own, then it is likely that neighborhoods that have a balance of renters and owners will be more diverse.

Diverse communities have been shown to have a high percentage of rental housing, because it is a more affordable option. In Nyden’s research, every diverse community had at least 25% rental housing, and “in 9 of the 14 neighborhoods studied, rental housing represented more than 50 percent of the occupied housing units.” But there still needs to be some mix with owner-occupied single family homes, especially to create stability. “In the middle-income diverse-by-design communities, the affordability of older single family homes to a broad range of middle-income homebuyers means that residents and prospective residents can ‘get good house value for the dollar.’ This ‘good value’ can help to retain existing residents and attract new residents at critical moments when other neighborhoods may be susceptible to rapid re-segregation.”

There are a lot of potential social benefits stemming from mixed tenure communities, “including addressing issues such as better neighborhood reputation, better facilities and services, increased social cohesion and community participation, role models for work and education, more job opportunities, and residential sustainability.” Research in England has shown that there is more neighborhood upkeep in a mixed tenured development than in a purely rental one, as owners who take care of their homes and yards set the stage for renters to follow their lead, even though they have no ownership stake. Mixed tenure has also been found to reduce turnover, creating a more stable community. One reason is upwardly mobile residents can buy a home in the same neighborhood. Furthermore, “if parents separate or divorce, the inclusion of private rental in the tenure mix has enabled the parent without primary custody to remain close to their children after the breakdown of the relationship.” Tenure mix has also been shown to reduce concentrated poverty and incident of crime because it supports the creation of mixed income communities. Finally, there are more social interactions generated between upper and lower income people, which improves lower income residents’ networks and job prospects. But this positive social interaction seems to only occur when the rental units are equally interspersed amongst the ownership ones. In Kearns’ study, when renters were integrated with owners, both had positive experiences and spoke highly of mixing tenures. But renters and owners both had negative opinions of mixed tenure neighborhoods when they were segregated in different buildings, since there was less understanding and cooperation between groups.

Despite these positive results from mixing tenures, there is also evidence of potential negative consequences. Mixed tenure neighborhoods have been found to offer lower quality services than ones with higher percentage of homeownership because there is less tax revenue available, and thus, are less appealing to owners. Additionally, conflicting with some of the research above, some studies have found that “there

---

18 Nyden et. al. 1997, page 512  
19 Nyden 2010, page 300  
20 Bond et. al. 2011, page 71  
21 Kearns et. al. 2013  
22 Tunstall 2006, page 21  
23 Tunstall 2006  
24 Bond et. al. 2011  
25 Kearns et. al. 2013  
26 Kearns and Mason 2007
was either no effect or negative effects of mixed tenure on social cohesion and therefore tenure mix did not have any effect on social capital.”

“Mixed tenure did not produce change in income mix and inequalities, in job opportunities or employment rates for social tenants.” Finally, mixed communities in England have been found to be “riddled with racism, interethnic tension, and cultural isolation.” It is because of these issues that many owners do not want to have renters in their building or their neighborhood. “The residential space is precisely the context in which people are least able to tolerate diversity. At work, at large in the city, shopping in a commercial area, individuals expect and tolerate diversity in racial characteristics, manifestations of socioeconomic status, public behavior. In the area around the home, however, most people seek certainty and security. Few are willing to make the extensive adaptations and expose themselves to the uncertainty.” There are still social hurdles to overcome in achieving actual social integration, even if the physical factors are in place to create more diversity.

III. Density and Diversity

The lot size and density of development also has an impact of the social makeup of the community. Historically, exclusionary zoning was used to keep minorities and lower income people from moving to the outer suburbs by artificially inflating the price for housing in those communities. Minimum lot sizes, minimum building setbacks, and minimum size dwelling units all effectively meant that only big, detached single family homes could be built. Additionally, larger plots of land reduced the amount of homes built, constraining the housing supply and stimulating higher housing prices. Pendall showed that the Black population in high density neighborhoods was double that in low density neighborhoods because of the lack of affordable housing in low density areas. Rothwell and Massey also found that diversity is strongly correlated with denser zoning districts, as “the greater the allowable density, the lower the level of racial segregation.”

Another restriction historically utilized was to limit the amount of multifamily units built in the suburbs. Schueltz’s study in Massachusetts found that zoning restrictions that limit the amount of building permits issued for multifamily housing reduced the amount of rental housing, and thus affordable housing options, built in those communities. Additionally, if multifamily homes had been allowed, then it was their size that was often regulated. Many suburban towns have restricted the amount of bedrooms in multifamily units to two. Towns often have a fiscal reason for this zoning; more bedrooms means more children, and more children means higher taxes for the community to pay for schooling. But this tactic has also been used as an excuse to exclude minorities, who generally have larger family sizes than White families.

Learning from these past mistakes, new communities today are built at higher densities for both

---

27 Bond et. al. 2011, page 81
28 Bond et. al. 2011, page 82
29 Amin 2002, page 968
30 Weiher 1991, page 38-9
31 Pendall 2000
32 Rothwell and Massey 2009, page 801
33 Schueltz 2009
34 Paulsen 2012
35 As well as legal actions, see South Burlington County NAACP vs. Township of Mount Laurel, NJ.
social and environmental reasons. Compact communities are more walkable, since a neighborhood with
more people will support more commercial activity in the area. Building at higher densities also reduces the
cost of housing. Smaller lots mean that homes by their nature will be smaller, so they will be less expensive.\textsuperscript{36} Furthermore, smaller lots create more units within an area, which increases the supply of housing available,
and thus, through economic principles, reduce the cost of housing, holding demand constant. Typically,
multifamily homes are the prevailing housing type in higher densities, which are less expensive than single
family homes and thus create a more affordable option.\textsuperscript{37}

Increased density also creates more housing mix, since it is “financially feasible for builders to
produce apartments, duplexes, townhouses, and neotraditional-style developments.”\textsuperscript{38} Because of this,
“neighborhoods composed of apartments, duplexes, and houses will arguably accommodate a wider range
of incomes than those consisting only of single-family homes on large lots.”\textsuperscript{39} Compact urban form may also
create higher levels of social equity, which is crucial to improving the quality of life for less fortunate peoples.
Higher density communities have more public and private services, since there is greater economies of scale
achieved by having more customers nearby.\textsuperscript{40} More services, such as stores, open space, transit and job
opportunities benefit lower income groups who usually have less access to these resources when they are
segregated from higher income people.\textsuperscript{41}

The drawback of higher density communities is that they are often expensive, since “high densities
both cause and result from intense competition over urban space.”\textsuperscript{42} Multiple studies have shown that residents
pay more for their home that have the characteristics of a compact, pedestrian friendly, neighborhood.\textsuperscript{43} Song and Knaap discovered “that this premium more than compensates for the severe price discount for the
small size of new urbanists lots.”\textsuperscript{44} Burton also found that “housing at the bottom end of the market appears
to be more expensive in a city with a high proportion of small or high-density housing.”\textsuperscript{45} There is a conflict
between these results: more affordable housing exists at higher density levels, but land values are also
greater at higher densities because the demand for these premium locations is higher.

\textbf{IV. Urban Design and Diversity}

The social implications of good urban design started with Jane Jacobs’ groundbreaking work on
the effects of mixed use, pedestrian friendly communities. Jacobs illuminated how walkable areas with
commercial uses on the ground floor and homes above created life on the streets that facilitated more social
interactions.\textsuperscript{46} The New Urbanist movement has put a modern day spin on these design principles but with
the same intentions, to create stable diverse neighborhoods where people meet and integrate in the public
spaces. A number of case studies and surveys have shown that walkable neighborhoods do create more social interactions. “Where residents are required to encounter each other in the public realm, literally by bumping into each other, there is some evidence of social interaction and mutual recognition…. A spectrum of relationships is facilitated that at its weakest levels becomes manifest as a tolerance of difference and at its strongest, actual mixing.”

Additionally, there is also an increase in the amount of public participation of residents in their community when they live in more pedestrian friendly neighborhoods. Mason and Frederickson found that residents in traditionally designed neighborhoods were more likely to participate in their community through volunteerism, voting and in neighborhood associations, which has been shown by Nyden to be an important component of stable diverse neighborhoods. Though mixed use communities increase social interactions and public participation, there is less clarity of the impact on diversity. Only one recent study in Houston showed a correlation to the urban design principles that Jacobs advocates and higher levels of socioeconomic diversity.

The final component to a well-designed walkable neighborhood is access to public transit. There is surprisingly little research on the impact of public transportation on the diversity of a neighborhood, but we do know that minorities and lower income people rely on it more. 20% of African Americans do not own a car, while only 4.6% of Whites are without a private vehicle. Additionally, lower income people do use public transportation more to get to work than higher income people, though not by a significant margin; 9.6% vs. 7.9%. Access to public transit has also been shown to create a cost savings to households on transportation from living in a mixed use community where they can walk to go shopping or take a train or bus to work instead of having to drive. “Families living in neighborhoods with greater residential density, a greater diversity of land uses and transit services spend 9 per cent of their income on transport as compared with 19 per cent spent by the average family.”

Good urban design may have its benefits—attractive neighborhoods, transit access, walkability, more social interactions—but it does come at a price. Talen stated that, “well-designed places quickly become unaffordable. It’s a relatively simple matter of short supply and high demand, coupled with the fact that affordability in desirable places goes against the basic laws of land use in the American real estate market.” A number of studies have shown that mixed use developments are more expensive. One examination in Europe showed that housing values in a mixed use area may be up to 6% higher than those in a non-walkable area. Tu and Eppli found double that price premium in the Kentlands, a New Urbanist planned community outside of Washington DC. Aurand also found that households are willing to pay a

---

47 Roberts 2007, page 200-01  
48 Mason and Frederickson 2009  
49 Nyden 2010  
50 Qian 2011  
51 Spector 2012  
52 Sachon 2013  
53 Cox 2012  
54 Aurand 2010, page 1034  
55 Talen 2008, page 115, 117  
56 Koster and Rouwendal 2012  
57 Tu and Eppli 1999
premium for housing near mixed use areas, but will do so only if the population density remains the same; they do not want to live in more crowded neighborhoods to do so.\textsuperscript{58} Song and Knaap established that housing prices are higher when they are closer to parks or commercial centers.\textsuperscript{59}

Other studies show that it is not just location but also the design itself that increases housing values. Ryan and Weber found that infill housing values are higher when they display good urban design principles: houses that abut the sidewalks, entrances that face directly onto the street, and facades that integrate with the surrounding homes.\textsuperscript{60} This cost premium could lead to gentrification when New Urbanist communities are built as infill development to revitalize decaying urban areas, since they appeal to higher income groups.\textsuperscript{61} Talen also revealed that most new traditional neighborhood developments were not affordable to the average citizen. In a survey of 152 New Urbanist projects, “there are substantially more affordable new housing options for middle and low-income homeowners in a given region as a whole as compared to New Urbanist developments within a region.”\textsuperscript{62}

Housing near train stations is also more expensive due to the location premium that comes along with this access. Research in Minneapolis showed that homes within ½ mile of transit sold for more than $5,000 than homes of similar size and quality farther than ½ mile away, and that multifamily homes sold for more than $15,000 premium.\textsuperscript{63} A study in Buffalo found that property values increased $2.31 for every foot closer to a light rail station.\textsuperscript{64} Finally, homes that are within walking distance of light rail hubs in Phoenix had greater than a 20% price differential than homes without a station.\textsuperscript{65}

New Urbanist developments have also been criticized as being designed for middle and upper class white America and not for minority groups. Day critiques the New Urbanist developments for assuming “that, beyond disparities in income and resources, different groups of residents are essentially similar.”\textsuperscript{66} Since not all ethnic and cultural groups respond equally to the same physical conditions, the concepts championed by the movement may not apply to the groups they are actually trying to target. Additionally, other researchers have shown that Jacob’s 1950’s Greenwich Village was an exception, and that most people do not actually have meaningful interactions on the streets. Amin suggests that the places where diverse peoples really mix is only where they are forced to do so, “such as the workplace, schools, colleges, youth centres, sports clubs, and other spaces of association.”\textsuperscript{67}

\begin{flushright}
\begin{minipage}{1\textwidth}
\textsuperscript{58} Aurand 2010 \\
\textsuperscript{59} Song and Knaap 2004 \\
\textsuperscript{60} Ryan and Weber 2007 \\
\textsuperscript{61} Bohl 2000 \\
\textsuperscript{62} Talen 2010, page 496 \\
\textsuperscript{63} Wardip 2011 \\
\textsuperscript{64} Hess and Almeida 2006 \\
\textsuperscript{65} Atkinson-Palombo 2009 \\
\textsuperscript{66} Day 2003, page 87 \\
\textsuperscript{67} Amin 2002, page 969
\end{minipage}
\end{flushright}
V. Designing for Diversity

Emily Talen’s book, *Design for Diversity*, offers the most holistic approach to the impact of urban design on socioeconomic diversity, taking into account many of the physical features discussed above. Her study is the model for which this thesis is based. Talen does a good job of summing up the reasons why some places are more diverse than others based on their physical components. Location within the region plays a role, as many of the most diverse neighborhoods are located in the inner ring, pre-World War II suburbs. These suburbs are often near former industrial sites, where land values are reduced near this less desirable edge condition, and where there is a high proportion of blue collar residents. Diverse communities may also be places where gentrification started by did not finish, or in neighborhoods next to gentrified areas that are in transition. Talen also confirms much of the research cited above. High density developments within walking distance to public transportation and commercial corridors are often diverse and more supportive of lower income population since the poor often do not have cars to reach these amenities. A mix of housing units and a variety of lot sizes are also present as expected, as well as an older housing stock, where there is greater filtering potential of homes down to lower incomes. Finally, diversity does also correlate with walkability, public transit, and good urban design.

Talen and others have demonstrated that the built environment and good urban design principles can impact the diversity of a neighborhood. However, it is important to note that these physical factors are not the only drivers of the socioeconomic makeup of a community: social policies, neighborhood conditions, and employment opportunities are also equally critical. The built environment is a necessary component, but not the only component, in affecting the diversity of a neighborhood. Keeping this in mind when preparing the methodology, this thesis will expand on the concept of designing for diversity in two ways. First, it will look to see whether a balanced urban environment correlates to more diverse communities, predicting that it is the physical features that straddle the attractiveness of the suburbs to the efficiency of the city that can create well designed neighborhoods at an affordable price. From the above research we have seen that having a mix of housing types and occupant tenure is correlated to higher levels of diversity. This thesis will expand upon these results and also look at distance to public transportation, public transportation usage, housing size and density. Secondly, it will combine all these factors together in one regression to see if there is a hierarchy of influence. This will hopefully shed some light on what are the most important physical characteristics that are associated with more diverse communities.
Chapter 3
Methodology
As seen from the previous research on the influence of the design of urban space on socioeconomic diversity in cities, researchers have used many different approaches to study the impact of urban form: sociological and demographic studies, observations and interviews, time series comparisons, and quantitative analysis. Each method has its own strengths and weaknesses and none provide a perfect platform on which to conduct a study, as measuring the impact of the physical environment has both a quantitative and qualitative component. On one hand, factors such as housing size, housing cost, distance to transit, amenities, and other potential locational elements are easily quantified and calculable. For these aspects, utilizing a Hedonic Regression will generate measurable results that are useful to compare effects across a wide sample. On the other hand, it is very difficult to equate values to urban design features that may influence where people live in more indirect ways. While researchers have tried, it remains difficult to quantify the subtle characteristics of a neighborhood that many residents desire, such as a feeling of safety or invitingness. Quantitative proxies, such as scores for building height, width of street, block length, and sidewalk furniture have tried to capture these psychological effects, but many urban design measures are yet unproven or fail to accurately describe what is happening on the ground. Even Walk Scores, which are widely used and accepted, do not truly represent access to transit and amenities and the emotional appeal of a neighborhood. It is therefore quite limiting at this present time to statistically measure the less numerical impacts of urban form in a regression equation.

Just as Hedonic Regressions may be limiting, qualitative examination also has its drawbacks. It is often difficult for researchers to conduct site visits objectively; when looking through the lens of their study, they usually see what they want to see. Site visits are also influenced by the personality of the researcher whose background and education affect the way they view their surroundings. Additionally, the scope of the investigation is restricted by time and resources—it is impossible to visit every single neighborhood in the Boston metro area to get thorough data. As such, while qualitative observations of neighborhoods may better fit the topic at hand, it does lack scientific method.

Because of the limitations of both approaches, I chose to do a mixed-methods study to look at both the qualitative and quantitative effects that the built environment has on the existence of diversity in cities. First, I developed a metric to define and calculate socioeconomic diversity for the metropolitan area of Boston. Next, I mapped this diversity index and identified clusters of diversity both in the city and in the suburbs. I then conducted field studies to examine the urban fabric of each of these diverse neighborhoods and get a better understanding of their design, and residents’ social response to the physical conditions. I used these site visits not to generate formal data, though there are some interesting observations that will be discussed in Chapter 4, but as a way to develop some new theories as to why some neighborhoods are diverse and

1 Owens 2005
I. Defining Diversity

The first step in this research method was defining diversity. As discussed in the introduction, race is still an extremely important issue in the United States, and the growing income inequality gap between the rich and the poor is a big threat to the long-term health of our society and economy. Other significant factors such as age, religion and sexual orientation are important to integrated communities, but homogeneous communities with these aspects do not develop the same social ills that segregated race and class communities do, and thus are not included in this thesis. The social scars of racial segregation have not yet healed, and the income inequality issue, if unmitigated, could cause major problems in the future. These are the two major aspects of social integration that planners should be addressing, which is why I defined socioeconomic diversity as race and class integration only.

II. Calculating Diversity

With neighborhood diversity defined as balance in race and class, the next step was to create a metric to measure the diversity level of communities. There are many ways to do this, and there is no universally accepted approach. A Glaster study in 1998 established a diverse neighborhood as, “mixed if no single group made up more than 75% of the population.” Another widely used measurement is Michael Maly’s Neighborhood Diversity Index, which defines a census tract as diverse if the percentage of each ethnic group’s population in that neighborhood equals approximately its overall representation in the metropolitan area. Another widely employed calculation is the Gini Coefficient, used to measure the inequality of a population based on income distribution.

The measurement chosen for this study was the Simpson Diversity Index, which calculates the diversity of a population. “The Diversity Index . . . represents the likelihood that two persons, chosen at random from the same area, belong to different race or ethnic groups.” Originally used for biological diversity, it has
expanded into the demographic world. Today, the method is employed for a variety of functions, including ESRI software, USA Today maps, and Talen’s study on the design of diverse neighborhoods.\(^6\)

The equation for the Simpson Diversity Index is:

\[
D = 1 - \frac{\sum_{i=1}^{n} n_i(n_i - 1)}{N(N - 1)}
\]

Where \(n_i\) is the number of entities belonging to the \(i\)th category (white, black, etc...) and \(N\) is the total number of entities in the dataset (total population of the block group). The index is measured on a scale from 0 to 1, with 1 being the most diverse and 0 being the least diverse. Below is an example of how the Simpson Diversity Index works:

**Block Group A**
- White 41
- Hispanic 28
- Black 23
- Other 8
- \(N=100\)

\[
1 - \frac{41*(41-1) + 28*(28-1) + 23*(23-1) + 8*(8-1)}{100*(100-1)} = .701
\]

There is a 70.1% chance that two people drawn at random will be of different races.

**Block Group B**
- White 90
- Hispanic 5
- Black 2
- Other 3
- \(N=100\)

\[
1 - \frac{90*(90-1) + 5*(5-1) + 2*(2-1) + 3*(3-1)}{100*(100-1)} = .189
\]

There is an 18.9% chance that two people drawn at random will be of different races.

While the Simpson Diversity Index is widely regarded and used, there are still some issues that need to be addressed. First, a higher diversity measure means a more equal population within each sub-group (in the example above, the sub-groups are White, Black, Hispanic, and Other). This does not account for the fact that not all ethnic groups are equally represented in the metro area, or even in the country. Measuring diversity relative to an ethnicity’s overall population is something the Neighborhood Diversity Index takes into account that the Simpson Index does not. In Boston, the racial breakdown is 73% White, 7.2% Black, and

\(^6\) Esri 2012, USA Today 2009, Talen 2008
9.7% Hispanic. Maly's Neighborhood Diversity Index argues that a neighborhood that mirrors the overall population in the area should be considered the most diverse because of the overall constraints in that area. I personally disagree and thus chose not to use his method—the goal is to create more diverse neighborhoods, regardless of the constraints due to overall population. Asserting that a Boston metro neighborhood is diverse because it is 73% White and therefore representative of its relative size in the local population masks the fact the region itself is, indeed, not diverse. More importantly, it ignores the fact that there are truly diverse places where Whites, Blacks, and Hispanics are represented equally, and those are the communities I seek to identify. In the same vein, a 95% Hispanic neighborhood should not be considered diverse just because it houses a minority population greater than its national representation. By using the Simpson Diversity Index, I look at diversity on the neighborhood scale, trying to identify communities that are well integrated, and not necessarily how they relate to their overall representation at the national level.

III. Measuring Diversity

The next step was to define how to measure income and race and how to define diversity within each of these categories. Categories need to be formed to group individuals along their income levels and racial status; without them the Simpson Diversity Index would be useless. While my definition of the categories may create some issues, discussed below, the impact of such issues on the ultimate outcome of the study is relatively immaterial. Ultimately, the cream will rise to the top, and the diverse neighborhoods will be uncovered regardless of the classifications made.

For the income diversity measurement, Household Income was used as the data set. Household income is the sum of income received in the calendar year by all household members 15 years old and over, including household members not related to the householder, people living alone, and other non-family household members. Household Income is widely used as income data because it comes from the Census, but it does count non-related roommates as part of a household, which potentially skews the income level of a neighborhood with a high amount of singles living with roommates higher. Furthermore, Household Income is not limited to the working population; as such, elderly households are classified as making no money. Therefore, an older community could register as being very low income simply because a large portion of their residents are not part of the working population, which is very different from a low income neighborhood that registers as such because the majority of its residents are unemployed or under employed. Despite these drawbacks, I considered Household Income a better proxy for the figures that I needed than the other datasets that were available. The alternative, Family Income, used by the Department of Housing and Urban Development (HUD) to determine their metro Area Median Income (AMI) levels for affordable housing, only takes into account families with two or more people. This obviously leaves out a large segment of the population who lives alone, so Household Income was chosen instead.

---

7 2010 Census, SE: T55
8 An extreme example of this is a population that is 98% White and 2% Hispanic. Most people would agree that a community that is 98% White is not diverse.
9 US Census Bureau 2010
To create the categories for Household Income, I used the HUD framework, which breaks down income classes as a percentage of the AMI, into High, Medium, Low, and Very Low incomes:

- **Very Low Income**: Below 50%
- **Low Income**: Below 80%
- **Moderate Income**: 80% – 120%
- **High Income**: Over 120%

The Moderate Income level revolves around the mean, and the Low and High income brackets are the next deviation from that level, so they are useful definitions for High, Moderate and Low Income households. Though HUD does also utilize Very Low at 50% of AMI, I did not want to add a 4th category which would skew diversity toward those areas with lower incomes. Therefore, I utilized these AMI breakdowns to define my three buckets from which to calculate Income Diversity:

- **Income Level** | **Area Median Income** | **Household Income**
- **Low Income** | Below 80% | Below $50,000
- **Moderate Income** | 80% – 120% | $50,000 - $100,000
- **High Income** | Over 120% | Over $100,000

I calculated Boston’s AMI at $75,000, and generated the other levels based on the percentage of that value. For more information on how the Household Income values for each level were calculated, please see Appendix 1. These breakdowns, though artificial, do approximate low, middle, and high income households in the Boston metropolitan area and also tend to follow the everyday vernacular of high, medium, and low income households.

Defining racial diversity is as equally difficult as defining income diversity. It is challenging to group people into separate classifications when almost everyone was originally an immigrant in the United States. Is race defined by the color of skin, ethnicity, country of origin, country of ancestry, or even by culture? Classifying solely along racial lines is more conventional, but it is not that simple. Hispanic is not considered a race, according to the U.S. Census, “Hispanic origin can be viewed as the heritage, nationality group, lineage, or country of birth of the person or the person’s parents or ancestors before their arrival in the United States.” One can be Hispanic and black, or Hispanic and white, which makes it difficult to create classifications. Additionally, categorizing by race groups different ethnicities under the “White” umbrella, encapsulating many diverse peoples that are prevalent in Boston and who identify themselves by their culture, such as Irish, Italian, German, and Middle Eastern communities.

---

10 Esri 2012, USA Today 2009, Talen 2008
11 Department of Housing and Urban Development 2013
12 Humes et. al. 2011
Given these challenges, I chose to follow the Census definition, which offers the best access to data and is widely accepted. In the Census, the first question asks for the individual’s identified ethnicity, followed by race. Most demographers then use this to build a data set in which race does not overlap with ethnicity, allowing one to group Hispanic ethnicity in with other counted races. This was the process that I followed.

For the most part, there are standard conventions for breaking down the groups, often White, Black, Asian, Hispanic/Latino, and Other. My categories are slightly different, placing Asian in the “Other” category. Therefore, my four racial buckets are:

- White
- Black
- Hispanic
- Other — Asian, American Indian/Native Alaskan, Native Hawaiian/Pacific Islander, Two or More Races

Some may argue that Asians should be a fifth category, since their population is rapidly growing, particularly in Massachusetts and Boston, which have a higher-than-average Asian representation. In fact, Middlesex and Norfolk Counties have more Asians than Hispanics, so their population is certainly significant enough to have their own category. However, the choice to group Asian under the “Other” category was less about the impact of Asians and more about the small population of “Other” had it not contained Asians. The other peoples represented in the “Other” category, such as mixed races (only 2% in Massachusetts) and Native Alaskans and Hawaiians, have very small communities, if any, on the East Coast. If “Other” was its own fifth category, the Simpson Index diversity formula gives more weight to this small population group, placing a large determinant of diversity on the existence of their population. This would detract from the impact of the other four major racial groups.

At the same time, if I only used the four major groups of White, Black, Hispanic, and Asians, then the remaining mixed and native populations would be left out entirely. Thus, in order to both include all peoples existing without heavily skewing results, I chose to combine Asian under “Other,” with the recognition that the majority of those under “Other” are, indeed, Asian. The results are not perfect, but there is no perfect way to define diversity. This method at least gives us a reasonable way to compare diverse communities within the Boston metro area and highlight the neighborhoods that have the most balanced ethnic populations.

---

13 Lee et. al. 2012, Talen 2008
14 Suffolk 8.7% Asian
   Middlesex 10.1% Asian, whereas only 7.0% Hispanic
   Norfolk 9.8% Asian, whereas only 3.6% Hispanic
15 It works similar to the Electoral College. Since the “Other” category has a small population but equal weight, changes in its population have a larger effect than changes in the other categories.
IV. Mapping, Site Visits and Hedonic Regression

Once the diversity index was calculated for each block group in the Boston metropolitan area, I then mapped the results to find the locations of the most diverse neighborhoods. Using a GIS tool in ArcMap called Hot Spots, highly diverse clusters were identified. I then performed site visits of each of these neighborhoods to observe their physical form.

![Map of diverse neighborhoods in the Boston metropolitan area.](image)

Diverse neighborhoods visited in the Boston metropolitan area.

At each of these locations, I walked around the residential neighborhoods to observe their design. Housing styles, sizes, and layouts were documented, keeping special note of the housing mix as well as certain typologies that may be more conducive to people of varying incomes. Scale, setbacks, street design, and lot size were also considered to observe the walkability of the area. Location to surrounding areas such as parks, transit, and commercial corridors were further noted. Ultimately, the goal was to observe the similarities and differences between each of the diverse neighborhoods and begin to identify any patterns consistent to these places. These results helped me develop three theories of balanced urbanism that I tested in the Hedonic Regression, which will be described in Chapter 5. Based on these theories, I created a list of potential factors that were used as the independent variables to test the dependent variable of diversity in the regression equation. These variables will be described in more detail in Chapter 6.
V. Data

All the data, unless otherwise indicated in Chapter 6, came from the 2011 American Community Survey, 5-Year Estimates from the U.S. Census. To get the data, I attempted to use the Census’ American Factfinder website, but due to the October 2013 government shutdown, all the data had to be obtained instead through Social Explorer, an online source for census data.\(^{16}\) The income data is from the Household Income in 2011 Inflation Adjusted Dollars table from Selected Economic Characteristics.\(^{17}\) Race data came from the Hispanic or Latino by Race table from Demographic and Housing Estimates.\(^{18}\) The data for the independent variables in the regression will be discussed in more detail in the Regression Equation section in Chapter 6.

Though the Census is a widely regarded and widely used data set, there are some issues with the American Community Survey (ACS). In 2000, the Census retired the long form survey, which was given to one out of every six people to detail their socioeconomic characteristics. In 2010, the Census went to only a short form, which collects population and racial information only, and replaced the long form with the ACS. The ACS is now the source for demographers to retrieve data on income, housing, transportation, and other useful statistics.

Like its predecessor the long form, the ACS is given to a random sampling of people, so the data is only an estimate of the total population at large. The good news is that the ACS is conducted annually, which keeps the data current. The drawback is that there are fewer participants each year, which produces a high margin of sampling error. Three million households are surveyed each year,\(^{19}\) which produces a 1:40 sampling ratio of the total household population.\(^{20}\) The Five Year ACS does improve the survey ratio to 1:8 by compiling the surveys from the five previous years, which increases the households surveyed to 15 million.\(^{21}\)

Even when using the Five Year ACS, high margins of error can be a problem. For example, in some of the detailed income categories, breaking down household earnings into $0 - $10,000, $10,000 - $20,000 etc., the confidence interval can be as high as 75%,\(^{22}\) since there may be so few people surveyed in that bucket. However, by aggregating these smaller categories into larger ones, the sample size increases, thus reducing much of the sampling error that exists. Another issue that faces the ACS is whether those surveyed are representative of the average population. While the ACS actually has a higher response rate than the decennial census due to its phone interview methodology—9.7% as opposed to the decennial’s 4.4%—\(^{23}\) there remains selection bias for those who participate. Due to a language bias and lower income households that are without phone access, the survey system does have slightly less representation of minorities.\(^{24}\)

\(^{16}\) www.socialexplorer.com
\(^{17}\) Table T56
\(^{18}\) Table T14
\(^{19}\) Lowenthal 2006
\(^{20}\) University of Michigan 2013
\(^{21}\) University of Michigan 2013
\(^{22}\) 5% is preferred
\(^{23}\) Lowenthal 2006
\(^{24}\) Lowenthal 2006
Despite these drawbacks, the ACS is a fairly accurate data set. “Estimates of race, Hispanic origin, age, gender, and household composition and relationships — items included on the Census 2000 short form sent to all homes — generally mirrored the 2000 Census population distributions (long form survey) at the national level.”\textsuperscript{25} It is also widely used and accepted by many reputable sources: HUD actually uses the income data from the ACS to set their AMI levels.\textsuperscript{26} For more information on the American Community Survey methodology, please see “American Community Survey: Design and Methodology”, from May 2006.

All the data was measured at the Census block group level. Drawn around a smaller neighborhood unit than a census tract, block groups reduce the chance that multiple communities are encompassed in the same grouping, which could impact the measurement of diversity. But even at this smaller level, there remain times when block group boundaries do not approximate a typical neighborhood unit. Therefore, the data had to be cleaned up to identify residential neighborhoods only. I removed block groups that were sparsely populated or made up of mostly parks, open space, cemeteries, waterways, or other non-neighborhood areas such as industrial parks, waterfronts, universities, and civic areas that could skew results. This was especially important for calculating metrics such as density and distance to transit. I also removed block groups that had a majority of large public housing projects. Ideally, these block groups would have been included, as they are a part of the urban fabric, but the parcels on which they reside are typically owned by the city, and thus, have no published housing values, which was needed to generate some of the variables in the regression. However, this should not impact the results significantly; older public housing projects are far from diverse, and the tower-in-the-park typology has already been phased out for creating numerous social ills. For a full list of block groups removed and why, please see Appendix 2.

VI. Case Study: Boston

Boston, and its metropolitan area consisting of Suffolk, Middlesex, and Norfolk Counties, was chosen as the location for this study.\textsuperscript{27} One core rationale for this choice is the fact that Boston, and New England as a whole, is actually not very racially diverse. A study by Brown University in 2010 found that the Boston metropolitan area was ranked the 120th most racially diverse metro area in the country, rather low for a major urban city.\textsuperscript{28} Massachusetts as a whole is 76% White, whereas the nation is only 63%.\textsuperscript{29} For this reason, the diverse neighborhoods that do exist standout even more in the face of their non-diverse environment, making the factors that contribute to their diversity not only more intriguing, but also likely more effective.

Additionally, Boston’s long history has resulted in a variety of neighborhood types to study and compare: some of the country’s oldest neighborhoods, such as Charlestown or Beacon Hill, sit alongside new

\textsuperscript{25} Lowenthal 2006, page 6 
\textsuperscript{26} Department of Housing and Urban Development 2013 
\textsuperscript{27} The metropolitan area was roughly defined as being within the I-495 ring road. 
\textsuperscript{28} Dougherty 2012 
\textsuperscript{29} Census QuickFacts 2010
Area of metropolitan Boston included in the study.

neighbordoms that are just taking off, such as Kendall Square or the Seaport district; planned communities such as the Back Bay and informally developed areas that grew organically; pre-war streetcar suburbs and post-war car-centric suburbs. As this study seeks to find out which types of neighborhoods influence more social diversity, the large variation in neighborhood types upon which to make comparisons is key. Furthermore, these different neighborhood types then yield a great variety of housing typologies—high-rises, apartments, old homes, new homes, single family, detached, attached, and multifamily homes can all be found within a relatively compact area—creating fertile research ground that may better inform which housing types are more conducive to promoting diversity.

Finally, Boston’s convenient location to MIT was also important. The easy access allowed me to visit many neighborhoods and go back to them if necessary. These site visits balanced out the data collection and helped to shape the story of how the physical environment impacted the residents who ended up living there.
Chapter 4

Anatomy of a Diverse Neighborhood
Socioeconomic Diversity in Metropolitan Boston
The map on the previous page shows the socioeconomic diversity of all 1,958 census block groups studied in this analysis, representing metropolitan Boston. The darker the red, the more diverse the block group; the lighter shades are less diverse. There is a wide range of diversity in the region, from very homogenous block groups with a 0.32 Simpson Diversity score, to almost perfectly balanced neighborhoods with a score of 0.96. The top ten percent most diverse block groups have a score greater than 0.75, while the bottom ten percent have a score below 0.48. Overall, the distribution of diverse neighborhoods was normal, as the average and median diversity scores were both 0.61.

The most diverse block groups are surprisingly suburban in nature, and can be grouped into two key neighborhood types. The first type, closest to the city center, is the streetcar suburb, consisting of Jamaica Plain, Dorchester, Allston/Brighton, Roslindale, Medford, and Cambridge. The second group, just beyond the streetcar suburb, is the affordable suburb, such as Ashmont, Forest Hills, Hyde Park, Quincy, Malden, and Randolph. There is also evidence of diversity in the older satellite cities of Waltham and Framingham farther west, but because there was not a strong cluster, these were not studied in depth like the first two neighborhood types.

Though they exhibit many of the same features, the streetcar and affordable suburbs are two distinct neighborhood styles that need to be addressed separately. The following are my observations and discoveries from visiting both of these diverse community types. It should be noted that the analysis in this chapter is based purely on the synthesis of my observations, and should not be construed as scientific support for the causes of diversity in these neighborhoods. Later, in the thesis, these observations are put to test in the hedonic regression to examine whether they have standing.

**Streetcar Suburb Observations**

1. Inner Ring Location
2. Rapid Transit Access
3. Small Lots
4. Walkability
5. Detached Multifamily Homes
6. Housing Mix
7. Flexibility

**Affordable Suburb Observations**

1. Transitional Ring Location
2. Commuter Rail Access
3. Small Lots
4. Car Oriented
5. Small Single Family Homes
6. Limited Housing Mix
I. Streetcar Suburb Observations

The streetcar suburbs are distinctive neighborhood relics of a past development pattern. They represent the first wave of middle class suburban development in the United States during the late 1800’s and early 1900’s. Their organic development revolved around access to public transit, and the physical distance to rail lines naturally limited their expanse and controlled their growth patterns. Thus, a new, unique form of neighborhood was born—one that was part urban and part suburban. These towns are dense, walkable communities within reach of public transit and commercial amenities. Simultaneously, they also feature detached homes, backyards, and driveways. The balance between these two realms may very well be one of the main reasons why they are able to harbor diverse residents.

Streetcar Suburbs in Boston

[Map showing various streetcar suburbs in Boston, with Medford, Cambridge, Allston/Brighton, Jamaica Plain, Dorchester, Roslindale marked.]

Diverse streetcar suburbs highlighted in dark red.

---

1 For a good history of the streetcar suburbs, please see Sam Bass Warner’s *Streetcar Suburbs* and Frederick T. Jackson’s *Crabgrass Frontier*. 
Observation #1: Inner Ring Location

The streetcar suburbs are located within the inner highway ring of Route 128/I-95 and fairly close to the urban core of Boston. However, though these neighborhoods are close to downtown, they are not located directly in or next to the central business district. Most of the diverse block groups are in the two-to-four-mile range from downtown. The two-mile radius surrounding Boston’s city center is very dense, built when walking was the main mode of transportation. This is also some of the most expensive real estate in the city since it is so densely packed, pricing out all but the wealthiest residents. The streetcar suburbs are located just beyond this expensive band, in the second zone beyond downtown Boston. Here, the homes are, on average, much more affordable to the middle class, but still close to the heart of the city to maintain its appeal for younger residents, sustaining the quality of the neighborhood. For example, median housing values in the South End, located within two miles of the center, are over $600,000, whereas they are under $400,000 in Roslindale, located in the second zone.² This affordable proximity to downtown is accessible and attractive to a wider range of residents with varying income levels and residential desires, making it more diverse.

² SE: T101
Observation #2: Rapid Transit Access

From this map, one can see the strong correlation between the location of diverse communities and the rail corridors. There is a distinct pattern of integrated neighborhoods that follow the transit lines as they radiate out to the suburbs. One long finger fans out along the Orange Line T, running through Jamaica Plain and heading toward the Franklin MBTA line where the diverse cluster continues. Another corridor follows the Red Line in Dorchester and continues into Ashmont. Though less concentrated, there is also a scattering of diverse areas following the Green lines in Brookline and Allston/Brighton. Public transit access is an important component of diverse neighborhoods because it provides both an affordable commuting option for low income residents and a desirable convenience for professionals who work downtown.
**Observation #3: Small Lots**

The lots in the streetcar suburbs are small and narrow, but deep. They measure roughly 30-50 feet wide and 80-90 feet deep, with an area of about 2,500 – 5,000 square feet. Despite these small parcels, the homes here can still provide the comforts of suburban life. Many of the homes in the streetcar suburbs have small front and back yards, with just enough room in the back or side for a grill, a place to store bikes and equipment, or to plant a tiny garden. Many homes also have driveways that are narrow but deep, with the capacity to fit three cars for a three unit building. This type of smaller, suburban lot provides an alternative to the sprawling, expensive homes in the outer suburbs, enabling more people and more types of people to live there.

Though small, the lots able to accommodate small side driveways and detached, rear garages. (Brookline)

Small front yards give residents the comforts of suburbia without the sprawl. (Jamaica Plain)
Observation #4: Walkability

Though the streetcar suburbs have suburban qualities such as yards and driveways, they are still walkable communities. Walkability is not only important for residents who cannot afford to live in the suburbs, where a car is needed to get around, but it is also attractive to young professionals who desire to be in sociable situations. Walkability is supported in multiple ways: though the homes have front yards, they all abut the sidewalk or come very close to it; the narrow driveways only take up a small edge along the sidewalk; garages, where they exist, are detached and located in the rear, bringing the homes closer together; the narrowness of the lots discourage side windows on the homes, concentrating the internal activity of the household at front and corner bay windows and creating more “eyes on the street.” Finally, and perhaps most importantly for walkability, the height of the buildings top out at three stories, keeping the neighborhood in scale compared to the width of the street. The streets are around 20-24 feet wide, with six foot sidewalks on either side. This 30-foot-wide public right-of-way matches the building height of the triple-decker, making it an attractive, walkable setting.

A key component of the streetcar suburb’s unique public walkability is that it does not come at the cost of a homeowner’s private safety, a hallmark of suburbia. This safety is created by many layers that buffer the personal space of the home from the public realm. Street parking on one or both sides of all streets slows down vehicular traffic, and the small strip of landscaping between the street and sidewalk provides an additional layer of protection for pedestrians. On the housing side, the resident typically has a small fenced-in yard and steps leading up to their house, both of which separate the home from the street. An elevated porch further provides a wider view of the neighborhood and also sets the actual entrance of the home farther from the public way. These “safety” features are effective in separating the public and private realms without impeding the comfortable pedestrian experience.
Bay windows and rounded corners create more windows facing the road, generating more “eyes on the street.” (Jamaica Plain)

Steps up to an elevated entryway separate the home from the public way. (Jamaica Plain)
Observation #5: Detached Multifamily Homes

There are two distinct features of the multifamily housing type in the streetcar suburbs. First, the buildings—primarily triple-deckers and duplexes—are detached from one another, giving rise to the ability—but not the necessity—for homes to have yards and driveways. This outcome creates a moderate level of density in the streetcar suburbs—urban because there are many multifamily homes in a walkable setting, but suburban because the buildings are detached and have private yard amenities. Secondly, the homes are narrow in the front, but very deep, which means that the size of the homes are larger than typical multifamily units in the central city. A one floor unit is often big enough for a two bedroom home, ranging from 800 to 1,200 square feet. This typology creates fairly large multifamily units, but since they are narrow, they do not detract from the walkability of the neighborhood.
Observation #6: Housing Mix

Another important feature of the streetcar suburbs is that they possess a mix of both multifamily and single family homes. This allows people of different income levels and ethnicities to live in the same neighborhood, generating more diversity. The beauty of the streetcar suburb is that it is able to mix this variety of housing types without impacting the urban design of the neighborhood. Talen notices that typically, a neighborhood with diverse housing types can be “jarring” because of the lack of consistency in the urban fabric. But the mix of houses in the streetcar suburbs work well together because the physical sizes of the homes are the same; there just happen to be different amounts of units within each one. Unless one were to actively look at the amount of mailboxes, satellite dishes or electric meters on each home, one would never know from the street whether it was a single or multifamily building. This uniformity creates a sense of equity, which “has enormous potential to reduce or eliminate the stigma of low-income housing.”

3 Talen 2008, page 124
4 Bohl 2010, page 785-86

This arrangement was a common sight in the streetcar suburbs, a single family home next to a multifamily one. (Jamaica Plain)

Uniformity in design creates equality. (Jamaica Plain)
As can be seen from this typical street in Jamaica Plain, housing mix can be achieved without one knowing which homes are single family and which are multifamily.
Observation #7: Flexibility

These neighborhoods’ ability to achieve a mix of single and multifamily units can be attributed to the flexible design of the houses. The triple-decker typology is more easily sub-dividable than today’s sprawling single family homes because it is built vertically, rather than horizontally. The narrow footprint of the home—with its stacked utilities, one front or back staircase access, and uniform floor sizes—makes it structurally feasible and relatively easy to convert a single family home to a multifamily structure. This flexibility increases the potential for a larger variety of housing options in the community.

Single family home being converted to three unit building. See building permit picture to the right. (Jamaica Plain)
The design of the streetcar suburbs not only enables diverse communities to exist, but it also encourages interactions amongst people living there, which helps to strengthen the stability of the neighborhood. Herbert Gans describes the dense suburb as an optimal place to engage your neighbors. “The opportunity for visual and social contact is greater at high densities than low ones, but only if neighbors are adjacent horizontally.”

He states that single family or row houses built close together increase the chances of communication more than apartment buildings, where one is likely to only know the people on her floor. There are also more potential interactions on the street because residents have to exit their home from their front door and walk outside to get to their car. Additionally, “if residents must share driveways, visual contact is inevitable.” Sharing driveways, as well as sharing front doors in a multifamily home, adds an element of cooperation between neighbors. These urban design features of the streetcar suburbs create a walkable and sociable environment that supports and strengthens diverse communities.

5 Gans 1986, page 153
6 Gans 1986, page 153
Case Study: Brookline

Brookline is an interesting case to study because it neutralizes the impact of many other, non-urban design factors that influence diversity. Since the town has a good school system, low crime rates, and high levels of public and private amenities, one can then turn to the physical characteristics to explain the differences in the varying levels of diversity throughout the city. Though Brookline is not as diverse as some of the other communities found in the Boston region, the northern part of the city is much more integrated than the southern section. Looking at a few of the physical factors previously discussed begins to shed light on this disparity.

First, the lot sizes in the northern half are much smaller than those in the southern half, which leads to the detached single and multifamily typologies found in the streetcar suburbs. The small lots and multifamily units creates more density, which produces the walkable areas that exist around Beacon Street, Harvard Street, and Brighton Avenue. Access to public transit is also a key component in supporting these diverse communities, as the northern half of Brookline has access to all three sections of the Green Line. The southern area’s larger lots, on the other hand, create much less density, which yields less public transit access, fewer affordable homes, fewer multifamily homes, and more reliance on a car, all of which lead to a less diverse community.

The more diverse areas of Brookline are located in the northern half of the city

Smaller housing parcels in the north increase building density
Higher building density creates a more walkable urban environment

Access to transit is also critically important to supporting diverse communities
II. Affordable Suburb Observations

The affordable suburbs represent a transitional point in the development pattern of the city from a streetcar suburb to a car-centric suburb, and display characteristics of both neighborhood styles. Like the streetcar suburbs, they have smaller homes and lots, but since their development took place after the car became more obtainable for most Americans, there is less focus on walkability and more focus on the personal ownership of private space. If one walks south from the end of the Orange Line at Forest Hills, the change in neighborhood design is evident. While the design of these neighborhoods also facilitates ethnic and economic diversity, I personally suspect that it is less sustainable in the long run than that of the streetcar suburb design.

Affordable Suburbs in Boston

Diverse affordable suburbs highlighted in dark red.
Observation #1: Transitional Ring Location

The affordable suburbs are also located in the inner ring of the Boston metropolitan area, but they are just beyond the streetcar suburbs in the next wave of suburban development that took place before World War II. They are located in the four-to-eight-mile range from downtown Boston. Since they are located squarely between the dense inner city and the wealthy outer suburbs, they provide a much more affordable suburban living option while still located within relative close proximity to downtown.
Observation #2: Commuter Transit Access

Public transit access in the affordable suburbs is also an important contributor to diversity. Many Asians choose Quincy because of the Red Line access to Chinatown, and Malden remains attractive because of the Orange Line, which heads right into downtown Boston and also connects with African American neighborhoods in Roxbury. However, unlike the streetcar suburbs, the affordable suburbs are located at the end of the T lines, and thus most of the neighborhoods are not within walking distance of rail. Therefore, except for Ashmont, the rapid transit stations that service these communities are essentially park-and-rides, as they are for Forest Hills, North Quincy, and Malden. The affordable suburbs beyond the reaches of the T also have ample commuter rail available, such as Roslindale and Hyde Park. Though less frequent, this transit access is important to providing a low cost commuting option for residents who cannot afford a car.
Observation #3: Small Lots

The affordable suburbs also have small lot sizes compared to the rest of the suburbs in the Boston metropolitan area. This provides a home at a more affordable price, making these neighborhoods available to middle and lower income residents, which, in turn, makes them more diverse. However, compared to the streetcar suburbs, the affordable suburb’s front and side yards are larger.

In theory, these larger yards should create greater value, but this additional space is often underutilized or unkept, dampening the attractiveness of these communities. Through landscaping or adornments, it is “possible to transform empty, meaningless space into a place pregnant with evocative symbolic significance.” On the other hand, emptiness and lack of landscaping can also be symbols, signaling a neighborhood of lower functionality and occupancy. This may communicate to the public that the land is not valuable. Lewis Mumford called this “kind of openness and low density … social and civic disintegration.” This phenomenon is similar to the experience in older public housing projects, where the minimal landscaping and large amount of open space gave the neighborhood a hollow ambience void of life or value. Ultimately, this became the way the residents treated it. Unoccupied open space creates what Howard Kunstler calls a “geography of nowhere,” a danger that the affordable suburbs must contend with.

---

8 Kefalas 2003, page 107
9 Mumford 1968, page 82
10 Kunstler 1994
“geography of nowhere”
Observation #4: Car-Oriented

This emptiness also hinders the walkability of these communities. While the streets are small and laid out in a linear pattern (without windy roads or cul-de-sacs) that theoretically engender connectivity, they fail to create walkability in this instance because the houses are still too spread out. Therefore, the population density does not support commercial services, such as corner stores, that create walkable neighborhoods. Rather than commercial corridors, these neighborhoods have their commercial nodes near the transit hubs, where the majority of their pedestrian activity takes place.

In addition to less density, the lack of a walkable environment is also amplified by urban design. The scale of the streets does not facilitate a pedestrian setting, with wider roads catering to the automobile. The homes have deeper setbacks created by the larger front yards, isolating the homes from the public realm, more clearly delineating the difference between public and private space and reducing the comfort of the pedestrian. Furthermore, while there is street parking, there are not enough cars in these less dense communities to supply a protective barrier between pedestrians and vehicles. While one could walk safely around these neighborhoods, there is less intrigue along the way and the distances in between two points are longer, designed for the driver rather than the pedestrian. As a result, there is often nobody walking around these neighborhoods to meet and engage.
Observation #5: Small Single Family Homes

The most visible driver of diversity in these communities is the housing size, and thus affordability. The houses are smaller and more affordable than a typical suburban single family home. Though some are two stories tall, many of the houses are a single story. Most do not have attached garages, which reduces the building footprint and thus, the cost. Once again, driveways here are only wide enough for a single car, which also reduces the need for a bigger lot. Here, income mix is mainly achieved by home size—larger single family homes sit alongside smaller single family homes.
Observation #6: Limited Housing Mix

Though the majority of the homes are small single family, there is nevertheless some blending of multifamily housing options in these affordable suburbs, albeit much less than the streetcar suburbs. Most of the homes are not conducive to conversion between single family and multifamily homes—they are either too small or not appropriately configured to subdivide. But the small amount of duplexes and triple-deckers that do exist serve as a signal to low income families and renters that they are welcome, opening up the community to a more diverse population.
As can be seen from this typical street in Hyde Park, some housing mix can be achieved if bigger units that can be subdivided were built.
Overall, the layout of these affordable suburbs increases the diversity of residents who live there, but the diversity is attributed more to economic influences than to urban design factors. These communities have only recently become diverse, simply because they are the most affordable suburban option available. As wealthier residents moved to bigger homes in the outer suburbs or back into the central city, minorities have made the migration to affordable housing in the suburbs. In 1990, Quincy had an Asian population of 5,500; by 2010, the population had jumped to over 22,000, a 340% increase. In Malden from 2000 to 2010, the Asian population grew 52%, the Hispanic population surged 85%, and the African American population nearly doubled. While this growth targets locations where minority communities were already established, the physical characteristics of the towns also attracted these ethnic populations.

While the affordable suburbs are diverse right now, their environment is less ripe for diversity to thrive continually—it is possible that this may be a finite, transitional period, in which the wealthier move out as low income residents move in. Eventually, they may become more segregated again because, though these communities exhibit some of the balanced urban design features that are hypothesized to create diversity—such as transportation usage, lot size, and housing size—they are missing the components that seem to sustain the diverse population over time. These car-centric communities are not very walkable, limiting the encounters that residents may have with each other. They are less dense and thus cannot support much commercial activity, reducing the common places available for people to meet, interact, and make friends. There is also a clear delineation between public and private space, creating a more closed society. The style of housing also makes the wealth disparity more visible, which may affect the long-term health of these communities. Thus, while diversity may be high in these communities for the time being, it will be interesting to see if they are able to maintain it in the future.

---

Encarnacao 2011

Census Viewer, www.censusviewer.com
Chapter 5

Three Theories of Balanced Urban Design
I. Second Best Location Theory

Based on the observations in the previous chapter, I developed three theories of how a balanced urban environment impacts socioeconomic diversity. The first theory is called the Second Best Location Theory. This idea stems from the fact that neighborhoods with a transit node are very expensive and price out all but the wealthiest. It is the next set of neighborhoods that are a bit farther away, but still within reasonable walking distance from these stations, that will be the cradles for diversity. These areas are still good, walkable locations, but less expensive because they are not quite the best location. Additionally, these farther locations do not have to be less dense; it is possible to be farther away from a transit node and still have multifamily housing or commercial corridors. My hypothesis is that dense neighborhoods in the “second best locations” are the most diverse areas in a city.

The diverse block groups in Malden display properties of the Second Best Location Theory. These neighborhoods are in the half-to-one-mile walking range, beyond the popular transit oriented development zoning of a half mile. Though only a few additional minutes’ walk, the difference in housing costs within this change of distance is staggering. In Boston, housing prices within half a mile of transit rose 226% from 2006 to 2011. Outside of this region, they actually fell 12.5%.¹ This puts these neighborhoods within walking distance of transit, but still far enough to resist price increases along transit corridors and preserve the affordability of housing.

Second Best Location Theory – Malden

¹ The Center for Neighborhood Technology 2013
Additionally, since the land values are often lower, there is reduced economic demand to build at higher densities. Therefore, the homes in these secondary locations are detached from one another, and thus usually have driveways. Though shunned by modern day urban planners, car ownership is an important component to generating diverse neighborhoods. “Most new jobs for less-educated, lower-income groups—i.e. jobs in the manufacturing and retailing/wholesaling sectors—are created in the suburbs. Job seekers dependent on public transportation often have difficulty getting to the places where lower wage jobs are likely to be found,” 2 In fact, 76% of low income people use a car to commute to work. 3 Overall, “67% of Americans live and work in the suburbs,” 4 and have little use for hub-and-spoke-like transit into the central city for commuting purposes. For many, having a car is necessary to get access to more remote jobs in the suburbs; not everybody works in the financial district downtown.

The result of having both houses with driveways and proximity to public transit means that multiple modes of transportation are available to commuters. With multiple modes of transit, people with both white-collar and blue-collar jobs can live in the same neighborhood while commuting to different parts of the metro area in a reasonable manner. If one works in the financial district, it is only a 20-30 minute commute from Dorchester, Jamaica Plain, or Malden on the T. Likewise, if employment is in the service industry in the suburbs or in construction, where location varies, one can still live in the same neighborhood and reach the job site by car without having to spend multiple hours a day riding public transit. It is these second best locations—located between the city and the suburbs and providing access to diverse jobs and commuting options—that allow residents with disparate educational backgrounds and employment opportunities to live together in the same community, and thus are more diverse.

2 Talen 2008, page 19
3 Cox 2012
4 Dizikes 2013
II. Affordable Walkability Theory

Walkability is championed as a critical component of any good urban design guideline. Walkable neighborhoods are beneficial to the environment, since it stimulates less car ownership and fewer vehicle miles traveled. Walkable neighborhoods are also dense, which results in more commercial development to serve these populations. More commercial vendors create competition, which drives segmentation in the market and creates various levels of services. For example, instead of having two laundromats, there may be one laundromat and one dry cleaner to cater to different customers. A dense, walkable neighborhood is more likely to have a diversity of services, and thus is more likely to attract a diverse residential population.

Walkability is also desirable for lower income individuals who do not have access to a car and rely on having services nearby. Similarly, walkable neighborhoods are also very desirable to young professionals with higher incomes, creating an attractive setting for clusters of bars, restaurants, shops, outdoor cafes, and other activities on the street that create a vibrant, 24-hour neighborhood. Thus, walkable neighborhoods create a setting where these diverse people can interact together, which is critical to creating and sustaining a diverse community.

But to generate walkable communities, one needs to build at higher densities, which, as seen from the graph, makes neighborhoods more expensive. At the best locations, land values are very high, which warrants building at a higher FAR. Walkable neighborhoods such as the Back Bay and Beacon Hill have densely packed row houses built wall-to-wall which are very expensive to live in. One study confirmed that higher walk scores lead to higher housing prices, finding that, “houses with the above average levels of walkability command a premium of about $4,000 to $34,000 over houses with just average levels of walkability in the typical metropolitan areas studied.”

The graph of walk scores versus housing values below confirms this. Thus, there is an inherent conflict between a neighborhood design that aims to increase diversity but prices lower income people out of the market.

![Walk Score vs. Housing Values](image)

Housing values increase as the walkability of the neighborhood improves.

![Building Density vs. Housing Values - Boston](image)

Housing values increase as density increases.

---

5 Cartwright 2009
Therefore, my hypothesis is that communities that offer the benefits of a walkable neighborhood at a more affordable price are more likely to be diverse. Dense suburbs fit this description: they are dense enough to support nearby commercial services, adequate public transportation access, and decent walking streets, but since the homes are detached, not too dense that the land values are very expensive. The places that maximize the walkability per dollar spent on housing will be the places that are the most diverse, since they provide the required amount of density at a more affordable price.

III. Personal Urbanism Theory

This theory posits that individuals want both a public and private life, and that it is difficult to reconcile these competing ideologies in the built environment, especially in the home.

On one hand, humans need companionship and community, and these are part of the reasons why cities developed in the first place—as public meeting centers of commerce and social activity. Amongst other reasons, we want to live in cities to be close to the action and to socialize with our friends. Cities are an expansion of our natural instinct to want a family and make us feel like we are a part of a tribe or society.

But cities also compete with our other natural instinct to be individually territorial. The ownership of land, even if small, also serves a psychological purpose beyond the practical one, as it is an “expression of territoriality.” Emos Rapoport describes it as “not a real need but a symbol.” Having a yard is especially preferred, since it is the homeowner’s way of communicating to the public their “affluence and status.” According to a survey by The Atlantic Cities, 76% of Americans prefer to live in a detached single family home. One of the main reasons for this is the privacy and peace and quiet that comes with a suburban style of living. Unlike suburbs, cities can overload on community, crowding out the individual in the process. Most of the time spent outside one’s home is in the public realm, and one often has to rely on the schedule of others to get around.

Because of these competing ideologies, we have tried to shape the environment around us to reconcile these two extremes. This has manifested itself in the built environment in two distinct ways.

The first way has been the development of suburbs. Owning a personal plot of land provides a safe haven and having a car provides freedom of mobility—a defiance of dependence on the public realm. Fences go up around homes and gates around communities to protect individualism. Cars are parked in the garage, allowing someone to travel from their home to their final destination, all-the-while being able to control their immediate surroundings. This focus on individualism has created a stark separation between one’s public and private life. This separation has negatively impacted society and caused tension between different peoples. As Talen states, the “loss of diversity mirrors the rise in privatized realms.”

---

6 Rapoport 1969, page 133
7 Rapoport 1969, page 132
8 Kefalas 2003, page 107
9 Benfield 2013
10 Talen 2008, page 149
The other manifestation of this expression of individualism is the ethnic neighborhood in the city, based on one distinct cultural identity. Chinatown or Little Italy give Chinese or Italian people uniqueness in a busy city, fostering a feeling of individualism, but as part of a collective identify rather than through the physical ownership of space. This individualism is the exact opposite of the suburbs; it is completely expressed through the public realm and the neighborhood in which they live.

As we know historically, both of these two competing ideologies have led to the segregation of our cities, both purposeful and inadvertent. But, as identified earlier in this study, there are places where diversity still thrives. My hypothesis is that neighborhoods that give people their own private space without hindering the public realm—that blend the privatization of the suburbs with the collectivism of the city—are where diversity can thrive because personal land ownership exists in support of, rather than against, the community in which it sits.

The streetcar suburbs are able to offer these suburban comforts without sacrificing their urbanity. The detached multifamily typology is able to achieve a high amount of population density while still maintaining the suburban neighborhood feel. Somerville, with the detached triple-decker as its main typology, is the densest city in all of New England, even more than Boston. Higher densities means that there will be more urban services available to residents, such as walkable commercial streets and public transit. The streetcar suburbs provide that balance between the urban and suburban, offering the best of both worlds. These neighborhoods allow people to take part in the public experience both at a whim and at their own convenience. These environments have been shown to be much more attractive to residents. “A 2010 study by researchers at the University of California, Davis, found that neighborhood satisfaction was higher among residents of older, more traditional neighborhoods than conventional suburban neighborhoods …, largely because of a perception of liveliness.” Their suburban nature provides the lifestyle that many seek from the suburbs—personal space, parking and larger homes—but still have public transportation options and walkable commercial activity that appeal to the urbane. Because of this attraction to people who seek both urban and suburban lifestyles, I predict that a more diverse population is more likely to live in the dense suburbs.

Additionally, having both a strong public and private realm in the same neighborhood is attractive to people of different cultures and backgrounds. Our culture impacts the form of housing that we seek and therefore, different ethnic groups having different preferences for housing. “Because building a house is a cultural phenomenon, its form and organization are greatly influenced by the cultural milieu to which it belongs.” Rapoport gives the example of how the design of the town and home differ because of cultural views. Latin and Mediterranean regions see their life as the town, with their home only representing the

---

11 www.somervillema.gov/about-somerville
12 Gallagher 2013, page 91
13 Rapoport 1969, page 46
14 Rapoport 1969, page 46
private aspects of their life. This is manifested in more time, and thus more investment, in public spaces and less in their homes, which are typically small. Anglo-American traditions favor the home as the center of their life, with the space outside “secondary in nature,” and thus invest more in their own private space than in the community.

Once again, the streetcar suburbs demonstrate this strong blend of private and public realms. They merge the desire of many to express themselves individually, but still with a strong public realm to maintain their connection to the community. Residents in these dense suburbs are able to use their small front yards to define who they are. The spaces are privatized such that owner or occupier can showcase her own personality, but public for the neighborhood to see. The personalization of these space gives residents a sense of belonging to a community. Dolores Hayden explains that, “a world of shared meaning builds up, couched in the language of small semiprivate and semipublic territories between the dwelling and the street…” The streetcar suburbs’ embodiment of the personal urbanism theory may be the reason they are able to foster more socioeconomic diversity.

### Personal Urbanism in the Streetcar Suburbs

15 Rapoport 1969, page 70
16 Hayden 1995, page 35
Taken together, these three theories predict that a more balanced urban environment can support more diverse communities. To say that there is a perfect form is unlikely, but those that can accommodate a wider range of preferences and needs are surely on the right tract. The desire for a balanced environment is in the human DNA. One study found that people, regardless of background or culture, prefer open clearings in the forest, and seek trees in the prairie. In the same vein, we enjoy the quiet park in the middle of a city, but the active main street in the heart of a suburb. Most humans like to avoid extremes, and places in balance are where we feel most comfortable and safe. It is in these places that we are willing to take more “risks,” such as living with others “different” than ourselves. The dense city and the sprawling suburbs are the extremes of our communal organization; the urban suburb, or the suburban city, is a hybrid of the two that meets both these conditions.

Ultimately, this semi-urban style of neighborhood, with public transportation access and driveways, multifamily and single family units, and dense, walkable communities where people also have their own private space, creates a balanced physical environment where diversity can thrive. It gives many the opportunity to obtain the physical benefits of suburban life—backyards, driveways, bigger homes—but at a more affordable price. The housing types allow renters to live alongside owners without the stigma that they are different, since the homes are roughly the same style and size. Unlike very dense areas where one is unlikely to recognize anyone on the street and community becomes lost, these communities are less crowded but still populated enough where neighbors run into each other while walking their dogs. These design features create a feeling of acceptance and increase the chances that residents interact with different members of their community, which improves understanding and is the key to sustaining these diverse neighborhoods. To see if these theories—Second Best Location, Affordable Walkability, and Personal Urbanism—have merit, they will be tested through a hedonic regression described in the next chapter.
Chapter 6

Regression Equation
In order to test the three theories that comprise the hypothesis that a balanced urban environment is more conducive to promoting socioeconomic diversity, a hedonic regression was created to test a number of physical factors that may influence the diversity of a neighborhood. The variables marked with a star indicate that these factors are testing for balance. This means that a second variable that is the square of that factor is also included due to the expected quadratic relationship of the relationship with diversity.

<table>
<thead>
<tr>
<th>Second Best Location Theory</th>
<th>Affordable Walkability Theory</th>
<th>Personal Urbanism Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to CBD</td>
<td>Lot Size</td>
<td>Single Family*</td>
</tr>
<tr>
<td>Distance to Transit*</td>
<td>Building Density*</td>
<td>Multifamily</td>
</tr>
<tr>
<td>Public Transit Usage*</td>
<td>Building Density per Dollar</td>
<td>Housing Mix</td>
</tr>
<tr>
<td></td>
<td>Walk Score</td>
<td>Housing Size*</td>
</tr>
<tr>
<td></td>
<td>Walk Score per Dollar</td>
<td>Percent Renter Occupied*</td>
</tr>
</tbody>
</table>

These are variables that planners can control, which is why housing value, age of structure, and other non-physical influences are not included. But they are by no means a perfect representation, since there is no easy way to quantify the impact of urban design. It is very difficult to capture the fine-grained details of a neighborhood with a regression trying to measure diversity at the metropolitan scale. These variables are bulky in the sense that they do not necessarily represent the true urban form and design of the neighborhood. This could be analogized to zoning: it works as an overall framework from which to guide the land use in the area, such as use, building setbacks, and lot coverage, but planners and design review are still needed to make sure the project is appropriate to the area. Variables such as building density and lot size are also these overarching influences, but there are micro-effects that are happening on the ground that cannot picked up from a regression. Therefore, while these variables included will hopefully shed some light on the impact of the built environment on the people who live there, they are by no means perfect or fully representative of the complexity that goes into residential location choice.

Another issue with these variables is that there is a high multicollinear relationship amongst them. For example, smaller lot sizes will likely mean that building densities are high, because there are more buildings closer together. Therefore, when I ran the regressions, I ran each of the equations multiple times, adding or removing variables to analyze their influence compared to the other variables. In the results, I explain how each variable impacts diversity, but also how they respond when other variables are removed. This analysis results in some interesting conclusions of the influence of each variable. Below I will describe each of the variables in the equation, how they were calculated and why they were chosen as important factors.
I. Testing the Second Best Location Theory

Distance to Central Business District

To test whether the inner ring neighborhoods are the most diverse, Distance to the Central Business District (CBD) will be one of the variables in the regression equation. I measured distance, in miles, from the center point of each block group to the State House, located right next to Boston Common. I estimate that areas closer to downtown will be more diverse, since a majority of the diverse neighborhoods identified are located in the inner ring close to downtown.

Distance to Transit

I expect that overall, neighborhoods that are close to transit stations will be more diverse, especially in the suburbs. In line with the Second Best Location Theory, however, I do expect that those block groups directly on or next to a transit hub will actually be less diverse because of the high demand and increasing housing values in these areas, especially in the city. Therefore, two variables will be included to test the Second Best Location Theory, Distance to Transit and Distance to Transit Squared. I expect that the coefficient of Distance to Transit will be positive, that as one gets further away from a transit station, diversity will increase. But this relationship exists only up to a point, because once one is too far away from a train station, the neighborhood is no longer within walking distance of public transit, and the diversity of the community will go down. Thus, the expected sign of Distance to Transit Squared is negative. The graph of this expected relationship in the regression will look like a parabola: diversity goes up as distance to transit increases, reaching an optimal distance away from a train station that maximizes diversity, and then falls as one gets too far away from the station.

Distance to Transit is measured in miles from the center point of the block group to the nearest transit station (T or commuter rail only, no bus stations). Distance to Transit Squared is, quite simply, the square of Distance to Transit. There are some issues with the way distance is measured that could impact the results of this variable. Distance represents the average distance for the whole block group, so the calculation does not distinguish between different areas within each tract. But taking the average distance of the neighborhood may erase the subtle gradient away from transit that may exist within the block group itself. For example, for block groups bordering a transit station, we cannot measure the diversity gradient that may occur as one traverses from one side of the block group directly next to the station to the other side farther away. Only the average distance is taken, which may wipe out some of the proposed second best location effects. However, since 1,958 block groups are included in the data set, there should be enough data points where the overall relationship between transit location and diversity will be brought to light.
Public Transit Usage

As described in the Second Best Location Theory, I expect that neighborhoods which offer a greater variety of transportation options allow people with different backgrounds and occupations to live in the same community. I am testing this hypothesis by measuring the percent of public transit usage as a commuting mode by residents. I expect that as public transit usage increases, diversity will increase. This relationship will be especially strong in the suburbs, where there are fewer public transit options available to ease lower income families travel burden. However, this relationship will only last until a certain point: once there are too many people utilizing public transit as their journey to work method, diversity will decrease. Therefore, I will include two variables to measure this impact, Public Transit Usage and Public Transit Usage Squared. I expect that the coefficient of Public Transit Usage will be positive, while the sign of Public Transit Usage Squared will be negative, representing that a balance of commuting modes will generate more diversity in a neighborhood. This variable is also a proxy for balanced urban design – communities that are walkable but also have driveways.

The data for commute mode came from the 2011 American Community Survey, Means of Transportation to Work for Workers 16 Years and Over table.\(^1\) I broke transit mode down into two categories, private and public transportation mode.\(^2\) Private transportation includes commuting by car, truck, van or motorcycle, while public transportation includes trains, buses, bicycle, and walking. Though biking and walking are individual modes, they do not require a large cost outlay and have a stronger association with public transportation because one utilizes these method in urban environments, so they were included in the public transportation category. A percentage was then calculated for public transportation usage as a proportion of all the commuters. This proportion was the data used in the regression.

II. Testing the Affordable Walkability Theory

Lot Size

The parcel is the foundation for the built environment, and sets the stage for how development will take place on top of it. Parcels affect the size and shape of a home that can be built, which influences the urban design and housing styles that exist in the neighborhood. Small housing parcels were one of the reoccurring themes consistent in diverse areas in both the streetcar suburbs and the affordable suburbs. Constrained lots usually translate to multifamily homes or small single family ones on top of them. Additionally, smaller lots mean that the homes are also closer together, which results in higher building densities and more services, such as public transportation and retail stores. Small parcels also create a balanced urban fabric; houses close together for greater walkability but detached so the density does not get too high. I predict that Lot Size will have a negative coefficient, block groups with smaller median lot sizes will be more diverse.

---

\(^1\) Social Explorer: T128

\(^2\) Working from home was removed from the data to capture only those commuting to work.
The data for the Lot Size variable is the median lot size in square feet of residential parcels in each block group. Parcel layers for each town came from MassGIS. To isolate residential lots, I overlaid zoning maps for each town to remove non-residential parcels. Zones R1, R2, R3, R4, R5, RA (Residential Agriculture), ML (Multifamily Light Density), MM (Multifamily Medium Density), MH (Multifamily High Density) and MU (Mixed Use) were used. While this may exclude non-conforming residential areas in other zones, there were not enough of these to significantly affect the outcome to attempt to factor them in. I also removed all public parcels, such as water, parks and roads which do not have houses on them, as well as any parcels less than 1,500 square feet, which is realistically the smallest parcel that one could build a house on. I also removed larger parcels that were not typical of house lots in the area, with the maximum size varying depending on the area (over 1 acre for Boston, but in the rural suburbs the maximum size reached as high as 250,000 square feet). While there was some discretion involved in this process, the goal was to isolate the typical residential parcel of land, so it was necessary to exclude large parcels that were not individual lots for homes. Taking the median instead of the average was another way to arrive at the typical lot size for the block group.

**Building Density**

Building Density will be used as a way to measure the compactness of the neighborhood. I chose this metric over population density or units per acre because I was more interested in this measurement from an urban design perspective. The lot coverage of a neighborhood gives us a sense of how walkable the neighborhood is, but also how much private space exists for each household (with the assumption that denser neighborhoods have less privatized space). This is actually a better urban design measurement than Walk Score, described below, since Walk Score measures proximity to transit and services rather than the actual physical composition of the neighborhood. I expect that neighborhoods with a moderate building density will be more diverse: not too dense that the land values are too high, but not too spaced out like the outer ring suburbs where houses have too much private land and where car ownership is required. This will again be measured through a quadratic function to measure the arc of building density. I expect that the coefficient of Building Density will be positive, as the compactness of a neighborhood increases, diversity will increase. But Building Density Squared will have a negative coefficient; communities that are too dense will not be diverse.

The data for Building Density came from MassGIS, which has a layer for building structures of each town in Massachusetts.\(^3\) Since I am only interested in the building density of the residential areas, I extracted the buildings in non-residential areas—same as the process for the variable Lot Size. The measurement of Building Density is the building coverage percentage of residential areas, and thus falls between zero and one.

\(^3\) Except Canton and Lincoln
Building Density per Dollar

Building Density per Dollar measures the cost for each incremental increase in building density percentage of a neighborhood. The rationale behind this variable is that density has both a benefit and a cost: more dense neighborhoods have more services, such as bus lines and walkable commercial streets that can help support diverse communities, but at the same time, it is expensive and can price people out of the best locations. Therefore, I expect the coefficient of Building Density per Dollar to be positive—communities that are able to maximize the value of density will be more diverse, since they can achieve a higher level of services at a more affordable living expense.

Building Density per Dollar was calculated by dividing Building Density over land value per square foot to create a metric for how much density one obtains per dollar of land value. As no land value data was available, I calculated land value per square foot by divided the median housing value by the median lot size of each block group.

Walk Score

Since I was only able to obtain walk score data for the city of Boston, I suspect that a higher walk score will actually decrease the diversity of a neighborhood. This is because the locations with the highest walk scores will likely be transit oriented developments and block groups with great access to transportation, which drives up housing prices and displaces lower income residents. Therefore, the coefficient of Walk Score will be negative.

Walk scores data from walkscore.com was used to measure access to transit and commercial venues from each block group. Walk score data has its positives and negatives, but overall it is considered one of the more acceptable measurements of access to amenities of a neighborhood.

Walk Score per Dollar

Like Building Density, I also created an interaction term to generate the cost of walkability, called Walk Score per Dollar. This is simply the walk score of each block group divided by the land value per square foot. I predict that the coefficient of Walk Score per Dollar will be positive, neighborhoods that obtain more walk score points per dollar they spend on housing will be more diverse, balancing the price increases of walkability with the benefits bestowed from them.

---

4 And therefore only used in Regressions 5-8
5 The data actually came from HUD, but the walk score calculations were generated by walkscore.com
6 For more information on the methodology of the walk score, please visit www.walkscore.com
7 For: Carr et. al. 2010; Manaugh & El-Geneidy 2011
Against: Goodyear 2012, Vanderbilt 2012
III. Testing the Personal Urbanism Theory

Housing Mix

Housing mix is an important indicator for diversity, since different housing types allow families with different sizes, wealth and needs to live in the same community together. Multifamily homes offer a more affordable option for families, but are also popular for singles living together or young professionals renting in the city. In contrast, single family homes are usually inhabited by wealthier or larger families. A neighborhood that has different housing types is likely to be more adaptable to varying preferences and needs, and thus is likely to be more diverse. Therefore, I predict that the coefficient of the variable Housing Mix will be positive, that more housing diversity correlates to more socioeconomic diversity.

Data for Housing Mix came from the 2011 ACS Housing Units in Structure, and was created by using the Simpson Diversity equation on four categories of housing: single family (attached or detached), small multifamily (2-4 units), small apartment buildings (5-19 units), and large apartments and high-rises (over 20 units). This variable is measured with values between zero and one. An issue with this variable is that a higher rating means that a neighborhood with an equal percentage in each of the four categories will be more diverse. However, there could be areas that have some housing mix but that is not equally balanced. This mix may still have a significant influence on diversity, but it may not show up in the regression results from this variable. Therefore, I compensated for this issue by graphing the impact of each housing type on diversity to figure out what the optimum percentage of each style is to promote diversity.

Small Multifamily

I included a variable to test the impact of small multifamily units on diversity, because duplexes and triple-deckers are critical to a balanced urban environment. I defined small multifamily as houses that have two to four units in their structure. The data for the variable came from the 2011 ACS, Housing Units in Structure table. This measurement was calculated by taking the percentage of homes in each block group that are two to four units in size. I predict that the coefficient of Small Multifamily will be positive; more multifamily housing types means more diversity.

Single Family

Another housing typology variable included was the percentage of detached single family homes. The data for this variable came from the same table as the multifamily typology and was calculated the same way. I predict there to be a parabola in the graph of single family homes relationship to diversity. As a neighborhood gains in amount of single family homes, diversity will increase due to the presence of higher
income people in a lower income neighborhood (since the rest of the typology would be multifamily), so the coefficient of Single Family will be positive. But this relationship will shift after there are too many single family homes and not enough multifamily, and thus Single Family Squared will have a negative coefficient.

**Housing Size**

Due to zoning techniques discussed in the introduction that created large parcels of land in the suburbs, homes are usually large, which reduces the likelihood that lower income families can afford to live there. Conversely, in highly urbanized areas, apartments are smaller to maximize the amount of units one can sell. But these smaller units are less conducive to minorities, who often have larger families and need bigger homes. In the Boston metropolitan area, the average household size for Whites is 2.4, while Blacks are 2.7, Asians 2.9 and Hispanics 3.2.\(^{11}\) Pendall found that neighborhoods that lack larger multifamily units had less diversity, as “places with a greater percentage of the available rental units having fewer than two bedrooms were associated with a statistically significant reduced black population.”\(^{12}\) Additionally, a recent survey by the National Association of Home Builders found that Whites actually desire smaller size homes than minorities. The median square footage wanted by Whites was 2,197 square feet, while the amount Asians wanted was 2,280 square feet, Hispanics 2,347 square feet, and African Americans 2,664 square feet.\(^{13}\) Therefore, the presence of larger multifamily units or smaller single family homes is likely to support lower income people with larger families, many of whom are often minorities.

Therefore, I suspect that neighborhoods with moderately sized units, like the narrow but deep multifamily unit in a triple decker or a small lot single family home, will be more diverse. Once again I will have two variables to test this relationship. I expect that Housing Size will be positive: as the unit size increases, diversity will increase. But the coefficient of Housing Size Squared will be negative, reflecting the greater expense of a large home.

No data for median housing size existed, so I used number of bedrooms as a proxy for housing size.\(^{14}\) Data for number of bedrooms came from the 2011 American Community Survey, Bedrooms table.\(^{15}\)

**Percent Renter Occupied**

A variety of housing creates integration at the neighborhood level as well as within the same building. A multifamily home can accommodate families with limited savings while simultaneously housing the owner, striking a balance between higher and lower wealth individuals. This creates a living scenario that brings together people of different income levels, making the neighborhood more economically diverse.

\(^{11}\) Harvard School of Public Health, [www.diversity-data.org](http://www.diversity-data.org)

\(^{12}\) Paulsen 2012, page 412

\(^{13}\) Swanson 2013

\(^{14}\) Keller (page 695) confirms the high multicollinearity between number of bedrooms and housing size.

\(^{15}\) SE: B25041, since a studio is considered zero bedrooms in the census, I counted a studio as a one bedroom so it was included in the calculation.
This sociological arrangement is also a stable way to integrate communities. Towns with a high proportion of property owners are stable, but often do not include lower economic classes who cannot afford home ownership. On the other hand, neighborhoods that are made up of mostly renters have a high turnover rate and are less likely to maintain their racial composition. But communities that have some renters as well as “a strong core of long-term residents [in this case homeowners], are less likely to experience rapid racial change.”

Housing tenure identifies the occupancy status of a resident living in a home and whether they own or rent the unit. The variable used to test tenure is the percentage of residents renting a home in each of the block groups. The data came from the 2011 ACS Tenure table. I took renter occupation as a proportion of the total units occupied to find the renter percentage. Like the other factors testing balance, I used two variables, Percent Renter and Percent Renter Squared. I suspect that the coefficient of Percent Renter will be positive and that of Percent Renter Squared to be negative, which will indicate that having a balance between renters and owners generates more socioeconomic diversity in those neighborhoods.

IV. Regression Equation

To run this regression in Stata, a generalized linear model (GLM) was used instead of a multi-variable linear regression. This model was chosen because the dependent variable, diversity, is measured as a proportion, and many of the independent variables are calculated as percentages as well. The family choice used for the GLM was an Inverse Gaussian Identity and robust standard errors were also used. In a GLM, z scores are generated instead of t scores, and Chi Squared used instead of $R^2$ to test significance of the model. Chi Squared is measured as a p value, where a lower p value means more significance. Below are the three equations used in the model.

Whole Metropolitan Area

Diversity = $f\{\text{Distance to CBD, Distance to Transit, Distance to Transit Squared, Public Transit Usage, Public Transit Usage Squared, Lot Size, Building Density, Building Density Squared, Building Density per Dollar, Housing Mix, Small Multifamily, Single Family, Single Family Squared, Housing Size, Housing Size Squared, Percent Renter Occupied, Percent Renter Occupied Squared}\}$

Boston

Diversity = $f\{\text{Distance to CBD, Distance to Transit, Distance to Transit Squared, Public Transit Usage, Public Transit Usage Squared, Lot Size, Building Density, Building Density Squared, Building Density per Dollar, Walk Score, Walk Score per Dollar, Housing Mix, Small Multifamily, Single Family, Single Family Squared, Housing Size, Housing Size Squared, Percent Renter Occupied, Percent Renter Occupied Squared}\}$

---

16 Ellen 1998, page 64
17 SE: T94
Suburbs

Diversity = f \{ \text{Distance to CBD, Distance to Transit, Distance to Transit Squared, Public Transit Usage, Public Transit Usage Squared, Lot Size, Building Density, Building Density Squared, Building Density per Dollar, Housing Mix, Small Multifamily, Single Family, Single Family Squared, Housing Size, Housing Size Squared, Percent Renter Occupied, Percent Renter Occupied Squared} \}

Neighborhood Performance Index

One important thing to remember is that location, housing options, and the urban design of neighborhoods are not the only factors that determine the diversity of a community. The social and municipal characteristics of the neighborhood also impact where people choose to reside. “One study … has found that when faced with two equally priced homes, nearly three times as many people opt for a less desirable house in a good neighborhood as choose a very good house in a less desirable neighborhood.” School quality is one of these factors, often enticing families with young children to move out of the cities and into suburban neighborhoods. Crime rates are another major reason why people have historically fled for the suburbs. These are just a few of the non-physical factors that could prevent a clear understanding of the regression results. Additionally, there is a strong correlation between the urban fabric of a neighborhood and these other non-spatial stimuli. Inner city neighborhoods are often the ones with poor schools and high crime, while suburban towns boast high performing education systems and a strong safety record. The multicolinearity between the physical environment and these other measures of neighborhood performance hinders the outcome of potential regressions, because it then becomes unclear whether the source of the population’s makeup is the physical urban form or the quality of the neighborhood.

Therefore, in order to analyze the output of the regression more effectively and isolate just the influences of the physical form, I created a Neighborhood Performance Index comprising of three factors: school quality, crime levels, and poverty. The Neighborhood Performance Index stratifies the block groups into three levels: high, medium, and low rated. Since the social characteristics at each of the three levels are similar, we then can compare their urban form with less noise from other non-physical influences. This improves the performance of the regression by isolating the independent variables from other influential factors so one can truly understand the impact of the physical urban environment on socioeconomic diversity.

Ellen 1998, page 137

While there are many other potential causes of diversity, these three have been deemed some of the most influential when people choose their place of residence (Mast 2010). Data from three separate indices were used to compile the Neighborhood Performance Index: School quality data from the HUD Neighborhood School Proficiency Index, poverty data from the HUD Poverty Index, and crime rates from NeighborhoodScout. All three indices, which measure on a scale from 0-100, were given equal weight in the Neighborhood Performance Index. Low grading neighborhoods total between 0 and 100 of the three combined indices, 101-200 are medium quality neighborhoods, and 201-300 are high performing neighborhoods.
Most of the low performing neighborhoods are found in Boston, the medium performing neighborhoods in the inner ring suburbs, and the highest performing neighborhoods are in the outer suburbs.

Twelve Regressions

<table>
<thead>
<tr>
<th>All Block Groups</th>
<th>Entire Metro</th>
<th>Boston</th>
<th>Suburbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Performing</td>
<td>Regression 2</td>
<td>Regression 6*</td>
<td>Regression 10</td>
</tr>
<tr>
<td>Medium Performing</td>
<td>Regression 3</td>
<td>Regression 7</td>
<td>Regression 11</td>
</tr>
<tr>
<td>Low Performing</td>
<td>Regression 4</td>
<td>Regression 8</td>
<td>Regression 12</td>
</tr>
</tbody>
</table>

¹² Regression 6, high performing neighborhoods in Boston, has only 20 block groups, which is not enough observations to support any significant analysis from those results.
With the Neighborhood Performance Index, twelve regressions were run overall. When running the regression, I first input data for each of the three different theories to see how they affected diversity independently of the other factors. Then, I incrementally added variables into the equation to see how the results changed. This allowed me to see how the other variables reacted relative to each newly added design characteristics, and overall, identify what themes were the most connected to diversity. The results of each of the twelve regressions can be found in Appendix 4. Chapter 7 will review the results of each of the variables, as well as a graphical analysis of the linear relationship between each variable and the independent variable diversity. I will also look at the top 10% most diverse and bottom 10% least diverse block groups and the variables to assess if there is any correlation from this data. I also graphed the quadratic equations that were generated from the regression tables for each of the “balanced” diversity variables to find out the optimal measure for each of these factors. Finally, there is a profile of diverse neighborhoods in Boston and the suburbs, and low, medium and high performing neighborhoods.

21 While there is some circular logic through this process (the data from the block groups themselves is generating what is optimal), all 1,958 block groups were used to generate this equation, so the results are not just based on the diverse neighborhood’s composition themselves but all of the communities in the Boston metro area.
I. Variable Results

The following are the outcomes of the variables run in the twelve regressions to test the three theories. The full table of regression results can be found in Appendix 4.

Distance to CBD

<table>
<thead>
<tr>
<th></th>
<th>All Metro Area</th>
<th>Boston</th>
<th>Suburbs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>HP</td>
<td>MP</td>
</tr>
<tr>
<td>Distance to CBD</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

Among just the Second Best Location variables, Distance to CBD follows its expected pattern; the farther away a town is from the center of Boston, the lower the diversity of its population. This relationship is as expected because the outer suburbs are less dense and have fewer public transportation options available. However, the significance of Distance to CBD decreases as the housing variables are added to the regression. The z score of Distance to CBD goes from 3.39 to 3.01 when Housing Mix is added, quickly drops to 1.97 when Small Multifamily is added, and progressively decreases to 1.68 when Single Family is added, 1.57 when Housing Size is added, and finally, down to an insignificant 0.99 when Percent Renter is included. Distance to CBD’s decreasing influence as other urban design variables are added holds throughout all the regressions, regardless of the performance of the neighborhood. Therefore, it seems that Distance to CBD was only significant initially because of the density and public transportation options associated with it, rather than its actual location in the region. This discovery may prove that a neighborhood can be more diverse if it has the appropriate urban fabric, regardless of its location.

The graph of the top ten percent most diverse neighborhoods shows that there is a clustering of the most diverse block groups within a ten-mile range of the city center, with most around two to six miles away. This supports the notion that diverse neighborhoods are close to downtown, but not directly within the premium locations, as predicted in the Second Best Location Theory.

* Not Statistically Significant
Location in and of itself is likely not a means to an end, because the least diverse neighborhoods are fairly evenly distributed throughout the region. Location is likely an association to other, more impactful urban design variables, rather than an actual cause of diverse communities.

Diversity decreases in the entire metro area as one gets farther from the Central Business District. One can also see the most diverse block groups clustered within ten miles of downtown.

When looking at just the Boston block groups, neighborhoods farther away from downtown are more diverse.

Suburban block groups follow the pattern of the entire metro area, as diversity decreases as one gets farther away from the city.
## Distance to Transit

<table>
<thead>
<tr>
<th></th>
<th>All Metro Area</th>
<th>Boston</th>
<th>Suburbs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>HP</td>
<td>MP</td>
</tr>
<tr>
<td><strong>Distance to Transit</strong></td>
<td>+</td>
<td>+</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Distance to Transit Squared</strong></td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

The regression equation for Distance to Transit displays a quadratic equation in the suburbs and the high performing neighborhoods, which have a similar location in the outer ring. The coefficient of Distance to Transit is statistically significant and positive, which means that the farther away a block group is from transit, the greater the diversity—if this were strictly a linear equation. But because Distance to Transit Squared is significant and negative, there is a maximum threshold for how far a diverse community can be from rail transport. This variable shows that balance is important, because once one is too far away from transit, reliance on a car results in a more traditional suburban typology and the neighborhoods usually become more segregated. This outcome supports the hypothesis that while being close to transit is expensive and prices out many lower income residents and minorities, it is nevertheless necessary to provide alternative modes of transportation for those who do not have access to an automobile. Hence, the Second Best Location is often the most diverse, offering a bit of both worlds.

That this relationship occurred in the suburbs is surprising though. I expected Distance to Transit to be negative in these areas where less public transit options are available, with block groups closer to transit being more diverse because they offer rail access that supports lower income families who rely on public transportation. On the other hand, I expected the balanced relationship to hold in Boston, since the property values of the neighborhoods are strongly influenced by the location to the T stations. But, in a similarly surprising result, Distance to Transit was not statistically significant in the overall Boston regression, likely because almost all neighborhoods in Boston have ample rail access, neutralizing its impact. The inconsistency of this variable leads me to believe it is less significant than it seems.

Distance to Transit’s insignificance becomes clearer when graphing the quadratic equation from the regression to identify the optimal, balanced distance away from a train station. The regression indicates that the most diverse neighborhoods are predicted to be three miles away from a train station, which, by most measures, is far beyond a reasonable walking distance. This effectively means that balanced proximity to train stations is not a factor in explaining diversity since the optimal distance is so far away, essentially debunking certain components of the Second Best Location theory. But nevertheless, most of the diverse neighborhoods observed are indeed near transit, which likely means that there are other factors that are present among neighborhoods close to stations, such as higher built densities, that have a significant influence on the diversity of a neighborhood. It is not the impact of train stations in and of itself that causes diversity, but rather, its impact on the built environment that seems to be more critical.
The optimal distance away from transit generated from the regression equation is three miles, which is too far to be walkable and does suggest that Distance to Transit has less significant of an influence than the other urban design features.

The location of the most diverse neighborhoods are almost all within one mile of a train station in the Boston metro area, and none are located more than three miles away.

Many of the least diverse block groups are also close to transit.

Diversity decreases as the block groups get farther away from a train station. Distance to Transit has little affect in Boston where most block groups have access. Diversity also decreases in the suburbs farther away from stations.
Public Transit Usage

<table>
<thead>
<tr>
<th></th>
<th>All Metro Area</th>
<th></th>
<th></th>
<th></th>
<th>Boston</th>
<th></th>
<th></th>
<th></th>
<th>Suburbs</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>HP</td>
<td>MP</td>
<td>LP</td>
<td>All</td>
<td>MP</td>
<td>LP</td>
<td>All</td>
<td>HP</td>
<td>MP</td>
<td>LP</td>
</tr>
<tr>
<td>Public Transit Usage</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>NS</td>
<td>NS</td>
<td>+</td>
<td>NS</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>NS</td>
</tr>
<tr>
<td>Public Transit Usage Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

Though the coefficient of Public Transit Usage is mainly positive throughout the regressions, indicating that more public transit usage leads to more diversity, a more nuanced analysis of this outcome shows that a nearly equitable use of both public and private commuting modes is important to balancing the demographics of the neighborhood. But since private vehicular usage is already the predominant mode of transportation in the suburbs, and in fact in most of the region except for the most central neighborhoods in Boston, it is the block groups that have higher levels of Public Transit Usage—thus bringing the modes closer into balance—that are predicted to be the most diverse.

When analyzing just the Second Best Location variables independent of the other factors that influence diversity, the signs of the variables Public Transit Usage and Public Transit Usage Squared demonstrate that neighborhoods that offer a mix of public and private transportation options are likely to be more diverse. The coefficient for Public Transit Usage is positive, indicating that the higher the use of mass transit as a method of commuting, the higher the levels of diversity. But this relationship only holds to a point, evident by the negative coefficient of Public Transit Usage Squared, the other half of the quadratic relationship. This indicates that communities with very high proportions of residents who commute by public transit are associated with lower levels of diversity, not dissimilar from those in which very high proportions of residents who commute privately. This balanced relationship also holds in medium performing neighborhoods, which are mostly the dense inner ring suburbs. This makes sense, as these are the neighborhoods that have both driveways to support cars and adequate access to both bus and rail.

Once again, this quadratic equation shows that a balance of transportation options leads to a peak in the level of diversity, lending support to both the Second Best Location and Personal Urbanism theories. In fact, the optimal level of commuters taking public transit is right at 50%, a perfect balance between public transit users and private drivers. To see where the neighborhoods with a balance of commuter options are located, I graphed all the block groups that had between 45% and 55% of its residents use public transit. The block groups that have both public transit and private vehicle options are the streetcar suburbs, and there is some correlation between the most diverse neighborhoods and those that exhibit this equitable balance.

The only place where Public Transit Usage is not statistically significant is in Boston and in low performing neighborhoods, which are almost all within Boston’s city limits anyway. This is likely because most people in Boston, rich or poor, utilize public transportation as their commuting method since there is ample access to it throughout the city, again neutralizing its impact.
The optimal balance of public transit commuters to private vehicle commuters is 50/50. The block groups with between 45% and 55% public transit commuters are seen in green, while the top 10% most diverse neighborhoods are outlined in red.

The most diverse neighborhoods have a wide proportion of commuters traveling by public transit, from 10% to 70%.

The bottom ten percent have a significantly lower amount of public transit usage in these communities, mainly under 20%.

The quadratic relationship between public transit usage and diversity is seen here. Lower levels of public transit usage in Boston correlate to more diversity. In the suburbs, more transit usage is associated with higher levels of diversity.
Lot Size is significant and has a fairly consistent outcome throughout the regressions. The coefficient is negative as expected: the bigger the median parcel size, the less diverse the community. This result varied in only a few of the twelve regressions. Lot Size was not significant in Boston or in low performing neighborhoods. This is probably due to the fact that most Boston neighborhoods have small lots to begin with, so there is less variation in the data to generate an impact on the dependent variable. Secondly, Lot Size has a positive coefficient in low rated suburbs. This makes sense, since larger parcels are more expensive, and the presence of wealthier families in lower income neighborhoods would lead to more income diverse communities.

### Most Diverse (Top 10%) - Lot Size

The majority of the diverse block groups have small parcels between 2,500 – 7,500 square feet, and only one town has a parcel size greater than 12,550 square feet.

### Least Diverse (Bottom) - 10% Lot Size

Some of the least diverse neighborhoods also have small lots, mostly located in the poorer neighborhoods in the city, but most are the communities with very large lots far out in the suburbs, with a median lot size greater than 20,000 square feet, and many over one acre.
As the median lot size of a block group increases, diversity decreases.

Lot Size has little significance in explaining diversity in Boston.

Small lots have a strong relationship to diversity in the suburbs.
An unexpected result surfaced in this regression: when Lot Size is included, the coefficient of Building Density is negative. I expected Building Density to be negative in Boston, as the results show, since areas that are less dense are less expensive and likely more diverse. But I certainly did not expect Building Density to be negative in high performing neighborhoods, which are primarily comprised of sprawling suburbs. Diving deeper into this anomaly, the regression for Building Density was rerun without Lot Size. As it turned out, removing Lot Size from the equation results in the coefficient of Building Density switching to positive, associating more Building Density with greater socioeconomic diversity, and Building Density Squared becoming statistically significant with a negative relationship—a similar quadratic relationship to the other balanced urban environment variables. This shows that Building Density is clearly correlated to Lot Size, which in and of itself is a proxy for Building Density: neighborhoods with smaller lots are denser because there are more homes in a smaller area, whereas large lots naturally correlate to less density. As such, when analyzed in conjunction with Lot Size, Building Density becomes negative in order to combat the increased density created by smaller lots, bringing density back to its optimal medium level for diversity. However, without consideration of Lot Size—removing the variable from the analysis—Building Density then becomes positive with Building Density Squared negative, following the expected pattern of predicting the most diversity in communities that are dense enough to be walkable, but not too dense to price out middle and lower income residents.

This shift in Building Density from negative to quadratic in high performing neighborhoods, depending on the existence of Lot Size, is also consistent with the Personal Urbanism theory: small lots with multifamily units that densify the neighborhood, but also detached so that the buildings have driveways and backyards to support a suburb style of living in an urban environment, are the communities that will be the most diverse.

The optimal building density from the regression equation is 30%, which also happens to be the median in the range of densities for the top ten percent most diverse neighborhoods. The map of block groups that have between 25% and 35% lot coverage shows that it is the inner ring, semi-urban style of neighborhood that exhibits this optimal density, supporting a strong correlation between this level of building density and the most diverse communities.
The optimal building density level, 30%, correlates to the streetcar and affordable suburbs, where most of the diverse communities are located.

Almost all the most diverse block groups have densities between 10-50%, with a majority clustered between 20% and 40%.

The least diverse neighborhoods reflect their suburban location, as most have less than 20% building density.

The quadratic relationship between building density and diversity is seen here.

Lower densities in Boston correlates to more diversity.

In the suburbs, higher levels of density is associated with higher levels of diversity.
Building Density per Dollar, which measures the cost of living in dense neighborhoods, is positive and very significant in almost all regions and neighborhood types. Because this is the variable that factors in the impact of real estate values on diversity, it makes sense that it is highly influential. The results indicate that the block groups that provide denser urban environments at a more affordable price are linked to higher levels of diversity. This confirms that density is an important component to supporting integrated neighborhoods, so long as it does not become too expensive for the general population. The only caveat to this relationship is that Density per Dollar is negative in low performing neighborhoods. This relationship is intuitive because low rated neighborhoods have inexpensive housing to begin with, so affordability is no longer an issue. These communities typically feature a more homogenous demographic, both ethnically and economically.

The Building Density per Dollar of the most diverse block groups are higher on average than the least diverse block groups. The least diverse neighborhoods tend to be on the lower end of this variable. Though less significant in this graph, a higher Density per Dollar value is connected to more diversity. There is little correlation in the graph despite the regression being very significant. The positive relationship is much stronger in the suburbs.
The results for Walk Score were different than expected, with a positive coefficient that indicates neighborhoods with a higher walk score correlate to greater diversity. This is surprising because, as seen in Chapter 5, neighborhoods with high walkability are more expensive. Additionally, Walk Score per Dollar was found to be insignificant in all of the regressions. I suspect that these results reflect the effects of gentrification, which I will explain in more detail later in this chapter and in the conclusion.
Small Multifamily

<table>
<thead>
<tr>
<th></th>
<th>All Metro Area</th>
<th>Boston</th>
<th>Suburbs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>HP</td>
<td>MP</td>
</tr>
<tr>
<td>Small Multifamily</td>
<td>+</td>
<td>+</td>
<td>NS</td>
</tr>
</tbody>
</table>

Small Multifamily, homes with two to four units, has a positive coefficient as anticipated, and is statistically significant in most of the regressions. As described in Chapter 4, this typology creates density at a more affordable price and also generates a more equal combination of rental and owner units. The only regression in which this typology is not significant is in medium rated neighborhoods. Since these neighborhoods represent the inner suburbs, which already have a lot of detached multifamily homes, the variable is less explanatory of the variance in diversity in this part of the metro area.

There is surprisingly little correlation between the top diverse areas and the presence of small multifamily units. The range is quite wide, though there is a greater concentration at the 20-60% range.

The least diverse neighborhoods have very few multifamily units, so there is proof by contradiction that multifamily homes are a necessary component to diverse neighborhoods.
The importance of housing mix can be seen from the quadratic form of the graph.

Small multifamily units has a positive relationship in Boston.

Small multifamily homes has a strong positive correlation in the suburbs.
In the overall regressions, Single Family follows the predicted balancing pattern. Single Family has a positive sign, denoting that the addition of single family homes improves diversity, likely by increasing the variety of housing options available. But when they reach a saturation point, such as the case in a typical suburban community, diversity is reduced, indicated by the negative sign of Single Family Squared.

However, when tenure is added (Percent Renter variable), Single Family is no longer statistically significant. This relationship has a few implications. The first is that housing mix can influence tenure mix, since much of the typologies’ impact on diversity comes from creating a combination of income levels. Secondly, public policies that help create a balance between owner and renters can be just as effective as mixing different housing types in a neighborhood. Finally, the fact that Single Family becomes insignificant but Small Multifamily remains important when the tenure variable is added signals the influence that triple-deckers have not just as a housing type, but also as an urban design factor in creating a walkable environment.

Not surprisingly, Single Family is mostly insignificant in the suburban tracts, since it is the prevailing typology in this outlying area. But when it was significant, it was negative as expected, demonstrating that fewer single family homes, or more multifamily homes, have a link to more diverse suburban towns. The optimal amount of single family homes, as shown in the regression equation graph, is 25%. This shows that some single family homes are important to generate a mix, but that a majority of the housing units should be multifamily. This amount was used to generate the map of housing mix found in the next variable.
Many of the diverse communities exhibit a wide proportion of single family homes, though most cluster below 50%. This supports the finding that some single family homes are needed to create a balance of housing options to serve a variety of residents.

The least diverse block groups have either a very high proportion of single family homes or almost none at all, illuminating the importance of housing mix, since areas that are saturated with any one single housing typology—regardless of what it is—are less diverse.

The quadratic relationship of single family homes to diversity can be seen in this graph. More single family homes lead to more diversity in Boston, though the relationship is not that strong here in this graph. There is a strong relationship between fewer single family homes and more diversity in the suburbs.
Housing Mix is positive and significant in explaining diversity in the suburbs. However, in Boston and in the region as a whole, it is only significant when the Single Family and Multifamily variables are not included, and becomes insignificant when the housing typologies are added in. This does not mean that having a mix of housing options is not significant to promoting diversity; quite the contrary. Instead, it denotes that the impact of housing mix can be captured through the Housing Mix variable itself, or through the Single Family and Small Multifamily variables, both of which are mostly significant and explanatory throughout the regressions. Additionally, since Single Family exhibited an arch, and Small Multifamily was positive in the suburbs, these results show that a balance of multiple housing options is linked to more diversity.

The other likely reason for the lower significance of the Housing Mix variable itself is that it is defined as an equal representation of single family, small multifamily, large multifamily (5-19 units), and large apartments (20 or more units). But the graph and regression analysis of each of these typologies show that the optimal mix is actually not equal balance between the housing types; it is closer to 25% single family, 40% to 50% small multifamily, and 20% to 30% apartment buildings (over 5 units). Therefore, the variable itself as it is defined is not significant, but housing mix as a concept has a strong correlation to diversity.

Mapping the block groups that meet this optimal housing mix condition produces convincing results. The neighborhoods with the optimal housing mix are the streetcar suburbs radiating out along the transit corridors. Except for Roxbury, all of the neighborhoods with this housing mix are diverse.
The optimal housing mix correlates very strongly with the most diverse block groups in the Boston metropolitan area.

There does not seem to be a clear relationship between the most diverse block groups and housing mix, even though the output on the map says otherwise.

The least diverse block groups have a similar housing mix percentage as the most diverse block groups. This is likely one of the reasons why the variable was not significant in the regressions.
Housing Size, using number of bedrooms as a proxy, also follows the expected results in the regression of all 1,958 block groups. Similar to the relationship of Single Family, more bedrooms generate more diversity because the presence of bigger homes in a neighborhood with mostly small units brings in a greater mix of incomes, until the houses are *too big*, at which point it then decreases diversity because the houses become too expensive for most citizens. This concept of balance is also displayed in the difference of the coefficient in high and low performing communities. In high rated neighborhoods, the coefficient for Housing Size is negative, indicating that smaller homes in a location that typically has large homes equalizes the housing sizes and makes it more likely for those block groups to be more diverse. Correspondingly, in low performing suburbs, the coefficient is positive, indicating that larger homes lead to more diversity in neighborhoods where residents are more likely to have lower incomes, bringing in wealthier families and thus greater diversity. While these two results show the need for a balanced housing size, the variable has a negative coefficient in low performing neighborhoods and in Boston, which was unexpected because larger homes should create more diversity in these communities. Gentrification is a likely explanation to this anomaly, which will be discussed in the conclusion.

The optimal number of bedrooms from the regression equation is right at two. A two bedroom home is significant for two reasons. First, it supports the idea of housing mix, since it is the average of small one bedroom apartments and larger three bedroom homes, each of which houses a different demographic. Secondly, a two bedroom home is usually moderate sized, like the ones seen in the affordable suburbs. Analyzing the map of block groups where the median amount of bedrooms is two (1.8-2.2 shown on the map) shows that the neighborhoods with the optimal sized homes are the streetcar and affordable suburbs.
The optimal housing size represents the streetcar and affordable suburbs and follows along the commuter rail corridors.

The most diverse neighborhoods have homes between two and three bedrooms.

The least diverse neighborhoods have homes between three and four bedrooms.

The quadratic relationship between housing size and diversity is seen here.

There is less conclusive evidence of a relationship from the graph of Boston.

The balanced relationship of housing size to diversity also exists in the suburbs.
The balance of housing tenure in a neighborhood has a very significant correlation with diversity. Percent Renter is positive and Percent Renter Squared is negative for almost all the regressions, forming a quadratic equation that symbolizes the importance of a balance between renters and owners for diversity. The only location where this relationship varies is in the low rated neighborhoods of Boston, where the variable has only a negative coefficient. This association makes sense, since most of the residents in low performing neighborhoods are renters, so the presence of more home owners will likely increase the class diversity of the community.

The optimal mix of renters and owners from the regression equation is exactly 50/50. Though less consistent in overlapping with the most diverse neighborhoods than the other optimal maps, the block groups with 45-55% renters are located in the inner ring suburbs along or near the transit corridors.
A 50/50 balance of owners and renters is mainly achieved in the streetcar and affordable suburbs, which optimizes the level of diversity.

The most diverse neighborhoods have a high percentage of renters, between 40-80%.

The quadratic relationship between housing tenure and diversity is seen here.

The least diverse neighborhoods either have a very high or a very low percentage of renters, confirming that balance of tenure is important to promoting diversity.

There is also a parabola in the graph of the Boston block groups.

In the suburbs, more renters correlates to higher levels of diversity.
II. Summary of Neighborhoods

High Performing Neighborhoods

As the regression results show, and as predicted, high performing neighborhoods are typically more diverse when there are more affordable housing options available. Smaller lots and higher affordable density (up to a point) are associated with higher levels of diversity. A mix of housing options is also important, as there is a cap on the amount of single family homes that correlate to diversity in the suburbs and one on multifamily homes in more urban areas. Houses that are average in size are also central to explaining diversity. While more access to transit correlates to more diversity, the optimal distance to transit is too far away to have any significance, making location in the region itself also unimportant.

Medium Performing Neighborhoods

In the average rated neighborhoods that account for most of the streetcar and affordable suburbs, there is a strong mixture of single family and multifamily housing types. Since many of these communities are made up of this mix, the housing types themselves are not significant in impacting diversity. In this case, it is the Density and Lot Sizes within a neighborhood that drive its socioeconomics. This leads to the idea that there is a hierarchy of urban form when it comes to influences on diversity: the housing size, type and mix is more important than the urban design features, such as density and walkability, of the neighborhood. Once again, the block groups with smaller lot sizes that are not too built up best predict where diversity will turn up in medium performing neighborhoods. This is corroborated by the fact that Housing Size follows its expected balanced pattern. Since Housing Size is a function of the Lot Size—a house is limited by the footprint on which to build—smaller lots will lead to smaller houses.

Similar to the top rated neighborhoods, the location of medium quality communities is not significant. Moreover, the location to train stations is not important either. However, despite these results, balanced transit usage is still a major factor in explaining diversity. This means there is something other than rapid transit driving public transit usage in these diverse communities, and it is likely bus service. The impact of bus service on socioeconomic diversity will be explained more in the conclusion.

Low Performing Neighborhoods

The characteristics of diverse neighborhoods with low performance differ greatly from the high and medium quality areas. First of all, Density per Dollar is negative, indicating that in this category, neighborhoods that get more value for higher levels of density are actually less diverse. This is likely because most of the low performing block groups are in Boston proper, and when neighborhoods are too affordable, they are often very segregated neighborhoods with high levels of poverty. Diversity in low performing neighborhoods is negatively correlated to Distance to Transit: as one gets farther away from a train station, diversity decreases. This differs from the other regressions and is unexpected since most neighborhoods in Boston that are close to transit have very high housing prices and thus, going farther away would increase diversity. Housing
Size also has a negative coefficient: larger units here contribute to less diverse neighborhoods, which is very surprising. Finally, in the Boston block groups, a positive Walk Score was associated with higher levels of diversity. Taken together, all these anomalies lead me to believe that diversity in low performing neighborhoods can be primarily attributed to gentrification. Higher density, highly walkable developments with small units near train stations describes the transit oriented development that is taking place along the rail corridors in the city, which does have an impact on bringing in a younger, wealthier demographic into the older, low performing neighborhoods of the city. This finding and its impact on the sustainability of these diverse communities will be discussed in the conclusion.

Another notable aspect in low performing neighborhoods is the fact that most of the other variables are insignificant, which signifies that the social factors making up the Neighborhood Performance Index – crime, poverty, and schools – likely trump the impact of the physical form in these communities. To confirm this, I ran the same regression with the NPI factored in as a variable, and it was statistically significant and positive. Design matters up to a point, but communities with higher crime rates, high poverty rates, and low quality schools are unlikely to draw a mixed demographic. Higher income residents or people of a race different than the predominant one in a neighborhood will probably not move into a very low performing neighborhood, regardless of the housing styles or layout of the neighborhood.

Boston Block Groups

Boston displays a similar story to that of low performing neighborhoods. Distance to Transit is significant and has a negative coefficient, and, along with a negative coefficient for Housing Size and a positive one for Walk Score, seems to support the location of diversity in Boston’s gentrified neighborhoods along transit nodes. In addition to these observations of gentrification, results in Boston also provide further evidence to support the idea that there is a hierarchy of urban form—when lot size and density are kept relatively constant, like they are in Boston block groups, the impact on diversity then falls to the housing mix that is available. This is supported by the fact that the variables Single Family and Small Multifamily are significant and follow their expected signs in Boston.

Suburban Block Groups

The theory of balanced urbanism is most clearly displayed in the suburban block groups. Lot Size is negative to create more affordable parcels, except in poorer neighborhoods where Lot Size is positive for the reverse reasons. Balanced density is present when not factoring in Lot Size, but when the small lots are in the calculation, less density on those small lots is preferred. This is confirmed by the positive and statistically significant variable of Density per Dollar. The spirit of housing mix is also significant in the suburbs despite the insignificance of the variable itself, as the presence of multifamily homes and a cap on single family homes play a crucial role in explaining diversity in the area. More average-sized houses also correlate to more diversity. Finally, more public transit usage in this highly car-centric environment is predictive of a community’s higher levels of diversity.
Chapter 8

Conclusions and Recommendations
I. Recap of the Three Theories

Though the results fluctuate from location to location and between differing neighborhood qualities, they ultimately point to the notion that a balanced urban environment is associated with more socioeconomic diversity. Neighborhoods that manage to have small lots without being too dense; feature a mix of housing types, including some single family units; balance home sizes that are not to big nor too small; and maintain roughly equal representation between renters to owners and public transit commuters versus car commuters are all more likely to be diverse. The results emphasize the importance of balance—of having limits on most of the critical variables studied. For example, in homogenous suburbs, where homes are typically large single family houses on large plots of land, the presence of smaller homes or multifamily structures is going to bring in a different demographic. However, density is not a cure-all, as very high-density development is negatively correlated with diversity. Instead, my research shows that balanced urbanism—the semi-dense, semi-urban environments—is more likely to start addressing segregation issues. While these results may be seem intuitive, they can be used to inform future development to proactively move the needle on greater integration in this country.

One of the more surprising regression results was that location within the metropolitan area is less important than expected, as the results for the Second Best Location Theory are inconclusive. Almost across the board, Distance to CBD was not significant. Even though the map clearly shows the most diverse neighborhoods clustered within the inner ring of I-95, the regression results consistently found that location is not important in actually explaining the reason why those communities are diverse. Similarly, outcomes for location to transit are also inconclusive, as the impact of Distance to Transit on diversity changes quite frequently. In Boston, neighborhoods closer to transit are more diverse, but in the suburbs, though the variable did exhibit a quadratic pattern as originally predicted, the “optimal” distance was so far away that one cannot reliably conclude any influence from this result other than location to train stations being insignificant. From observation, it is likely that access to trains does play a crucial role in explaining diversity, but this likely more as an influence on urban form than as a mode of public transportation.

But public transit is still critical to a diverse community, as Public Transit Usage was significant throughout the regressions. Therefore, other modes of transportation usage seem to be driving this relationship to diversity. Because the Public Transit Usage variable accounts for all modes of public transit, whereas Distance to Transit only considers trains, its importance supports the notion that it is actually bus service that is the influential mode of transit throughout these diverse communities.

Bus service is important for a few reasons. First, buses provide adequate transit access without the increase in property values.¹ Thus, the upward pressure on housing prices that exist near train stations, which often leads to displacement of peoples and communities, is not a factor in bus-serviced neighborhoods.

¹ Barker 1998; Goodwin and Lewis 1997
Secondly, bus routes are typically more circuitous, providing access from suburb to suburb rather than to downtown, which is the case for most rail lines. This assists those working in the service industry throughout the region, which are often located in suburbs, rather than just those who work in professional industries, which comprise the majority of jobs downtown. These results have important policy implications. While rapid transit is important to metropolitan areas and should be expanded, it is almost always associated with increased land values. Buses provide alternative transportation options for those in the suburbs without access to a car, and without the housing price increase associated with this service.

Not unexpectedly, the diverse neighborhoods do indeed exhibit high concentrations of bus routes and services relative to its less diverse counterparts. Malden has 13 bus routes, but as seen from the map, most run in the southern and eastern sections of the city that are more diverse, and only a few of the lines run through the less diverse northern half. The affordable suburbs, even if they are not within relative walking distance to rail, still have adequate bus service, unlike most of the outer suburbs. The connection between bus service and diversity demonstrates that more dense urban environments can indeed succeed in suburban settings even without rail service nearby, so long as there is adequate public transportation available.

Malden Bus Routes

2 Bowes and Ihlanfeldt 2001; Cervero 2004; McMillen and McDonald 2004
When looking at the urban design characteristics of a neighborhood, the concept of Affordable Walkability is definitely viable. Though Walk Score per Dollar itself was not significant, affordable density, as indicated by the variable Density per Dollar, was extremely significant throughout almost all of the regressions. Also consistent in most regressions was the concept of smaller lots with less density. Small lots bring homes closer together and create a walkable environment, but the units are still detached so as to not generate a huge increase in housing prices. This is further supported when the regressions were not controlled for lot size: balanced density was then very important in predicting diversity.

This foundation of small lots also satisfies the Personal Urbanism Theory. The idea is to be able to capture the value of the suburbs while living in a dense enough environment to have the services of a city. Detached multifamily units or average-sized, single-family homes on small lots that are close together are the characteristics that predict the higher levels of diversity. These housing types give residents a piece of the suburbs without the costs typically associated with it. Multifamily and single family homes are also capable of existing side-by-side at this density, which creates housing mix. While the defined Housing Mix metric itself was not significant, the concept of having a balance of housing types is shown to lead to more diversity because the variables of Single Family, Single Family Squared and Multifamily followed their expected patterns and did indicate greater diversity. Finally, the results of Housing Size were also consistent with the Personal Urbanism Theory. Average-sized homes are the bridge between very small, very affordable units, and very large, very expensive suburban homes. Modest homes can exist closer together, increasing the population density and thus allow the city to provide services such as buses, and for walkable commercial activities to be economically viable.

II. Hierarchy of Urban Form

From these results, a hierarchy of urban form and its relevance to diversity begins to emerge. The hierarchy is interesting because the farther up the pyramid, the more influence the physical factors have on the socioeconomic diversity of the population. However, the lower levels on the pyramid affect the physical outcomes that exist above it, indicating that they are the most influential components. Lot Size and Building Density are clearly on the foundation. Small lots constrain the type of development that takes place and act as a blueprint for the urban design qualities that are steadily present in diverse neighborhoods. Similar to zoning, small lots effectively control what is built in the district. While other zoning factors, such as building setbacks and lot coverage, also help control size, shape and height, limiting lot size is one of the most effective ways to restrain the type of development that can occur. Building Density is directly related to Lot Size, as seen in its importance when Lot Size was removed from the equation. Building Density is a function of Lot Size; the smaller the Lot Size, the greater the Building Density.

Public Transit Usage is also on this first rung of importance alongside Lot Size/Density, since, without public transit, density cannot thrive. Public Transit Usage was consistently influential in the regressions
and pointed to balanced transit usage as the greatest indicator of diversity, regardless of location. As such, it called for more transit usage in the suburbs and less transit usage in the cities. Access to public transit, then, is necessary to provide multiple modes of transit alongside private automobiles.

Transit access, lot size, and density create the foundation for a diverse neighborhood, but it is the housing type, size and mix that actually generate those diverse communities. This helps explain why the affordable suburbs are just as diverse as the streetcar suburbs even though they are not walkable, they have an affordable suburban typology available to a wider range of people.

Finally, the end goal is to create a mix of people. Balance between owners and renters had a significant impact on this mix of people and the diversity of communities. Of note was the fact that when neighborhoods exhibited a balance between owners and renters as its residents, the housing variables were no longer significant. Thus, we can conclude that housing styles do have an effect on who lives in a neighborhood and are the likely cause for a balance of tenure, but it is the mix of people itself, naturally, that is the most important. Therefore, policies that can balance the owner/renter relationship, or mixing of incomes, are likely be just as effective at generating diverse communities as the physical mix of housing options.

There are two balanced neighborhood styles that display these results from the regression and correlate to more diversity: the streetcar and affordable suburb. Both offer small lots and small homes, satisfying the upper rungs of the hierarchy. But the streetcar suburbs are likely a better form in the long run because they have one additional piece to make these diverse neighborhoods sustainable, enough density to support walkable amenities that make these communities popular. Housing affordability generates diverse neighborhoods, but an attractive urban environment that appeals to both urban and suburban dwellers will produce longer term, sustainable, diverse communities.

This indicates that although affordable housing is an important component, it is not the only influence in describing the location of diverse neighborhoods. The presence of communities with moderate housing sizes and more multifamily rentals, which in combination can create an inexpensive housing option, was correlated to higher levels of diversity. But more transportation options and density factors are also important in identifying which communities will be more diverse. Therefore, planners need to think holistically when trying to create integrated neighborhoods and expand beyond thinking solely about affordable housing, and into other facets of the neighborhood fabric as well.
III. Other Regression Conclusions

These findings support the hypothesis that the physical factors of a neighborhood influence diversity. They also validate many of the previous studies on the subject, discussed in Chapter Two, particularly those for New Urbanism. Most of the diverse neighborhoods studied here do indeed exhibit traditional neighborhood design with small lots, houses that are closer together, and a mix of housing types and unit sizes, that are the basis for New Urbanist designed communities. The only difference is that the diverse neighborhoods in the Boston metro area are older and not newly planned. This may explain why New Urbanist developments have not produced the outcomes for diversity that their characteristics suggest. Because they are a “new” style of suburb in high demand and they are still in short supply, they are often more expensive. Until there are enough New Urbanist communities where the demand premium is no longer a factor in the pricing, we will not be able to adequately test their true impact on socioeconomic diversity. Additionally, New Urbanist developments are often large planned communities in the suburbs or brownfields redevelopments in the cities—new neighborhoods built entirely from scratch that render their construction more expensive. The New Urbanist design principles may have merit, but translating them into the existing built environment of the city and the suburbs, instead of building from the ground up, will be the challenge for the future.

The other challenge is creating stable diverse communities. The results in lower performing neighborhoods suggest that many of these communities are diverse due to gentrification, especially in conjunction with rapid transit. This is not a new discovery. In fact, from 2000 to 2007, Boston led the nation in gentrification, according to a study by the Federal Reserve Bank of Cleveland. With a negative coefficient for Distance to Transit, a negative coefficient for Housing Size, and a positive coefficient for Walk Score, it is likely that diversity in the lower performing neighborhoods is explained by transit-oriented development around rail stations. These redevelopment projects are close to transit hubs, have smaller units built up at high densities, and are more expensive because they are new and desired, all of which attract higher income residents to low performing areas, creating socioeconomic diversity where it may otherwise be consistently low income. This housing style is also consistent with the type of resident that would move into a heavily minority community. “The typical white resident who decides to move into a racially diverse area is young, single, childless, and a renter.” This demographic is more apt to live in smaller units near transit hubs. Unfortunately, this means that diversity exists in lower rated communities almost strictly as a result of gentrification, rather than because of a balanced physical environment. While this transitional period may create diverse neighborhoods for the time being, it is unlikely that these communities will remain diverse for long. Communities with a more balanced approach to development, instead of building as dense as possible, are likely to create more stable, sustainable diverse communities.

---

3 Bradley 2013
4 Ellen 2000, page 8
Finally, the results demonstrate that the physical realm is more influential in explaining the nature of diverse communities in the suburbs than in the city. This is likely because the outer suburbs uniformly exhibit positive social factors that drive residential choice, such as higher quality schools and lower crime rates. Therefore, the physical factors that drive the economics of the housing market become very significant, especially home and parcel size. These elements were not as important in the city, where problems with high crime and poor schools end up driving away those who can afford to leave, regardless of the neighborhood style that is available.

Therefore, if the urban form was a probability function, it is an A and B scenario, not an A or B one. Having a balanced urban form (A), as discussed in this paper, will likely result in more diverse communities, if the social factors (B) are also satisfied at an adequate performance level. But, if there is a balanced urban environment without the other satisfactory institutional services (A without B), then the communities are less likely to be diverse, such as those found in parts of Boston. Likewise, B without A does not predict diversity, as most of the outer suburbs with high quality services are not diverse. This means that neighborhood type is a prerequisite for, but not the cause of, diversity. There are neighborhoods with this typology that are not diverse, but all the diverse neighborhoods were of this style.

The built environment is the vessel in which diversity is collected, but other factors determine whether diverse residents are likely to end up in that vessel. An analogy to flooding can be used. Rain causes the flooding, but it is the topography that determines where the flooding will occur. If it does not rain, then there will be no flood; but if it does rain, the water will find the spots to be flooded. Likewise, if there is a lack of different peoples and cultures in a given metropolitan area, there will not be diversity; but if there are dissimilar peoples, they are more likely to end up living together in neighborhoods with a balanced urban design. A balanced neighborhood is more likely to support a wider range of people with different preferences, needs, and resources for living, should it be given the opportunity to do so. Though it may not create diversity, it is more likely to support it if the other elements are in place.

IV. Research Method Conclusions

It is clear that the ways in which I chose to define and measure diversity had a major impact on the outcome of the study. Because I defined diversity as equal representation across different groups, even though they are not equally represented in the national or metro populations, the neighborhoods that are diverse ultimately have high minority populations. This choice was tempered by including income diversity as well, which is why Dorchester registered as diverse while Roxbury did not—not all ethnically diverse communities are also economically diverse. Though the neighborhoods that were the most diverse under my metric do indeed have reputations for being so, other ways to calculate diversity can change the results. One way to improve the study would be to calculate diversity using multiple methods discussed in the methodology section of Chapter Three, and then identify the communities that are consistently ranked high across each of these approaches.
Additionally, some improvements in data collection and analysis would benefit this type of study in the future. Ideally, there would be more robust data for specific urban design measurements to actually capture their impact on the walkability and livability of an area. Using data at a level closer than the Census block group level would more directly connect the physical features of an area to the demographics of its streets, rather than averages for the neighborhood. This data would particularly improve the Distance to Transit metric, as it would provide more details that may actually illuminate the land value gradient as one gets farther away from a train station and possibly prove the Second Best Location Theory. This was not possible in this study as currently organized.

Another improvement would be to use a spatial regression instead of a generalized linear model. Spatial regressions capture the impact of the neighboring block groups. Rather than analyzing each neighborhood in a vacuum, its location to every other neighborhood is taken into account. Finally, conducting this same study using time series data would allow for identification of stable diverse communities. Seeing which neighborhoods are sustainably diverse, which became more diverse, and which became less diverse, and why, would shed more insight on which urban fabric factors are more conducive to stable diversity, as well as ascertain where gentrification is actually taking place. While such a time series approach would improve the results, it is difficult to obtain data for it, as the census tracts change with each decennial census.

There are many directions to take this study in the future. Other cities can be analyzed, especially newer cities in the Sunbelt and out west. These cities feature different typologies than those found in New England, so any similarities in results for diversity across regions would be very telling for urban designers. Similarities and differences between various cities in general would shine more light on which physical layouts of a neighborhood are consistently correlated to diversity across varying regions, which in turn would help inform broader potential policy changes and design review decisions.

V. Recommendations

After analyzing these conclusions, my recommendations are rooted in bringing the city and the suburbs back into balance. The idea is to take the strengths of one and use them to improve the other. Cities have innovative zoning techniques that can also be utilized in the suburbs, while the suburban philosophy that is attractive to so many can be employed more effectively in the city. By densifying and increasing bus service to the suburbs, revitalizing existing neighborhoods, and instilling more community control over public spaces, we can begin to make inroads toward the goal of creating more diverse communities.
Recommendation #1: Infill 2.0 - Densify the Suburbs

As described in the introduction, suburban development has been the cause of many social and environmental ills over the past half-century. It is argued that segregation by race and income took hold through exclusionary zoning and a disproportionate share of government resources that supported private home and car ownership in the suburbs at the cost of urban public investment. Nevertheless, despite these past transgressions, the suburbs represent an opportunity to create more diverse communities. There is room for infill development without the need for significant change to the current urban fabric. Better yet, most of the infrastructure is already in place to accomplish this goal. Densifying the suburbs would not only benefit the country from a smart growth perspective by curbing sprawl, but it would also begin to bring the suburbs back into balance, creating denser suburban environments that are more conducive to housing a wider range of residents.

Unfortunately, densifying existing suburbs is difficult, and has not yet been successfully carried out. Typically, when densification occurs, it is either in new suburban communities built in the New Urbanist fashion, or larger multifamily apartments constructed as transit oriented developments that promote a more urban lifestyle. But we do not see conversions of a large-lot suburb into a small lot one, or a small-lot, single family suburb into one of detached multifamily units. It is hard to change what already exists, as there is resistance from all fronts—neighboring residents who are fearful of disturbances or reductions in property values, government officials who want to get reelected and follow their constituents, and developers who will not get involved unless there is money to be made. Therefore, we need to create ways to incentivize towns, developers and owners to want to reinvent their communities.

Obtaining the support of local suburban governments is critical because they need to change their zoning codes in order to allow densification to happen. Additionally, most towns pass off the problem to the next one, exhibiting a “not-in-my-backyard” philosophy at the municipal level. Therefore, any suburban redevelopment plan must be regional in scope to effect not just one or two towns, but the entire metropolitan area. If not, more greenfield development will take place, continuing suburban sprawl and undermining the locational advantage of the inner suburbs.

Though many towns are afraid to densify, there is a convincing argument outside of the diversity priorities that should make them want to do so. First of all, there are economies of scale in densification, since roads, water lines, sewers, and electric infrastructure are already in place. In fact, “a 2008 report by the University of Utah’s Arthur C. Nelson estimated that municipal service costs in low-density, sprawling locations can be as much as 2.5 times those in compact, higher-density locations.” This cost savings could help offset the increased burden on other services that comes with an increase in population, such as police and fire services and the school system.

5 Gallagher 2013, page 60
Secondly, denser communities would also attract the younger generation, as most millennials prefer to live in cities or walkable urban areas. Many suburbs face a loss of their future tax base if they do not act. Luckily, suburban communities can be competitive in this regard—well-designed, dense suburbs are attractive to millennials. Dubbed “hipsturbia” by *The New York Times*, inner ring suburbs similar to those found to be most diverse in Boston are becoming popular with people looking for a more urban environment at a more affordable price, leaving bedroom communities that only provide bedrooms at a disadvantage. In the most recent recession in 2008, there was a major shift of poverty from the city to the suburbs, and it was the middle-class, car-centric suburban communities, that took the biggest hit. These towns should consider densifying their communities to improve their outlook for the future.

Developers must also be on board to drive this densification transformation. One way for suburban towns to encourage developers to invest in their communities is through innovative planning methods commonly employed by cities, such as incentive zoning or transfer of development rights (TDR) districts. Typically, these are used in high-density areas, wherein a few additional floors on an already tall building are allowed in exchange for public parks and plazas to benefit the population at large. But there is no reason that this incentive-based system could not also work in the suburbs. Developers could receive incentives from the town in exchange for increasing the density in their communities. One way is to create a transfer of development rights district, in which developers would receive a Floor Area Ratio (FAR) bonus that they could transfer or sell in a market exchange if they were to take part in the densification process. For example, if a developer renovated or rebuilt a home that went from a single story, single unit home to a three story, three unit home, the developer would receive additional square footage as an FAR bonus that can be sold or transferred. This additional FAR could not be used in that suburban district, as it should still remain semi-suburban. Rather, those development rights could be transferred or sold to a receiving district where higher density development is encouraged, improving the financial return for the developer by creating another valuable asset to sell or utilize, while also stimulating higher density suburban infill development in selected regions. Receiving districts for these transfers would be in the center of towns, where even greater density is desired to create a walkable, downtown environment. The transfer districts should be within a close radius around this central receiving district, so as to create new urban centers for the budding densified suburbs.

---

6 Williams 2013  
7 Leinberger 2008
TDR districts will probably not work in all suburbs, but the affordable suburbs are a good place to start, as they already have lot sizes that are smaller and are located within relative proximity to public transit. Additionally, these communities, as described in Chapter Four, are diverse now, but likely only because they are affordable. But if they become too affordable, they are “vulnerable” to a decline in property values, which would cause not only a loss of its diversity, but also potentially attract the next wave of poverty as it migrates out of the central city. Lucy and Phillips pin the at-risk communities as the affordable suburbs that have “large numbers of small houses with little aesthetic charm, located in inconvenient settings with few public amenities.” Therefore, the affordable suburbs that Lucy and Phillips describe are precisely the places to densify now before it is too late. Without further investment to maintain the diversity, such as densification and the services and perks that go along with it, these communities risk deterioration.

In addition to local governments and developers, owners of property in these communities should also be encouraged to densify their communities. Homeowners are the biggest challenge, as they are likely to be wary of new development in their neighborhood and are often resistant to change. Therefore, owners should also be incentivized to incorporate them into the neighborhood densification process. For example, towns could allow owners to build an attached rental unit without having to pay any extra property tax for a period of time for the additional square footage created. They could also incentivize garage conversions into dwelling units in a similar fashion, or granny flats that are promoted by the New Urbanists, creating more accessory apartments, more rental units, and a more attractive walkable environment where the car is less of a focus. Tax Increment Financing could also be used to engender a similar result, giving up front public financing for redevelopment in exchange for future property tax revenues that result in higher density development. Additionally, lot division schemes can be created to encourage homeowners to subdivide their property into smaller lots to generate smaller homes and more multifamily units. One example is two neighbors teaming up to create a third parcel between their two lots in exchange for tax breaks. Finally, cities can also utilize property tax breaks or other means to incentivize owners of small multifamily units to live in one of their own apartments while renting out the others (rather than renting out all of the apartments), creating tenure mix and, consequently, greater diversity.

Furthermore, towns should couple these incentives with infill design guidelines that plan for a denser urban form in the future. For example, renovation guidelines could allow homeowners to build additions on the front and back of the house, or add additional floors, while restricting new construction on the sides to maintain narrow footprints. Taller, narrower homes, as observed in the diverse communities, are much easier to subdivide into multifamily units in the future than sprawling ranch style homes, so limiting the types of permissible renovations to these forms can be a step in creating a more adaptive typology for the future. Additionally, rules that prohibit any new attached garages or two lane driveways can be introduced, which

---

8 Farmer 2013
9 Lucy and Phillips 2000, page 57
Infill Development

would begin to improve the walkability of these neighborhoods—a critical step in injecting a sense of urbanity into these suburban communities.

Creating ways to densify existing suburbs without disturbing the quality of life in these communities is a challenge, but it is an important way to begin to address the problems of both sprawl and socioeconomic segregation.

Zoning guidelines would allow additions to the front and back of the homes, as well as additional floors, but not the sides, to maintain the narrow footprint of the homes for future infill development.
Recommendation #2: The Less Sexy Approach – Increased Bus Service in the Suburbs

Mobility is everything, especially for low income and disadvantaged people. If they cannot afford a car, they must locate near public transit in order to move around and commute to work. Suburbs have even fewer transit options, which is one of the key reasons why those without car access would not consider living there, even if they could afford it. Therefore, increased public transportation methods in the suburbs is critical to be able to diversify the population in these areas. Rail access would be one way to accomplish this goal. However, rail’s exorbitant costs; slow pace of planning, funding, and building; and ensuing upward pressure on neighboring property values, all make rapid transit a less enticing proposition from a social welfare standpoint. Therefore, though less prestigious and desirable than rail, an increase in bus service would begin to open up the suburbs as a residential location for a more diverse population.

One way to accomplish this is to create a second level of hub-and-spoke transit service by having bus lines radiate out from the train lines into the suburbs. Bus Rapid Transit has become popular, but it still typically follows the suburb to city route, which, similar to rail, services a select clientele who works downtown. Instead of thinking of each individual town in relation to the central city, this second level system would connect suburb to suburb, putting each suburb in a regional rather than individual context. While many bus routes do arise from suburban T and commuter rail stations and connect directly to suburbs or neighborhoods, these new lines would be select service routes from suburban centers directly to the stations. This would improve the level of service by speeding up the trip, as well as strengthen the downtown aspects of these suburban communities by creating new mini-centers around these bus depots. This system would especially benefit the affordable suburbs, which have rapid transit not too far away, but are out of walking distance, and areas of town without any public transit access. Second level hub-and-spoke bus lines off of Malden, Quincy, Hyde Park, and the Ashmont T and MBTA stations would strengthen the attractiveness of these areas to people who do not have a vehicle.

The beauty of such a bus transit model is its swiftness of implementation and its flexibility, because the fixed route concept may actually not be necessary for much longer. Current technology enables on-demand bus service on non-fixed routes, with Philips and other companies exploring a system in which riders utilize a phone App to input their locations and destinations in order to optimize a variable bus route based on everyone’s inputs. A first attempt at this type of smart bus system will be debuting in Orlando in 2014, called the Flexbus. If successful, this could mean that efficient public transportation can be accessible to all residents in the suburbs, which would significantly benefit these communities for both social and environmental reasons.

10 Synan 2013
More public transit in the suburbs would also help these communities become more attractive to the younger generation. One of the reasons why millennials prefer the city to the suburbs is the amount of public transportation options. The reason people desired cars in the first place was for freedom of mobility, but the car is no longer needed for that endeavor; technology has given people the freedom that the car used to represent. Instead of driving to a mall to shop, it is faster to view and buy products online—even purchasing groceries can be done online and delivered directly to your door. These technological innovations have translated into reduced car usage and ownership. “According to CNW Marketing Research, Americans between the ages of 21 to 34 purchased just 27 percent of new cars in 2010, down from 38 percent in 1985.”[11] Additionally, “the percentage of 20-to-24-year-olds with drivers’ licenses dropped to 81 percent in 2010, down from 92 percent for the same age group in 1983.”[12] Many millennials no longer need a car as a mode of transportation, but they still require some mobility needs, and thus need to be near public transportation infrastructure when they do need to get around. Therefore, the comparative advantage that the suburbs previously provided is decreasing. Improving the public transportation options in suburban towns will increase the attractiveness of these communities to both young professionals and those who would rather save money than own a car, increasing the diversity of these towns by bringing in these new groups of people.

**Recommendation #3: Stay the Course - Preserve and Bolster Traditional Neighborhoods in the Cities**

Densifying and increasing public transportation options in the suburbs are necessary to get them back into balance, but for cities, it is not practical, or necessary, to de-densify them. Even though density is expensive, it is still often a good thing for the environment, and would probably be less expensive if we had more supply of dense communities across our regions. Nevertheless, cities still have an opportunity to create dense *suburban* environments, since many old industrial cities along the eastern seaboard, from Boston to Baltimore, have great—albeit old and often run-down—stock of traditional, semi-urban neighborhoods that should be preserved. They already exhibit the physical characteristics that, if given the opportunity, would make for a more diverse community.

Currently, redevelopment in inner cities is happening at transit nodes. But there are only so many of these infill sites left, and the next wave of infill development will stretch farther into these struggling neighborhoods. By protecting the existing stock of housing, which is already designed to meet the balanced community, lower income families who currently live there are less likely to be displaced even in the face of redevelopment. On the other hand, large new multifamily development would likely price them out. If higher density development is to take place, it is important to continue any inclusionary zoning requirements to combat the effects of gentrification and ensure the availability of enough affordable housing in these communities.

---

Recommendation #4: “Suburbanize the City” - Community Control over Public Space

While the city need not become an actual suburb, there are elements of suburban philosophy that can improve the quality of life in the hectic, crowded city that also support more diverse communities. The driveway may not be practical in the central city, but expanded car-sharing services, such as Zipcar, would give residents the option of personal mobility should they need it. The backyard would also be difficult to recreate, but giving residents a small private outdoor space is still an important concept. Roof decks, whether private or semi-private, have become popular for personal gardens or social gatherings, and may be enough for many to satisfy their desire for some land. The community garden concept has also worked well, giving everyone a plot of land to control and grow her own food without need for direct ownership. While privatization of the city would certainly defeat the beauty and attractiveness of its communal nature, creating some “personal space” beyond the inside of one’s apartment that is private or semi-private is important to producing an environment that supports our human territorial instincts. If more of these spaces existed, residents would be less likely to move out into the suburbs to obtain these features of the built environment.

Expanding this concept to the public spaces around a neighborhood—sidewalks, planters, and parks—would also help personalize a community. In most cities, there is a clear separation of public and private space; once out the front door, the public realm begins. But one of the beauties of the streetcar suburb is the ability to personalize the semi-public space between the home and the street, which gives residents a sense of “ownership” of the neighborhood. One possible way to produce this same experience in denser cities is to create programs that allow neighborhoods to take ownership of their own communities. For example, an Adopt-a-Street program could allow residents to landscape and decorate their own street, giving residents some control over their surroundings, while also adding to the character of the neighborhood. Residents would also have a greater stake in the public spaces around them, leading to cleaner and better maintained streets, which, in turn, also reduce crime. Finally, these types of programs would also improve cooperation amongst neighbors, which helps break down the barriers that prevent diverse communities from forming.
**Recommendation #5: Balance the Scales**

Cities should consider the importance of a balanced urban environment as they plan for the future:

- A balanced density for people with different neighborhood preferences
- A balance of housing styles for people of different cultures
- A balance of housing sizes for people of different incomes and family sizes
- A balance of housing tenures for people in different stages of their lives
- A balance of commuting options for people with different jobs in different locations

A community that has a wider range of physical options—from a culture, preference, and resource standpoint—is more likely to be not only diverse, but also more competitive in the future. But these physical options must also be in balance to produce a harmonious neighborhood, since a balance of scales is also important on the psychological level. Human scale neighborhoods make us feel comfortable: not too tall that we are overwhelmed, but not too expansive where we feel unsafe. A neighborhood that is attractive to more people is likely to maintain its property values and ability to weather future recessions. Though a long term planning process, cities should review their current breakdowns in transportation options, density and urban design, and housing typologies, and develop methods—in addition to the ones discussed here—to bring the urban fabric more into balance. It is not easy to do, but thinking about these issues will improve our planning and design of communities in the future. Creating diversity in our communities is critical to improving the future of our society, and neighborhoods that display a balance between the city and the suburbs are a step in the right direction toward achieving this goal.
Appendix 1

Calculating Household Income for the High, Medium, and Low Levels of Income Diversity

HUD’s most recent (2013) AMI for the Boston Metro Area is $94,400, but that number is for a family of four. So first I needed to adjust the family size to the average household size in the Boston metropolitan area to calculate the median household income.

<table>
<thead>
<tr>
<th>Average Household Size</th>
<th>Population</th>
<th>Total Pop</th>
<th>Pop Weight</th>
<th>Weighted House Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suffolk County – 2.29</td>
<td>744,000</td>
<td>2,926,000</td>
<td>.255</td>
<td>.58</td>
</tr>
<tr>
<td>Middlesex County – 2.49</td>
<td>1,500,000</td>
<td></td>
<td>.510</td>
<td>1.27</td>
</tr>
<tr>
<td>Norfolk County is 2.53</td>
<td>682,000</td>
<td></td>
<td>.235</td>
<td>.59</td>
</tr>
</tbody>
</table>

Average Household Size Boston Metro Area 2.44

The average household size of Massachusetts is 2.49, and the entire United States is 2.6, so 2.5 is a good proxy. Therefore, at an average household size of 2.5, the AMI for the Boston metro area based on the HUD chart (halfway between a family of 2 and family of 3) is $80,225. To check this, I compared this number to the population weighted 2011 median household incomes for the three counties studying in Massachusetts. Since this is using household incomes, this is more in line with the data that I am using:

<table>
<thead>
<tr>
<th>Median Household Income</th>
<th>Weighted Pop</th>
<th>Weighted Median Household Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suffolk County - $51,638</td>
<td>.255</td>
<td>$13,168</td>
</tr>
<tr>
<td>Middlesex County - $79,691</td>
<td>.510</td>
<td>$40,642</td>
</tr>
<tr>
<td>Norfolk County - $83,733</td>
<td>.235</td>
<td>$19,677</td>
</tr>
</tbody>
</table>

Median Household Income (Boston Metro) $73,487

Because I am using census data, I need to work within the levels of their data. Their levels are:

- Less than $10,000
- $10,000 - $15,000
- $15,000 - $25,000
- $25,000 - $35,000
- $35,000 - $50,000
- $50,000 - $75,000
- $75,000 - $100,000

1 HUD 2013
2 Census QuickFacts
3 Census QuickFacts
$100,000 - $150,000
$150,000 - $200,000
Over $200,000

Since $75,000 is one of the breaking points of the data and falls in between the range of the HUD family income and the weighted census median household income ($80,000 and $73,000), I used that number as my area median income. Therefore:

Below 80% AMI       <$60,000
80% - 120% AMI      $60,000 - $90,000
Over 120% AMI       > $90,000

Since the census does not have data from the $60,000 to $90,000 range, I expanded the moderate range on each side $10,000 to reach a viable level. Therefore, the three levels are:

Low               = Below $50,000
Moderate          = $50,000 - $100,000
High              = Over $100,000
# Appendix 2

## Block Groups Removed

| Tract 5.02, Block Group 2       | Chestnut Hill Reservoir                        |
| Tract 5.02, Block Group 4       | Boston College campus                          |
| Tract 8.02, Block Group 5       | Boston University campus                        |
| Tract 8.03, Block Group 1       | Harvard Business School campus and industrial area |
| Tract 8.03, Block Group 2       | Boston University campus                        |
| Tract 101.03, Block Group 1     | Boston University campus                        |
| Tract 101.03, Block Group 2     | Boston University campus                        |
| Tract 101.03, Block Group 3     | Boston University campus                        |
| Tract 102.04, Block Group 1     | Boston University campus                        |
| Tract 103, Block Group 1        | Museum area                                    |
| Tract 103, Block Group 2        | Longwood Medical Area                          |
| Tract 104.05, Block Group 1     | Northeastern University                        |
| Tract 104.05, Block Group 2     | Northeastern University                        |
| Tract 104.05, Block Group 3     | Northeastern University                        |
| Tract 203.01, Block Group 1     | Mass General                                   |
| Tract 203.01, Block Group 2     | Mass General                                   |
| Tract 203.01, Block Group 3     | Mass General                                   |
| Tract 305, Block Group 1        | North End along river, mostly commercial/waterfront |
| Tract 406, Block Group 1        | Charlestown, industrial area and waterfront    |
| Tract 408.01, Block Group 2     | Charlestown, waterfront area                   |
| Tract 408.01, Block Group 3     | Charleston Navy Yard and waterfront           |
| Tract 501.01, Block Group 2     | East Boston waterfront                         |
| Tract 503, Block Group 2        | East Boston waterfront                         |
| Tract 509.01, Block Group 3     | East Boston industrial area                    |
| Tract 512, Block Group 1        | East Boston waterfront (no population)         |
| Tract 607, Block Group 2        | Industrial area by South Boston                |
| Tract 806.01, Block Group 1     | Northeastern University                        |
| Tract 809, Block Group 1        | Longwood Medical Area                          |
| Tract 810.01, Block Group 1     | Longwood Medical Area                          |
| Tract 907, Block Group 4        | Boston, industrial area                        |
| Tract 909.01, Block Group 1     | UMass Boston campus                            |
| Tract 909.01, Block Group 2     | UMass Boston campus                            |
| Tract 1001, Block Group 1       | Boston, sparsely populated                     |
| Tract 1001, Block Group 6       | Harambee Park                                  |
| Tract 1008, Block Group 4       | Ashmont, open space and cemetery                |
| Tract 1301, Block Group 2       | West Roxbury, mostly open space                |
| Tract 1301, Block Group 3       | West Roxbury, mostly open space                |
| Tract 1301, Block Group 6       | West Roxbury, mostly open space                |
| Tract 1304.02, Block Group 2    | West Roxbury, large spread out area, mostly commercial |
| Tract 1304.04, Block Group 1    | West Roxbury, mostly open space                |
| Tract 1304.06, Block Group 1    | West Roxbury, not many homes                   |
| Tract 1604, Block Group 1       | Chelsea, industrial area                       |
| Tract 1703, Block Group 2       | Revere, mostly open space                      |
| Tract 1704, Block Group 1       | Revere, mostly open space                      |
| Tract 1804, Block Group 1       | Winthrop, mostly park                          |
| Tract 3164 Block Group 6        | No population                                  |
| Tract 3371.02, Block Group 1    | Medford, mostly pond                           |
| Tract 3391, Block Group 1       | Medford, mostly park                           |
| Tract 3397, Block Group 1       | Somerville, industrial and highways area       |
| Tract 3398.01, Block Group 1    | Medford, commercial/industrial area            |
Tract 3411.02, Block Group 4  Malden, mostly open space
Tract 3413, Block Group 2  Malden, industrial area
Tract 3421.01, Block Group 1  Everett, cemetery
Tract 3424, Block Group 3  Everett, mostly industrial area
Tract 3424, Block Group 4  Everett, mostly industrial area
Tract 3501.03, Block Group 1  Assembly Square in Somerville – census done before development fully finished
Tract 3506, Block Group 1  No population
Tract 3515, Block Group 1  Somerville industrial area
Tract 3521.01, Block Group 1  Lechmere industrial area
Tract 3521.01, Block Group 2  Cambridge, Lechmere area where will be future development
Tract 3524, Block Group 1  Kendall square office park area
Tract 3530, Block Group 1  Cambridge, Central Square businesses
Tract 3531.02, Block Group 1  MIT campus
Tract 3531.02, Block Group 2  MIT campus
Tract 3531.02, Block Group 3  MIT campus
Tract 3536, Block Group 5  Harvard campus
Tract 3537, Block Group 3  Harvard campus
Tract 3539, Block Group 3  Harvard campus
Tract 3543, Block Group 3  Cambridge, Fresh Pond
Tract 3546, Block Group 4  Cambridge, industrial area
Tract 3549, Block Group 3  Alewife commercial and open space area
Tract 3593, Block Group 5  Hanscom Air Force Base
Tract 3601, Block Group 1  Hanscom Air Force Base
Tract 3613, Block Group 5  Great Meadows National Wildlife Area
Tract 3690, Block Group 1  Spread out area with different neighborhoods in Waltham
Tract 3703, Block Group 1  Mt. Auburn Cemetery
Tract 3836, Block Group 2  Framingham, commercial big box area
Tract 3840.01, Block Group 1  Framingham, mostly lakes and office parks
Tract 3840.02, Block Group 1  Framingham, commercial area
Tract 4051, Block Group 4  Dover, large wooded tract
Tract 4173, Block Group 1  Quincy, mostly open space
Tract 4177.02, Block Group 2  Quincy, mostly open space
Tract 4182, Block Group 4  Quincy, large wooded tract
Tract 4222, Block Group 1  South Weymouth Air Station
Tract 4223.02, Block Group 2  Weymouth, mostly open space
Tract 4223.02, Block Group 3  Weymouth, mostly open space
Tract 4231, Block Group 5  Cohasset, large mostly wooded tract
All 9,000’s  Parks and open space only

No Parcel Data:
Tract 3883  Lincoln
Tract 4151-4153  Canton

Outside I-495:
Ashby – Tract 3001
Townsend – Tract 3011
Lowell – Tracts 3101-3125
Tyngsborough – Tract 3131
Dracut – Tracts 3141-3143
Ayer – Tract 3251
Groton – Tract 3261
Pepperell – Tract 3271
Dunstable – Tract 3281
Shirley – Tract 3882
Appendix 3

Additional Maps

Housing Values

Elevation
### Regression 1 – Metro, All Block Groups

<table>
<thead>
<tr>
<th>Distance to CBD</th>
<th>Second Best Location</th>
<th>Affordable Walkability</th>
<th>Personal Urbanism</th>
<th>Location and Density</th>
<th>Add Housing Mix</th>
<th>Add Small Multifamily</th>
<th>Add Single Family</th>
<th>Add Housing Size</th>
<th>Add Percent Renter</th>
<th>Chi Squared p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distance to CBD</th>
<th>Second Best Location</th>
<th>Affordable Walkability</th>
<th>Personal Urbanism</th>
<th>Location and Density</th>
<th>Add Housing Mix</th>
<th>Add Small Multifamily</th>
<th>Add Single Family</th>
<th>Add Housing Size</th>
<th>Add Percent Renter</th>
<th>Chi Squared p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Regression 2 – Metro, High Performing

<table>
<thead>
<tr>
<th>Distance to CBD</th>
<th>Second Best Location</th>
<th>Affordable Walkability</th>
<th>Personal Urbanism</th>
<th>Location and Density</th>
<th>Add Housing Mix</th>
<th>Add Small Multifamily</th>
<th>Add Single Family</th>
<th>Add Housing Size</th>
<th>Add Percent Renter</th>
<th>Chi Squared p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Regression 3 – Metro, Medium Performing

<table>
<thead>
<tr>
<th>Distance to CBD</th>
<th>Second Best Location</th>
<th>Affordable Walkability</th>
<th>Personal Urbanism</th>
<th>Location and Density</th>
<th>Add Housing Mix</th>
<th>Add Small Multifamily</th>
<th>Add Single Family</th>
<th>Add Housing Size</th>
<th>Add Percent Renter</th>
<th>Chi Squared p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Regression 3 – Metro, High Performing

<table>
<thead>
<tr>
<th>Distance to CBD</th>
<th>Second Best Location</th>
<th>Affordable Walkability</th>
<th>Personal Urbanism</th>
<th>Location and Density</th>
<th>Add Housing Mix</th>
<th>Add Small Multifamily</th>
<th>Add Single Family</th>
<th>Add Housing Size</th>
<th>Add Percent Renter</th>
<th>Chi Squared p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Appendix 4

- **Regression 1 – Metro, All Block Groups**
  - | Distance to CBD | Second Best Location | Affordable Walkability | Personal Urbanism | Location and Density | Add Housing Mix | Add Small Multifamily | Add Single Family | Add Housing Size | Add Percent Renter | Chi Squared p Value |
  - |                |                      |                        |                  |                     |                |                      |                |                |                |                   |
- **Regression 2 – Metro, High Performing**
  - | Distance to CBD | Second Best Location | Affordable Walkability | Personal Urbanism | Location and Density | Add Housing Mix | Add Small Multifamily | Add Single Family | Add Housing Size | Add Percent Renter | Chi Squared p Value |
  - |                |                      |                        |                  |                     |                |                      |                |                |                |                   |
- **Regression 3 – Metro, Medium Performing**
  - | Distance to CBD | Second Best Location | Affordable Walkability | Personal Urbanism | Location and Density | Add Housing Mix | Add Small Multifamily | Add Single Family | Add Housing Size | Add Percent Renter | Chi Squared p Value |
  - |                |                      |                        |                  |                     |                |                      |                |                |                |                   |
- **Regression 3 – Metro, High Performing**
  - | Distance to CBD | Second Best Location | Affordable Walkability | Personal Urbanism | Location and Density | Add Housing Mix | Add Small Multifamily | Add Single Family | Add Housing Size | Add Percent Renter | Chi Squared p Value |
  - |                |                      |                        |                  |                     |                |                      |                |                |                |                   |
Regression 5 – Boston, All Block Groups

<table>
<thead>
<tr>
<th>Distance to CBD</th>
<th>.0129098***</th>
<th>.0180699***</th>
<th>NS</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to Transit</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Distance to Transit Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Public Transit Usage</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Public Transit Usage Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Lot Size</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Building Density</td>
<td>-0.8868355**</td>
<td>-1.107452**</td>
<td>-1.154744**</td>
<td>N</td>
</tr>
<tr>
<td>Building Density Squared</td>
<td>-0.0342732***</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Density per Dollar</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Walk Score</td>
<td>.0013429**</td>
<td>.0093443**</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Walk Score per Dollar</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Percent Renter</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Percent Renter Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>N Observations</td>
<td>463</td>
<td>463</td>
<td>463</td>
<td>463</td>
</tr>
<tr>
<td>Chi Squared p Value</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Regression 6 – Boston, High Performing

<table>
<thead>
<tr>
<th>Distance to CBD</th>
<th>.0129098***</th>
<th>.0180699***</th>
<th>NS</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to Transit</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Distance to Transit Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Public Transit Usage</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Public Transit Usage Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Lot Size</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Density per Dollar</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Walk Score</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Walk Score per Dollar</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Small Multifamily</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Single Family</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Single Family Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Heating Mix</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Heating Size</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Heating Size Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Percent Renter</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Percent Renter Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>N Observations</td>
<td>206</td>
<td>206</td>
<td>206</td>
<td>206</td>
</tr>
<tr>
<td>Chi Squared p Value</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Regression 7 – Boston, Medium Performing

<table>
<thead>
<tr>
<th>Distance to CBD</th>
<th>.0129098***</th>
<th>.0180699***</th>
<th>NS</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to Transit</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Distance to Transit Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Public Transit Usage</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Public Transit Usage Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Lot Size</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Density per Dollar</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Walk Score</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Walk Score per Dollar</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Small Multifamily</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Single Family</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Single Family Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Heating Mix</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Heating Size</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Heating Size Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Percent Renter</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Percent Renter Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>N Observations</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Chi Squared p Value</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Regression 8 – Boston, Low Performing

<table>
<thead>
<tr>
<th>Distance to CBD</th>
<th>.0129098***</th>
<th>.0180699***</th>
<th>NS</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to Transit</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Distance to Transit Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Public Transit Usage</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Public Transit Usage Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Lot Size</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Density per Dollar</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Walk Score</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Walk Score per Dollar</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Small Multifamily</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Single Family</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Single Family Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Heating Mix</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Heating Size</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Heating Size Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Percent Renter</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>Percent Renter Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>N</td>
</tr>
<tr>
<td>N Observations</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Chi Squared p Value</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>
### Regression 9 – Suburbs, All Block Groups

<table>
<thead>
<tr>
<th>Second Best Location</th>
<th>Affordable Walkability</th>
<th>Personal Urbanism</th>
<th>Combined</th>
<th>Add Tenure</th>
<th>Remove Lot Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to CBD</td>
<td>-0.001217***</td>
<td></td>
<td>-0.0019177</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Distance to Transit</td>
<td>NS</td>
<td></td>
<td>0.0134972**</td>
<td>0.0156134***</td>
<td>0.0118972**</td>
</tr>
<tr>
<td>Distance to Transit Squared</td>
<td>NS</td>
<td></td>
<td>-0.0020572***</td>
<td>-0.0024697***</td>
<td>-0.0020897***</td>
</tr>
<tr>
<td>Public Transit Usage</td>
<td>0.178058***</td>
<td></td>
<td>0.0795789**</td>
<td>0.0785896**</td>
<td>0.0650856***</td>
</tr>
<tr>
<td>Public Transit Usage Squared</td>
<td>NS</td>
<td></td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

| Lot Size | -0.0024625***          | -0.0013795***     |
| Building Density | 0.1224773***   | -0.118627**      | 2468447***   |
| Building Density Squared | NS               | NS               | -434402**     |
| Building Density per Dollar | 3024923***      | 1.788486***     | 1.895698***   |

| Small Multifamily | 0.0362732*** | 0.025319**   |
| Simple Family     | NS           | NS           |
| Simple Family Squared | NS           | NS           |
| Housing Mix       | 0.0393272*** | 0.0349199*** |

| Housing Size       | 1.7505016*** | 1.979287***    | 1908682***    |
| Housing Size Squared | -0.0454686*** | -0.0458427*** | -0.0454546*** |

| Percent Renter     | 0.2396314*** | 0.2062563***   |
| Percent Renter Squared | -2.156707*** | -2.145886***   |

| Constant            | 3027146***   | 5203836***     | 4592486***    | 3695946***    | 3372486***      | 2722555***     |

| Chi Squared p Value | 0.00         | 0.00           | 0.00           | 0.00           | 0.00           | 0.00           |

### Regression 10 – Suburbs, High Performing

<table>
<thead>
<tr>
<th>Second Best Location</th>
<th>Add Affordable Walkability</th>
<th>Add Personal Urbanism</th>
<th>Remove Lot Size</th>
<th>Add Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to CBD</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Distance to Transit</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Distance to Transit Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Public Transit Usage</td>
<td>0.0205628**</td>
<td>0.0144747**</td>
<td>NS</td>
<td></td>
</tr>
</tbody>
</table>

| Housing Size Squared | -0.0205628***          | -0.0144747***         | -0.0144747***   |
| Year Built           | 0.007031***             | 0.007031***           | 0.007031***     |

| Public Transit Usage Squared | -0.001213***          | -0.0009177***         | -0.0009177***   |
| Building Density     | 0.3206193***           | 0.3444009***          | 0.3488998***    |

| Building Density per Dollar | 1468                 | 1468                  | 1468             |

### Regression 11 – Suburbs, Medium Performing

<table>
<thead>
<tr>
<th>Second Best Location</th>
<th>Add Affordable Walkability</th>
<th>Add Personal Urbanism</th>
<th>Remove Lot Size</th>
<th>Add Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to CBD</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Distance to Transit</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Distance to Transit Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Public Transit Usage</td>
<td>-0.0020572***</td>
<td>-0.0024697***</td>
<td>-0.0020897***</td>
<td></td>
</tr>
</tbody>
</table>

| Housing Size Squared | -0.0036796***          | -0.0032559***         | -0.0032327***   |
| Year Built           | 0.007031***             | 0.007031***           | 0.007031***     |

| Public Transit Usage Squared | -0.001213***          | -0.0009177***         | -0.0009177***   |
| Building Density     | -0.1528858*            | NS                   | NS              |

| Building Density per Dollar | -0.2548648***         | -0.2311758***         | -0.2311758***   |

### Regression 12 – Suburbs, Low Performing

<table>
<thead>
<tr>
<th>Second Best Location</th>
<th>Add Affordable Walkability</th>
<th>Add Personal Urbanism</th>
<th>Remove Lot Size</th>
<th>Add Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to CBD</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Distance to Transit</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Distance to Transit Squared</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Public Transit Usage</td>
<td>-0.0020572***</td>
<td>-0.0024697***</td>
<td>-0.0020897***</td>
<td></td>
</tr>
</tbody>
</table>

| Housing Size Squared | -0.0036796***          | -0.0032559***         | -0.0032327***   |
| Year Built           | 0.007031***             | 0.007031***           | 0.007031***     |

| Public Transit Usage Squared | -0.001213***          | -0.0009177***         | -0.0009177***   |
| Building Density     | -0.1528858*            | NS                   | NS              |

| Building Density per Dollar | -0.2548648***         | -0.2311758***         | -0.2311758***   |

| Housing Mix | 1.438446**            |
| Simple Family | 2549449***         |
| Simple Family Squared | NS               |
| Year Built           | 0.007031***             | 0.007031***           | 0.007031***     |

| Public Transit Usage Squared | -0.001213***          | -0.0009177***         | -0.0009177***   |
| Building Density     | -0.1528858*            | NS                   | NS              |

| Building Density per Dollar | -0.2548648***         | -0.2311758***         | -0.2311758***   |

| Housing Mix | 1.438446**            |
| Simple Family | 2549449***         |
| Simple Family Squared | NS               |
| Year Built           | 0.007031***             | 0.007031***           | 0.007031***     |
Bibliography

All photos taken and all maps and graphics produced by author.

American Factfinder, www.factfinder2.census.gov


Census Viewer, www.censusviewer.com


Dreier, Peter, John Mollenkopf and Todd Swanson (2004). “Place Matters: Metropolitics for the Twenty-First Century” University Press of Kansas, Lawrence, KS.


Keller, Gerald. “Housing Prices: Multiple Regression, Multicollinearity and Model Building” Statistics for Management and Economics, JMP.


Social Explorer, www.socialexplorer.com


USA Today Diversity Index (2009), USA Today, web.


