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The Persistence of Mixed Income Neighborhoods: A Case Study of Neighborhood Change in Chicago

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Abstract

This study examines neighborhood change among mixed income neighborhoods in Chicago, IL between 2010 and 2017. Previous literature has focused extensively on the process of gentrification in transitioning homogenous low income neighborhoods to homogenous high income neighborhoods. However, few studies have tested empirically if mixed income neighborhoods are a persistent neighborhood type or if they are inherently a neighborhood undergoing transition. This methodology uses data from the U.S. Census American Community Survey to utilize a logit regression which tests the likelihood that a 2010 mixed income neighborhood will transition upwards to a 2017 homogenous high income neighborhood. Additionally, ArcGIS maps and a spatial autoregressive model were considered to test the surrounding spatial influences in the model. The findings of this study indicate that mixed income neighborhoods are more persistent in the short run than originally hypothesized.

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Chapter 1: Introduction

Urban neighborhoods are constantly undergoing changes that are subject to housing market forces, consumer preferences, and government policies. The process of gentrification, known as an influx of high income residents entering a neighborhood, has the ability to lead to dramatic changes in the makeup of the neighborhood. As many urban neighborhoods experienced disinvestment throughout the 20th century, gentrification will have a profound impact among these neighborhoods. This impact can be seen through gentrification-induced displacement in which low income residents can no longer remain in the neighborhood due to the rising cost of living associated with the influx of high income residents. The increasing cost of living in gentrifying neighborhoods is triggered by consumer preferences which is accommodated by developers converting rental housing units to owner occupied units (Keating et al., 1996). This neighborhood change can also be considered urban revitalization, or local economic growth, which politicians are incentivized to seek out. However, the factor of residential displacement raises the question of who benefits from such revitalization if low income residents are unable to reap the neighborhood improvements.

Thus, mixed income neighborhoods, in which both high income and low income coexist in the same neighborhood, can be viewed as a more equitable option. This is based on the documented studies of concentrated poverty in urban neighborhoods and its negative effects on residents. Through examining concentrated poverty, the theorized benefits include the creation of positive social capital and decreasing social isolation (Chaskin & Joseph, 2015; Wilson, 1987). However, mixed income neighborhoods were most prominently examined in the 1990s during the Department of Housing and Urban Development's HOPE VI program which attempted to

create a public-private partnership to reform public housing in the country. These developments were created under explicit policy guidance and with few developments being built (Sampson et al., 2015).

This study attempts to understand mixed income neighborhoods that occur naturally in urban areas. More specifically, this research is directed at observing the persistence of mixed income neighborhoods. This is intended to address the question of if mixed income neighborhoods occur because the neighborhood is transitioning or if neighborhoods are persistent across time. If mixed income neighborhoods are inherently neighborhoods in transition, it would be concluded that they are not persistent because it is transitioning into homogeneity.

The outline of this Independent Study will begin with a theoretical discussion of neighborhood change in the context of gentrification among urban neighborhoods. It will then shift focus to the effects of displacement and a review of the current theories surrounding mixed income neighborhoods. The second chapter will address empirical literature that has looked at mixed income neighborhoods in regards to how they maintain economic heterogeneity. This will then lead into the methodology of this research which will incorporate a logit regression that tests the probability that a mixed income neighborhood will transition to a homogenous high income neighborhood. The case study selected for this research is the city of Chicago between the years of 2010 and 2017. Given the results of this research design, the paper will then discuss key findings from the model. This paper will conclude with the implications of the study in regards to the persistence of mixed income neighborhoods and future barriers facing mixed income neighborhoods in the long run.

Chapter 2: Theory

2.1. Introduction

Across urban areas, neighborhoods are subject to transition and change. Many of these processes, in recent years, have been documented through widespread gentrification and housing affordability crises in many of the country's largest cities. These major urban areas contain a large network of urban neighborhoods that are constantly changing. Because of this, neighborhoods represent a diverse set of characteristics. This paper will examine the prevalence of mixed income neighborhoods; urban neighborhoods that are economically heterogenous. This chapter will begin with an examination of the historical factors leading to gentrification in urban neighborhoods. This discussion will then look at the role of consumers in instigating the gentrification process. The chapter will also highlight the role of developers in providing a market response to gentrifying forces. The government's role, in particular the Growth Machine, will be emphasized in relation to providing a catalyst for gentrification. Next, the focus will look at the methods in which gentrification causes residential displacement among low income renters. Relating to mixed income neighborhoods, theoretical goals of such neighborhoods will be considered in addition to how mixed income neighborhoods can maintain their heterogeneity. The paper will conclude with a theoretical explanation of how mixed income neighborhoods can prevent gentrification and persist over time.

2.2. Gentrification: Historical Precedent

The decline of urban neighborhoods in the 20th century created the conditions for gentrification to take place. At the beginning of the 20th century, historical factors related to racial segregation and discrimination toward black urban residents played a signifcant role in the

present-day uneven development of urban areas (Massey & Denton, 1993). The middle of the 20th century saw Federal policies that created incentives for residents, those of which were overwhelmingly white and of higher income, to migrate out of urban neighborhoods and into suburbs (Rothstein, 2017). The historical changes among urban areas in the 20th century reinforced a pattern of concentrated poverty and disinvestment in urban neighborhoods which would allow gentrification to occur at the conclusion of the 20th century.

During the Great Migration of black residents to Northern cities in the early 20th century, Massey and Denton (1993) detail how white residents institutionally created and reinforced the "ghetto" for the black urban population. They define the "ghetto" as "...a set of neighborhoods that are exclusively inhabited by members of one group, within which virtually all members of that group live" (Massey & Denton, 1993, p. 18-19). The authors' main focus is how racial segregation and discrimination towards black populations have led to lasting impacts across metropolitan areas. The causal mechanisms that instilled racial segregation included racial violence, discrimination in Federal housing programs, discrimination in the private housing market, public housing construction, white suburbanization, and restrictive covenants. Because of this, up to the 1970s, the suburbs were overwhelmingly represented by white residents and the central city was overwhelmingly represented by black residents. This observed racial segregation exists within the suburbs as well, making it not simply a dichotomous relationship between the suburbs and central city. The authors argue that more recent discriminatory practices operate less visibly through lending practices and racial steering; racial biases in the location of housing shown to people of color (Massey & Denton, 1993). The significance of such historical factors have led to the prevalence of concentrated urban poverty experienced disproportionately by

black households. It fueled greater structural inequality in metropolitan areas along the basis of race, income, and location.

As a result, the housing market in declining urban neighborhoods underwent changes to its housing stock. These changes are seen through the filtering model; a process in which the housing stock of the neighborhood transitions from high income, owner occupied housing to low income rental housing (Keating et al., 1996). The model starts with the assumption that housing is a significant determinant of wealth for households. The homeowner has an asset, or an economic return with monetary value, in the form of their property ownership. However, the property of the homeowner is partly determined by its surrounding neighborhood characteristics, which will influence the value of the property, or land value. Given that the homeowner has an incentive to maximize the value of their asset, they invest in maintenance and repair to prevent physical deterioration that would lower their home value. Thus, the decision to engage in this investment is dependent, in part, on the surrounding neighborhood. If the neighborhood is experiencing decline, the owner will have less of a propensity to invest in the required maintenance and will consequently exit the neighborhood. The vacated housing unit, having experienced unabated deterioration by the previous homeowner, will decrease the surrounding home values. Because of this, middle and lower income residents are now able to afford to occupy the housing unit while the neighborhood shifts away from homeownership and towards renting. The incentives for current tenants to maintain and repair their housing unit has now decreased because the housing unit is no longer an owned asset (Smith, 1979). Therefore, filtering is a cycle in the housing market from higher income homeowners to lower income

renters based on neighborhood decline, homeownership, and the willingness to abate housing deterioration.

The outcome of the 20th century metropolitan developments have led to a spatial structure of urban neighborhoods and surrounding suburbs that are steeped in inequality. This inequality is observed along the lines of income, race, and location. These neighborhood trends were first enforced at the beginning of the Great Migration which led to pervasive forms of racial discrimination towards black urban residents. This was combined with discriminatory Federal policies and other incentives that spurred white suburbanization away from urban neighborhoods. The effect of these historical changes led to the conditions for gentrification to take place as urban neighborhoods experienced disinvestment throughout the 20th century.

2.3. Gentrification: Consumer Preferences

When considering the process of gentrification, the market response is determined through the expression of consumer preferences. Thus, developers base their decisions to build on the preferences that they receive from consumers. In the context of urban housing markets, consumers live in close proximity to one another across a fixed space in the short run. Because of this, the spatial structure of urban areas will be considered in order to better understand the residential location preferences that drive gentrification.

The first theories attempting to explain the urban spatial structure originated from early-20th century urban sociologists in the Chicago School. In response to observing Chicago's rapid growth in its urban population, Park et al. (1925) proposed the Concentric Zone theory as an explanation for neighborhood change and urban expansion. According to the authors, urban land is organized in a series of successive zones radiating outward from the center of the city,

referred to as the central business district (CBD). They argue that improvements to transportation and the facilitation of utilities has allowed for this outward urban expansion to occur. The concentration of economic, cultural, and political activity in Chicago's CBD combined with the outward expansion led them to characterize this urban growth as, "...processes of concentration and decentralization" (Park et al., 1925, p. 52). When explaining the Concentric Zone theory, Park et al. describe the city as a living organism with the succession of zones being analogous to the metabolism system. According to the authors, the succession of zones occur from an influx of in-migrants, what they refer to as excessive social disorder, that causes the original residents of the zone to migrate outward from the CBD. Thus, Park et al. see the spatial structure of urban areas as being segregated along the basis of class, occupation, and race. The authors claim that the successive movement from the CBD is functional for the city in order to minimize the authors' conception of social disorganization. It makes the assumption that urban residents have an aversion to living in close proximity to people of a different race, class, and socioeconomic background (Park et al., 1925). This theory relates to consumer preferences because it states that residents express their preferences through relocation in relation to the CBD and an influx entering their residential zone. This theory establishes the relationship between consumer preferences and the CBD. It also introduces a theoretical discussion pertaining to socioeconomic statuses and consumer preferences. However, this theory, as it is the standard template for neighborhood change, has been criticized for overlooking larger structural factors that can influence neighborhood change (Sampson, 2013). These factors include institutional forms of housing discrimination that were previosuly discussed in addition to affordability considerations related to the overall housing market.

Regarding the racial preferences of residents, the Concentric Zone theory indicates that consumers have a low willingness to locate in racially diverse neighborhoods, as seen through the model's designation of neighborhood diversity as zones of transition. This formulation of racial preferences is supported by Massey and Denton (1993) who argue that white residents have internalized negative stereotypes attached to black urban residents related to issues such as high crime and declining property values. Likewise, the authors claim that black residents have a low preference for being the pioneer of racial integration when entering a predominantly white neighborhood, given the history of racial discrimination (Massey & Denton, 1993). This argument, in connection to the Concentric Zone theory, indicates that urban residents may have a lower willingness in counteracting racial segregation because of stigma and a history of racial discrimination. In the context of gentrification, these preferences could become a determining factor regarding which urban neighborhood becomes gentrified. Given an understanding of gentrifiers as being predominantly white (McKinnish et al., 2010), this assertion would indicate that urban neighborhoods with lower levels of ethnic and racial minorities are more likely to become gentrified. Therefore, these racial preferences potentially provide a negative relationship between gentrification and communities of color, particularly black communities, as a result of racial stigma.

Following the Concentric Zone theory, the Rent-Bid model further explains the location preferences of consumers in urban areas. According to Alonso (1964), the Rent-Bid model is concerned with how the value of land is determined and allocated in metropolitan areas. It continues with the Concentric Zone theory in which urban land expands outward from a concentrated CBD. The Rent-Bid model assumes a featureless plain radiating out from the CBD.

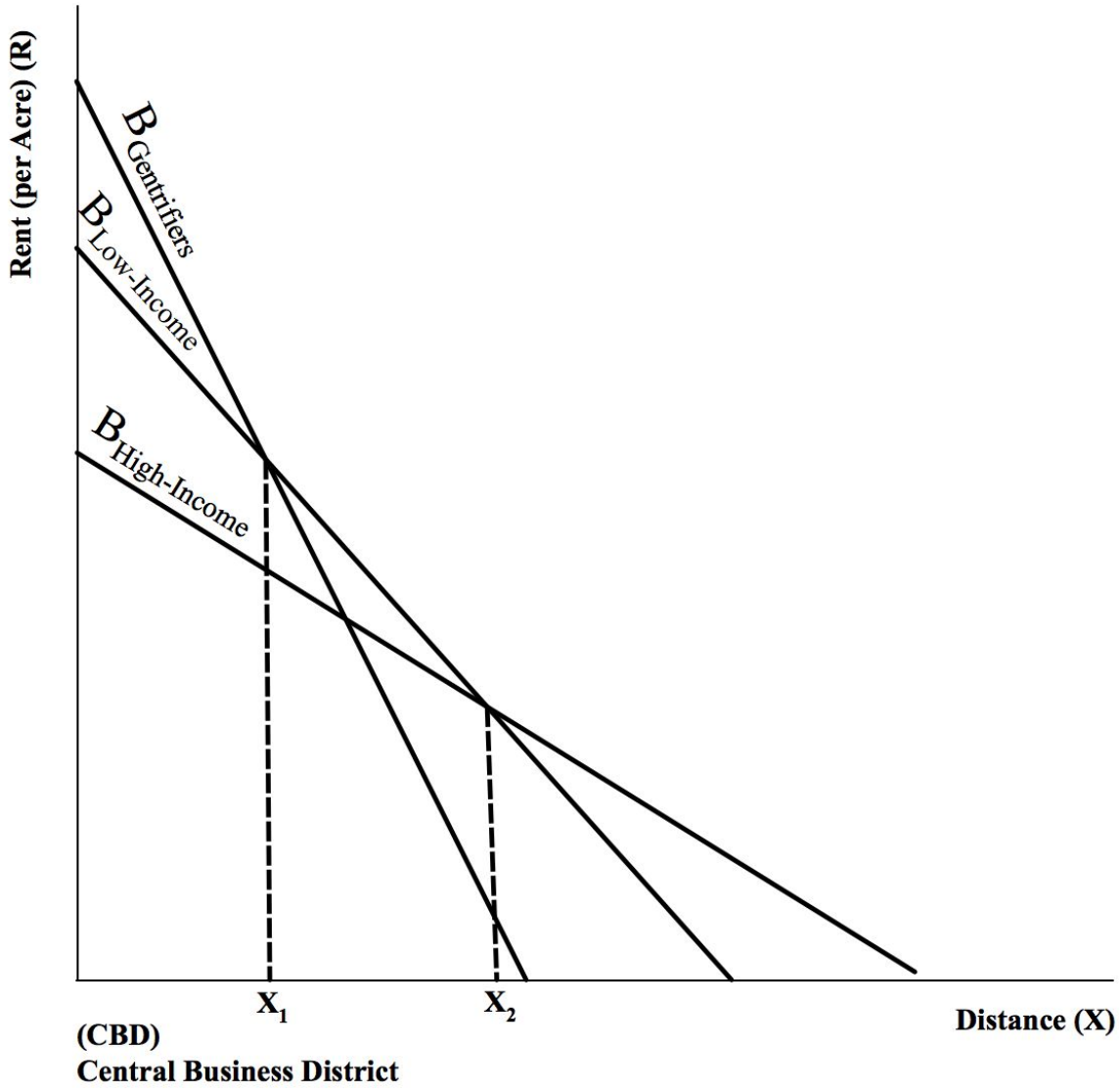
Alonso incorporates the factor of density in which the number of housing units per acre increases closer to the CBD. Given these assumptions, the model states that the land in the urban area is allocated to the highest bidder. The bids for land is an expression of how much consumers are willing to pay in order to locate in the specific plot. The consumer's willingness to bid is influenced by their value of accessibility. Given that employment is concentrated predominantly in the CBD, the value of accessibility is reflected as the disutility of commuting. This disutility is realized through a movement away from the CBD which causes an increase in commuting. As a result, the value of accessibility leads to higher land values closer to the CBD and lower land values farther away from the CBD. However, the lower density away from the CBD provides the consumer with larger lot sizes. This results in a tradeoff facing the consumer between attaining a larger lot and having a longer commute or attaining a smaller lot and having a shorter commute. This tradeoff, or the value of accessibility, is dependent on the preferences and needs of the consumer (Alonso, 1964).

In the graph provided in Figure 1.1., the value of accessibility represented in the rent-bid curves is seen across three different subsets of the urban population: low income households, high income households, and gentrifiers. As previously mentioned, the Rent-Bid curve is an expression of the consumers' willingness to bid for land when choosing where to locate in relation to the CBD. Each household in the model has a different value of accessibility, seen as the rate of change in the consumers' willingness to bid when moving away from CBD. Thus, the rate of change, or slope, of the rent bid curve is seen as:

$$\Delta R/\Delta X = -t/L$$

In this equation, the change in rent per acre (R) over the distance from the CBD (X) is equal to the disutility of commuting (t) over the lot size of the property (L). In this model, the type of household determines the relative magnitude of each of these variables.

Figure 1.1.



More specifically, the high income households in this model have a flatter rent-bid curve because they tend to value a greater lot size more than the disutility of commuting. This is because, with

increases in income, households are expected to demand a greater lot size. The rent-bid curve demonstrates that they have a greater willingness to increase their distance from the CBD for larger lot sizes. For low income households, there is a steeper rent bid curve because they tend to value the disutility of commuting more than the lot size of the property. There is a greater disutility of commuting among low income households because of factors relating to the use of public transit in which locating further away from the CBD would result in less public transit connections for households. The last curve provided in Figure 1.1. is the rent-bid curve for gentrifiers. According to McKinnish et al. (2010), the characteristics for gentrifiers are an influx of predominantly white, college educated, and under 40 years of age residents (McKinnish et al., 2010). Given the lack of child-bearing responsibilities among younger residents, there would be less of an expected demand for larger lot sizes among gentrifiers. This means that gentrifiers, as seen in the graph, have a higher willingness to bid closer to the CBD. Therefore, they have a greater demand to locate in urban neighborhoods.

Another main explanation regarding the gentrifiers' willingness to locate in urban neighborhoods is their access to employment. Given that the gentrifiers have a higher educational attainment, they would most likely be employed in higher skilled occupations. The structure of the U.S. economy at the end of the 20th century has transitioned away from manufacturing and towards the service sector (Wilson, 1987). This has implications on the location decisions among firms in metropolitan areas. Like consumers, firms have to make a location decision subject to similar considerations under the Rent-Bid model. Among higher skilled, service sector firms, there is a higher willingness to locate closer to the CBD in order to take advantage of the external benefits from agglomeration economies. In agglomeration

economies, firms experience positive externalities from locating in close proximity to one another. This includes benefits such as knowledge spillovers and the shared access to a highly skilled labor force. The firms, therefore, have a higher willingness to bid for land closer to the CBD. In response to this, gentrifiers will have a high value of accessibility as they forego larger lot sizes in order to minimize the disutility of commuting. Because of the firm's decision to locate in the CBD, gentrifiers would have a higher willingness to bid for land near the CBD in order to locate closer to their place of employment. Finally, the graph in Figure 1.1. provides an insight into how land will be allocated through its labels on the x-axis. The distance on the x-axis between the CBD and X_1 demonstrates that this portion of urban land will be allocated to the gentrying population. This is because at every point on the graph, the gentrifier will be able to outbid the lower income residents due to higher value of accessibility and a higher income. The distance between X_1 and X_2 demonstrates that low income households, who have a higher value of accessibility at these points, will outbid high income households and will be allocated this portion of land. The remaining land farthest from the CBD will then be allocated to the high income segment of the population.

Another explanation for why gentrifiers are moving to urban neighborhoods is through Tieout's Hypothesis. According to Tiebout (1956), households will sort themselves across municipalities based on their demand for public services. He argues that metropolitan areas are able to best allocate public services to households if they are fragmented into numerous suburban municipalities. This is because local municipalities, outside of the central city, are able to levy their own taxes that would provide public services for the community, such as local school districts. In his article, Tiebout compares his hypothesis for public services to a private market.

His hypothesis argues that there should be many available options for households with varying levels of public services and that, given the assumption of household mobility and perfect information, they should be able to meet their desired level of public services (Tiebout, 1956). The theory outlined by Tiebout helps explain the low value of accessibility for high income households in the Rent-Bid model. The higher demand for public services is demonstrated through their lower willingness to bid for land closer to the CBD. The demand for public services, primarily in regards to the quality of local schools, causes families to bid up for land farther away from the CBD. This results in the flatter slope seen in Figure 1.1. However, the influx of gentrifiers without children do not have a high demand for public services and will have a higher value of accessibility in the Rent-Bid model, seen in the steeper sloped curve in Figure 1.1.

The demand for urban land, as an expression of consumer preferences, plays a significant role in the process of gentrification. These preferences were first developed through early theories on the urban spatial structure of neighborhood change and growth away from the CBD, seen in the Concentric Zone theory. This contributed to theories concerning consumers' racial preferences which may hold implications on the nature of gentrification. The theory also allowed for the introduction of the Rent-Bid model which proposes a gradient of consumer preferences in relation to the consumer's willingness to locate close to the CBD. The disaggregation of consumers between low income, high income, and gentrifiers demonstrated an allocation of urban land to gentrifiers based on their value of accessibility; the tradeoff between length of commute and lot sizes. These considerations pertaining to the preferences of consumers that will dictate gentrification is then met with a market response from developers.

2.4. Gentrification: Developer Response

As discussed earlier, many urban neighborhoods in the middle of the 20th century experienced concentrated poverty in addition to suburbanization away from central cities. This resulted in a depreciation in land values among urban neighborhoods closer to the CBD. In addition to this, the housing markets in these neighborhoods were filtering down from owner occupied housing units to renter occupied housing units. As gentrifiers have a demand for living closer to the CBD, developers in urban neighborhoods will respond to such market signals.

The main decision rule for developers considering new construction is seen in the Land Use Succession model. This model explains how a developer chooses to redevelop a plot of land. It includes the following condition (Clapp, 1977):

$$V_n - B_n > V_0 + D_0$$

In the expression, the value of the new land use (V_n) minus the cost of development (B_n) must be greater than the sum of the value of previous land use (V_0) and the cost of demolition (D_0) (Clapp, 1977). Developers, being profit motivated, will not choose to redevelop a plot of land if this condition is not met. In the model, their economic profit is calculated through the difference in values of the new land use (V_n) compared with the value of the previous land use (V_0). Many urban neighborhoods would be expected to have a low V_0 due to the effects of disinvestment resulting from concentrated poverty, discrimination, and filtering. Given the Rent-Bid model, gentrifiers hold a higher willingness to bid for land closer to the CBD. This is because of factors related to a high value of accessibility; a substitution away from larger lot sizes towards higher density living and shorter commute times (Alonso, 1964). Developers, noticing the willingness to bid among gentrifiers in urban neighborhoods, will redevelop the land by building market rate

housing. The motivation for building market rate housing is to achieve a higher V_n within the Land Use Succession model. This generates greater profits for developers because market rate housing will allow the owner to charge higher rents with the influx of gentrifiers willing to enter the neighborhood. Thus, developers, responding to the increase in bidding from gentrifiers, will redevelop urban neighborhood land with market rate housing in order to maximize profits.

The effect of the redevelopment process in urban neighborhoods has an impact on the existing renting population. As mentioned previously, the filtering process in urban neighborhoods is based on the maintenance and repair of homeowners as well as the depreciation of land values (Keating et al., 1996). The outcome of this process is a population of renters with low homeownership in the neighborhood. However, the developer's decision to redevelop the land with market rate housing creates a reverse filtering process. This occurs when the housing stock begins to transition away from renter occupied housing and towards owner occupied housing. The increase in owner occupied housing units will cause residents to have a greater willingness to maintain and repair their structures, which will cause the land value to continue to rise in the neighborhood.

Through the signals sent to the developers from the influx of gentrifiers, developers are given an incentive to redevelop land in urban neighborhoods. Furthermore, they are profit maximizing actors that will build market rate housing in order to capture the highest bids for land from gentrifiers. This will cause a transition to occur within the housing market of the urban neighborhood as rental housing is converted into market rate, owner occupied units. The result is a market outcome that accommodates and reinforces the process of gentrification in urban neighborhoods.

2.5. Gentrification: The Growth Machine

The inflow of higher income residents, seen in gentrifying neighborhoods, creates a positive outcome for local politicians. As higher income residents enter the neighborhood, the local taxing jurisdiction will be able to raise a greater amount of revenue through taxation. The tax base, being improved through the inflow of higher income, allows for the government to improve the level of public services that it provides. This creates a politically beneficial outcome for politicians in local government because the improvement of public services would allow politicians to better address the needs of their constituency. The inflow of gentrifiers also provides benefits to the local economy as it increases the amount of spending in the local sector, such as towards retail and commercial options. Other forms of urban revitalization can be seen in the effects of human capital improvement, or greater educational attainment, in the urban population. A higher skilled labor force in the urban area allows for the city to be more competitive in attracting corporate relocations. Thus, gentrification poses benefits to the local economy resulting from urban revitalization.

The relationship between local government and gentrification can be further understood through the Growth Machine. According to Molotch (1976), the Growth Machine is a political coalition established through mutual interest in population growth among homeowners and the local government (Molotch, 1976). As seen in the filtering model, the value of urban land, an asset to the homeowner, is partly dependent on the surrounding land values of the neighborhood (Keating et al., 1996). Thus, according to Molotch, homeowners have a collective incentive to maximize their wealth. This causes them to coalesce around a common interest; maximizing their land value. According to Molotch (1976):

> The clearest indication of success at growth is a constantly rising urban-area population—a symptom of a pattern ordinarily comprising an initial expansion of basic industries followed by an expanded labor force, a rising scale of retail and wholesale commerce, more far-flung and increasingly intensive land development, higher population density, and increased levels of financial activity (Molotch, 1976, p. 310).

Molotch explains that, through the increase in urban population, urban revitalization will occur, specifically among businesses and in the labor force. This will create positive spillover effects for local retail through increases in spending. Additionally, Molotch believes that density, land use intensity, and suburban development will experience an overall increase. In the context of the Rent-Bid model, the increase in density and intensity of land use from population growth can be seen through a greater willingness of consumers to bid for land closer to the CBD. The expansion outward away from the CBD from population growth is explained through an increased willingness of consumers to substitute proximity to the CBD for greater lot sizes. Moloch's theory that communities mobilize to increase their land value through population growth is supported by the Rent-Bid model because the overall increase in bidding process will result in higher land values, both closer to and farther away from the CBD. This increase in land values from population growth allows homeowners to generate wealth through the increasing values of their property.

According to Molotch (1976), the Growth Machine responds to the interests of the homeowners by adopting neoliberal policies; governance through free market economic principles. In describing the local government response, Molotch writes, “To promote growth, taxes should be ‘reasonable,’ the police force should be oriented toward protection of property, and overt social conflict should be minimized” (Molotch, 1976, p. 312). With the mobilization of the Growth Machine, Molotch outlines the framework that governments operate in order to

respond to their constituency. When he refers to “reasonable taxes” it can be implied that he means favorable tax incentives for corporations and residents. This would be aligned with the Growth Machine because it is targeted at encouraging corporations to locate in the urban area. If this occurs, it would generate urban revitalization in the local economy. Other policy proposals under the Growth Machine would be the protection of property, which would be a favorable goal for homeowners concerned with wealth creation and increasing property values. Additionally, lowering crime would also have a positive effect on the land values of the neighborhood and the ability for the urban population to grow.

These considerations connect to the Land Use Succession model which has a role in facilitating the process of gentrification. As developers are faced with the cost of building reflected in B_n, they gather costs when redeveloping a plot of land. With the adoption of neoliberal policies in urban areas, the developer could face lower building costs through lower taxes. Thus, the difference between the value of the new land use and the cost of building will increase. According to the Land Use Succession model, holding all other factors constant, decreasing the cost of building leads to an increase in the willingness of a developer to redevelop through greater economic profit (Clapp, 1977). This conversion of land use to a higher value land use is aligned with the goals of the Growth Machine as the surrounding area of the site could appreciate in land value, holding all else constant.

The Growth Machine connects to gentrification because it posits that local communities are often not only accepting of, but are encouraging, an influx of population growth. This is, in part, due to the revitalizing impact that population growth creates for the local economy and tax base. Urban neighborhoods that experienced depreciation in the 20th century due to

suburbanization and concentrated poverty will have an incentive to achieve urban revitalization through policies in the Growth Machine. The coalition of homeowners will encourage local governments to adopt neoliberal, market oriented policies in an attempt to stimulate urban revitalization. The result of these political incentives is an increasing rate of gentrification.

2.6. Gentrification-Induced Displacement

The impact of consumer preferences, the response from developers, and ensuing government facilitation created the conditions for gentrification to become a major source of neighborhood change. Because of this, residential displacement is an increasingly greater risk for low income renters in gentrifying neighborhoods. The impact of displacement in the neighborhood has consequences beyond housing unaffordability because of its ability to disrupt pre-existing social networks in the neighborhood.

Following the depreciation of land values, many urban neighborhoods contained a large proportion of renter-occupied units within its housing stock. The neighborhood decline that followed suburbanization and concentrated poverty in the 20th century resulted in a higher rate of filtering with the housing stock. This caused a transition away from homeownership because the previous homeowners were disincentivized to maintain and repair their housing units because of depreciated land values. With gentrification in effect, higher income residents entering the urban neighborhood create a cycle of reverse filtering; a transition from predominantly renter-occupied housing units to owner-occupied housing units. This is the result of higher income residents' willingness to bid for land closer to the CBD causing developers to redevelop urban land into market rate housing. As a result, the process of reverse filtering, led by gentrifiers and accommodated by market rate developers, transitions the housing stock towards

owner-occupied units and away from renter-occupied units (Keating et al., 1996). Landlords, noticing the signals from gentrifiers entering the neighborhood, have an incentive to capture the higher willingness to bid from gentrifiers by converting their previous rental unit into market rate housing. This causes a decline in the overall supply of rental units in gentrifying neighborhoods as the process of reverse filtering takes place. When this occurs, low income residents face displacement pressures in the form of a diminishing supply of affordable housing rentals and the threat of eviction in the gentrifying neighborhood.

The consequences of residential displacement for low income residents also lead to the severance of pre-existing social networks. The social ties that residents feel toward their neighborhood is encapsulated in the concept of social capital. According to Putnam (2000), social capital is defined as, "...connections among individuals — social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000, p. 19). These social networks that are established in neighborhoods over time provide long term residents with intangible value. This form of social capital is lost in the process of residential displacement. As reverse filtering takes hold, low income renters will face eviction pressures that will make remaining in the neighborhood difficult. Because of the factor of social capital, the cost of residential displacement becomes greater as the social ties and trust built in the neighborhood are broken.

As gentrification takes place in previously disinvested urban neighborhoods, low income residents of the neighborhood experience displacement pressures. This is seen through the process of reverse filtering which occurs as a market response to gentrification. The developers will continue to build market rate housing as long as the influx of gentrifiers continue to have a

higher willingness to bid for urban land closer to the CBD. The transition from renter occupied units to owner occupied units causes low income renters to be threatened by the possibility of eviction and neighborhood unaffordability. Consistent with this, the homeowners of the gentrifying neighborhood would support the inflow of income as it allows for urban revitalization and the appreciation of property values. These market forces stemming from gentrification will negatively impact the pre-existing low income residents through the economic and social costs of displacement. As a result, the unchecked displacement of low income residents can lead to homogenous high income neighborhoods across urban areas.

2.7. Mixed Income Neighborhoods: Theoretical Goals

The underlying goals of mixed income neighborhoods is to alleviate the effects of concentrated poverty, according to Chaskin and Joseph (2015). Chaskin and Joseph argue that mixed income public housing reform attempts to deconcentrate urban poverty through neoliberal, market oriented urban revitalization efforts. However, they claim that skeptics of the programs criticize mixed income policies as catering to the middle class at the expense of residents with the highest need. Chaskin and Joseph, in reviewing the theoretical arguments for pursuing mixed income developments, provide two theoretical goals: an acknowledgement of neighborhood effects and the establishment of positive social capital (Chaskin & Joseph, 2015).

The first theoretical goal of mixed income neighborhoods is based on the concept of neighborhood effects. This originated from the research by Wilson (1987) which examines the conditions of predominantly black urban neighborhoods with high levels of poverty in Chicago. Wilson argues that larger structural changes in the economy account for this inequality which racial discrimination by itself cannot explain. One of these structural changes is the shift from a

manufacturing-based urban economy to a services-based urban economy, therefore creating new educational requirements for the labor force. Wilson explains that these changes in the economic base particularly hurt the economic prospects for black populations in central cities, many of which initially migrated to such cities for manufacturing employment. Additionally, Wilson contends that the middle and working class outmigration from urban neighborhoods reinforced the concentration of poverty, which eliminates what Wilson calls "the social buffer" that neighborhoods have to weather economic changes. These factors create the environment for what Wilson calls "concentration effects", which later scholars refer to as "neighborhood effects". Wilson, in explaining this theory, seeks to disprove the prevailing conservative theory at the time which believed that the social problems in such urban neighborhoods was the product of a "culture of poverty". Instead, Wilson argues that social isolation among these neighborhoods is a leading cause for these social trends. In formulating his point, Wilson (1987) writes:

> ...concepts such as *social buffer, concentration effects,* and *social isolation* are used to describe the social and institutional mechanisms that enhance patterns of social dislocations originally caused by racial subjugation but that have been strengthened in more recent years by such developments as the class transformation of the inner city and changes in the urban economy (Wilson, 1987, p. 137).

Wilson is contending that the social environment, or neighborhood effects, are significant because of its causal impact on individual outcomes. This is because of the larger structural changes in the urban area leading to racial and economic inequality which becomes entrenched through neighborhood effects. This is at odds with an individual unit of analysis which would argue that the "social dislocation" is not a function of neighborhood factors but of individual factors. The ideal of mixed income neighborhoods is based on this concept of neighborhood effects because it implies that neighborhood effects play a significant role in the life trajectory of

the neighborhood residents due to factors of social isolation and social buffers. In regards to this theory, mixed income neighborhoods could decrease social isolation and increase social buffers through the exposure of residents from across the income distribution, thereby decreasing the concentration of poverty. Thus, mixed income neighborhoods can alleviate the concentration of poverty by focusing on neighborhood effects.

While expanding on the concept of neighborhood effects, Chaskin and Joseph (2015) argue that mixed income neighborhoods are targeted at creating positive forms of social capital. The authors argue that mixed income neighborhoods allow for interactions to occur between high income residents and low income residents. This has the theoretical potential to increase social mobility among low income residents because of greater resources relating to, "...jobs, child care, financial management, working with schools, negotiating bureaucratic hurdles, getting a response from city agencies" (Chaskin & Joseph, 2015, p. 30). The authors, it is worth noting, are not stating that low income neighborhoods do not have high social capital, but rather that the social networks in such neighborhoods do not have access to the same resources. Chaskin and Joseph are also skeptical of the promised social mobility in mixed income neighborhoods because they state that interactions occur primarily within similar socioeconomic backgrounds, not across socioeconomic backgrounds. Because of this, they argue that mixed income neighborhoods must make a deliberate effort to facilitate cross-socioeconomic interactions in order to improve social mobility among low income residents. Another limitation discussed by the authors is the potential for conflict due to the differences in power between high income residents and low income residents (Chaskin & Joseph, 2015). This connects with the issues brought to the attention by Wilson (1987) regarding the detrimental effects that a

neighborhood in social isolation experiences. The positive social networks that can be formed in mixed income neighborhoods act as the social buffer that urban neighborhoods lost during the out-movement of higher income residents.

The goals of mixed income neighborhoods, as mentioned by Chaskin and Joseph and Wilson, are to alleviate the effects of concentrated poverty. This is grounded in the failed legacy of public housing in the 20th century. It also is based on the belief that neighborhood effects in the form of social isolation and social buffers will create a positive outcome for low income residents that would otherwise not be possible in a neighborhood of concentrated poverty. The factor of positive social capital creation also provides a foundation in which some policymakers find mixed income neighborhoods to be an objective worth pursuing.

2.8. Mixed Income Neighborhoods: Maintenance Strategies

Gentrification, as previously discussed, has the ability to cause resident displacement among low income renters in the neighborhood. The theories mentioned so far have explained how neighborhoods can become disinvested and how neighborhoods can become gentrified. However, they do not explain the existence of mixed income neighborhoods in urban areas. Thus, naturally occurring mixed income neighborhoods must be able to resist gentrification induced displacement. Additionally, mixed income neighborhoods may be created through policy action. Both approaches will be considered in the context of mixed income neighborhoods.

The theoretical frameworks for naturally occuring mixed income neighborhoods have been developed by McKinnish and White (2011). The authors argue that there are two possible explanations. The first being that neighborhoods are formed through a diversity of in-movers

entering the mixed income neighborhood. The second theory is that mixed income neighborhoods exist in the midst of gentrification and are in the process of transitioning to a fully gentrified neighborhood (McKinnish & White, 2011). Regarding the second proposed explanation, mixed income neighborhoods will not maintain their heterogeneity because gentrification-induced displacement will cause an outflow of low income residents. This is due to developers responding to the influx of higher income gentrifiers by converting urban land into market rate housing. The decline in affordable rentals and displacement pressures on low income residents would make it difficult for the mixed income neighborhood to remain heterogeneous.

Another consideration for mixed income neighborhoods is the levels of vacancy in the urban neighborhood. In areas with high levels of vacancy, there would be less of an expectation that displacement would occur in the neighborhood. As many neighborhoods in urban areas lost population from suburbanization and neighborhood decline, the relationship between gentrification and displacement can be subject to the neighborhood context. However, if all higher income gentrifiers had a high willingness to bid for land in mixed income neighborhoods, the neighborhood would then transition away from being mixed income. Because of this, there must be a diversity within the influx of in-movers in order to maintain the mixed income nature of the neighborhood. This would entail lower income and middle income residents increasing their willingness to bid for land in mixed income neighborhoods.

Regarding the policy approach to mixed income developments, the Federal government attempted to supply low income housing through different means. From the U.S. Department of Housing and Urban Development (HUD), public housing was converted into mixed income

housing development, referred to as HOPE VI. The key elements of the program, according to the HUD website, include:

> -Changing the physical shape of public housing
>
> -Establishing positive incentives for resident self-sufficiency and comprehensive services that empower residents
>
> -Lessening concentrations of poverty by placing public housing in nonpoverty neighborhoods and promoting mixed-income communities
>
> -Forging partnerships with other agencies, local governments, nonprofit organizations, and private businesses to leverage support and resources ("About HOPE VI - Public and Indian Housing—HUD | HUD.gov / U.S. Department of Housing and Urban Development (HUD)," n.d.).

The HOPE VI program consists of a series of Federal grants that local Public Housing Authorities (PHA) are able to utilize to fund the cost of demolition and revitalization. In order to be eligible, HUD required that the PHA applicant own "severely distressed public housing units". The final fiscal year that HOPE VI grants were awarded was in FY 2010 causing the housing program to span between 1993 and 2010 ("About HOPE VI - Public and Indian Housing—HUD | HUD.gov / U.S. Department of Housing and Urban Development (HUD)," n.d.). In the outlined goals, HUD attempted to alleviate the negative effects of concentrated poverty through mixed income developments. One of the policy failures of public housing was the PHA's inability to maintain and repair the housing blocks because of budgetary constraints. As a result, the HOPE VI program was based on a public-private partnership in which a portion of the HOPE VI developments were market rate housing alongside public housing units. This is beneficial from the PHA standpoint because they have less of a liability regarding maintenance costs, compared to the earlier forms of public housing. Additionally, the developers also benefit from the inclusion of market rate housing in HOPE VI developments due to the Land Use

Succession model. Because of concentrated poverty and deteriorated public housing, the previous land value of the plots depreciated. However, with the demolition of the previous public housing developments, developers were able to maximize their profits through constructing market rate housing in the HOPE VI program. It is important to note that the HOPE VI is no longer an active Federal policy today. However, the framework of HOPE VI was based on urban revitalization and creating a mutually beneficial outcome for both developers and PHA's.

As mentioned by Sampson et al. (2015), the HOPE VI program had explanatory limitations due to the small size of the program (Sampson et al., 2015). The creation of mixed income developments, through the HOPE VI program, was a policy intended to address concentrated poverty, seen in the history of public housing. However, this was a policy objective between the Federal government, public housing authorities, and developers. For naturally occurring mixed income neighborhoods, the likelihood of a mixed income neighborhood maintaining its diversity will be a challenge. This is due to the need for low and middle income in-movers to match the willingness to bid from higher income in-movers. However, this will be difficult given the income constraints of low income and middle income residents in comparison to high income bidders. The longevity of naturally occuring mixed income neighborhoods will then hinge on the ability to curb gentrification-induced displacement.

2.9. Conclusion

Given the current theories discussing neighborhood change, mixed income neighborhoods appear to be at risk of neighborhood upward transition if gentrification is taking place. Gentrification, the process of neighborhood change from a lower socioeconomic group to a higher socioeconomic group, is seen as higher income residents' willingness to live in the

neighborhood. This willingness can be the result of a variety of factors regarding the central business district and higher income residents' value of accessibility. With this, developers respond by converting urban land from rental apartments to condominiums that cater to a higher income group moving into the neighborhood. Local governments, throughout the process, are given little incentive to mitigate the effects of gentrification and its ability to displace low income renters. Given these neighborhood dynamics, mixed income neighborhoods appear unlikely to remain economically heterogenous. In connection to the original research question, the current theories of neighborhood change indicate that mixed income neighborhoods appear to be the result of transitioning. This theoretical framework provides the conclusion that mixed income neighborhoods will not be persistent over time.

Chapter 3: Empirical Literature Review

3.1. Introduction

This literature review will discuss relevant articles pertaining to the relationship between gentrification and mixed income neighborhoods. The first article will discuss the impact of the diversity of in-movers in relation to mixed income neighborhoods. The second article will discuss the stability of mixed income neighborhoods over time. The third article will discuss the durability of a neighborhood's concentrated income in relation to individual level data. The fourth article will discuss the relationship between gentrification and displacement. The fifth article will also analyze the relationship between gentrification and displacement with a greater emphasis on the impact of displacement on low income residents. These articles are analyzed to better understand the relationship between gentrification, displacement, and mixed income neighborhoods empirically.

3.2. Who moves to mixed-income neighborhoods?

In the article "Who moves to mixed-income neighborhoods?" by McKinnish and White (2011), the authors explore how mixed income neighborhoods maintain their economic heterogeneity. McKinnish and White argue that mixed income neighborhoods exist due to either a diversity of in-movers into the neighborhood or because the neighborhood is in the midst of gentrification. As discussed earlier, if the mixed income neighborhood is experiencing gentrification, the expected outcome would be a complete neighborhood transition from a mixed income population to a higher income population. Based on this reasoning, the authors' hypothesis is to test if mixed income neighborhoods attract a diversity in-movers on the basis of income.

McKinnish and White, in reference to Tiebout's hypothesis and the Rent Bid model, argue that previous urban economic theories do not explain the prevalence of mixed income neighborhoods. This is because both theories predict an economically homogeneous metropolitan area (McKinnish & White, 2011). According to Tiebout (1956), households, under a neoliberal framework, sort themselves based on their preferences for public services across a fragmented metropolitan area. As the provision of public services and tax levies are closely related to income, it would be expected that the household sorting would not result in mixed income neighborhoods (Tiebout, 1956). Additionally, the Rent Bid model, developed by Alonso (1964), will also support economic homogeneity because urban land is allocated according to a bidding process from households. This bidding process is based on the households' value of accessibility and their willingness to bid, which is also dependent on their income (Alonso, 1964). Thus, according to McKinnish and White (2011), both urban economic theories are not sufficient to explain the occurrence of mixed income neighborhoods which requires alternate explanations. Additionally, the authors state that mixed income neighborhoods are more common in metropolitan areas as compared to racially diverse neighborhoods. Given the lower degree of economic segregation compared to racial segregation, the authors explore the relationship of a diversity of in-movers and mixed income neighborhoods as this could decrease the liklihood of gentrification induced-displacement.

In testing their hypothesis of mixed income neighborhoods, McKinnish and White use two different samples of census data. The first sample includes non-public household data on 14.3 million households and 38.6 million individuals for the census in 1990. For the census in 2000, the first sample includes 16.6 million households and 43.5 million individuals. The second

sample includes 12,338 census tracts across 72 consolidated metropolitan statistical areas that are linked between 1990 and 2000. Before conducting their analysis and stating their findings, the authors note that an important consideration regarding displacement are high mobility costs. As there are high mobility costs facing households, low income households in a neighborhood undergoing gentrification will be slow to react to the neighborhood changes. Because of this, empirical statistical analysis could demonstrate low displacement due to this factor. Additionally, the authors state that they are only able to study the population entry into the neighborhood, not the exit. McKinnish and White claim that the population exit from the neighborhood would have a significant impact on the mixed income status of the neighborhood, but they explain that a lack of data sources allow them to only analyze the entry into the neighborhood. The authors provide other limitations of their model, such as not knowing the in-mover household income at the time of the move-in and not being able to capture if the household moved from within the same census tract. Also, previous research on the stability of mixed income neighborhoods, according to McKinnish and White, were limited due to their cross-sectional analysis of neighborhood change. Therefore, the authors claim that cross section studies cannot observe the prevalence of mixed income neighborhoods over time.

In specifying their model, McKinnish and White use neighborhood economic diversity, which they refer to as the coefficient of variation for tract-level income dispersion, as their dependent variable. This variable was selected as the dependent variable in order to measure the degree to which the census tract is mixed income. A high variation would indicate an economic heterogenous census tract while a lower variation would indicate an economic homogenous census tract. For the model's independent variable, the authors use five separate variables

representing the income distribution of the in-movers into the census tract. The five income groups, from lowest income to highest income, were specified according to the metropolitan area's median income. These independent variables are included in order to examine if an increase in the highest and lowest income groups lead to an increase in economic heterogeneity of the tract. Other independent variables include the migrant cohort, which is divided into three independent variables: in-movers who moved into the census tract in the last year from the census record, in-movers who moved into the census tract in the last one to five years from the census record, and in-movers who moved into the census tract in the last five to ten years from the census record. The migrant cohort independent variable is included in the model in order to observe the demographic changes over time of the in-movers into the census tract. A second model by the authors examines if mixed income neighborhoods attracted mixed income in-movers, compared to the earlier model which looked at the effects of a diversity of in-movers on the variation of income in the census tract. In this second model, the authors specify the model in order to determine if mixed income neighborhoods are able to attract diverse in-movers in regards to income. Other significant variables in the model include the racial and ethnic composition of the tract, specifically the percentage of the census tract population that is black and the percentage of the census tract population that is Hispanic. The authors also include variables for the age and college education attainment of in-movers. These variables are added to the model to get a better understanding of the demographic profile of in-movers entering mixed income neighborhoods.

In the results from their model, McKinnish and White provide four main findings. The first was a high level of income diversity among in-movers across several migrant cohorts.

However, the authors note that this diversity was diminishing with the recent cohort of in-movers. The second was a significant, positive relationship between mixed income neighborhoods and a higher influx from the highest and lowest income groups. This indicates, according to their hypothesis, that mixed income neighborhoods attract more economically diverse in-movers. The third finding was a significant, negative relationship of a higher percentage of black and Hispanic residents in the census tract causing less economic diversity among the in-movers. This result demonstrates that, over time, black and Hispanic neighborhoods are less likely to be mixed income neighborhoods, thus being more economically homogeneous, because of the lower economic diversity of the in-movers. The final finding from the model is a significant, positive relationship of younger, college educated in-movers on the variation of household income in the census tract. The authors, regarding the higher lifetime earnings potential, suggests that there will be an out-movement of this population. This is because, according to the authors, the higher earning households are more likely to move to higher income neighborhoods in the future (McKinnish & White, 2011).

This article relates to the persistence of mixed income neighborhoods because it provides insight regarding the in-movers' demographics. Most importantly, it provides evidence that mixed income neighborhoods may attract a diversity of in-movers, therefore allowing the neighborhood to remain mixed income if such diversity persists. One important consideration is the relationship between the racial and ethnic composition of the neighborhood and the income diversity of in-movers. McKinnish and White do not provide any theoretical explanations for why this causal relationship occurs. Exploring this relationship and understanding why there is a decrease in income diversity among the in-movers could inform how and which mixed income

neighborhoods change over time. Additionally, the aspect of gentrification would imply that there is not an adequate level of diversity among in-movers into mixed income neighborhoods. Thus, implicitly, the authors argue that gentrification, the in-movement of a higher income group into a low income group, does not allow for mixed income neighborhoods to maintain its mixed income status.

3.3. The Stability of Mixed Income Neighborhoods

In the article titled "The Stability of Mixed Income Neighborhoods" by Tach (2009), the author explores the question of how stable mixed income neighborhoods are across successive years. The author uses the term "income mixing" in reference to mixed income neighborhoods. The article gives specific attention to how economic segregation impacts mixed income neighborhoods. The author explains that racial segregation is much more prevalent and documented than economic segregation which informs her decision to examine mixed income neighborhoods. She also references the HOPE VI housing policies that constructed mixed-income developments in replacement of public housing units. Regarding Federal policy, she argues that little research was conducted on mixed-income neighborhoods before undergoing the policy. In order to examine the changes in mixed income neighborhoods over time, Tach uses tract-level census data between 1970 and 2000 across Metropolitan Statistical Areas (MSAs) in the United States. The author notes that 83% of the U.S. population is included in her dataset.

Before conducting her research methods, Tach provides two theories that could explain neighborhood change in regards to mixed-income neighborhoods. The first theory she refers to as the Invasion-Succession model. This was developed by the Chicago School of sociologists which has been widely influential in explaining neighborhood change. In discussing the model,

she argues that population flows between different socioeconomic groups determine how neighborhoods change over time. She argues that mixed income neighborhoods could be a neighborhood that is undergoing population change between different socioeconomic groups. In connecting this theory to the Concentric Zone theory, it would argue that these neighborhood changes are occuring in zones radiating away from the central business district. The second theoretical model that Tach provides is the Life-Cycle model. In this model, the focus of neighborhood change is based on the housing stock. She argues that there are five stages a neighborhood is placed in within the cycle that is based on a variety of housing characteristics. These factors include the number of single family housing, density, number of rental units, homeownership, and vacancy rates. The theory argues that higher homeownership leads to more stable neighborhoods. This connects to the underlying basis of the filtering model such that the neighborhoods' housing stock transitioning is based on the ability and willingness of the occupant to engage in maintenance and repair. With the decline in homeownership, that willingness and ability decreases. This reflects the conclusion that Tach makes in regards to the Life-Cycle model; that low homeownership is an indicator for less stable neighborhoods. Given the above theories that hope to predict neighborhood change, Tach then attempts to apply these theories to her research design.

In order to examine the level of income-mixing across the metropolitan areas, Tach begins by defining low income, middle income, and high income. She sets the definition by setting the income cut-offs at the 33rd and 66th percentiles of the income distribution for each MSA. She then, in order to define neighborhoods as mixed income, created a series of neighborhood classifications based on the percentage of families in each census tract that fall

within each of the income percentiles. In these classifications, she has three neighborhood types that are considered a non-mixed income neighborhood: majority low income, majority middle income, and majority high income. She defines each of these non-mixed income neighborhoods as tracts that have greater than 50% of families within the given income category. Regarding mixed income neighborhood classification, Tach created four separate neighborhood types. These include: low-middle, middle-high, low-high, and low-middle-high. Each of these mixed income neighborhood types are defined as having 75% of the families falling within the two income groups and less than 25% in the excluded income category. For example, a low-middle mixed income neighborhood has 75% for families that fall within the low and middle income group with less than 25% in the high income group.

Given the neighborhood classification for mixed income neighborhoods versus non-mixed income neighborhoods, Tach has three components in her research design. The first is analyzing transition matrices for mixed income neighborhoods to examine changes in neighborhood stability. Transition matrices are diagrams that compare neighborhood change between multiple time periods. In looking at the transition matrices, Tach found that when greater economic segregation is present in the census year, there was a decrease in mixed income neighborhoods. She also found that decreases in mixed income neighborhoods coincided with increases in majority low income neighborhoods, not majority high income neighborhoods. Tach noted that she expected to see increased concentrated affluence, but found that the increases were small. Additionally, when controlling for income inequality, she states that the increases in the percentage of families in high income groups were from wealth accumulation of existing families, not an in-movement of higher income residents. The other finding from Tach is that a

decrease in majority low income neighborhoods coincided with a decrease in concentrated poverty. She argues that this indicates a rising overall income distribution such that the 33rd percentile in the income distribution rose. In discussing these findings from the transition matrices, she argues that they do not explain mixed income stability.

In order to explain mixed-income stability, Tach ran a regression looking at the probability that a mixed income neighborhood remains a mixed income neighborhood in the following census year. This regression also allows for a determination to be made on the direction of the neighborhood transition; if the mixed income neighborhood moves to a higher income classification or a lower income classification. She used the Invasion-Succession model and Life-Cycle model to determine the independent variables in the regression. For the Invasion-Succession model, Tach's independent variables include variables representing demographic changes, such as race and age. For the Life-Cycle model, Tach's independent variables include variables representing housing changes such as vacancy rates, affordable housing construction, and housing tenure.

Regarding the findings from Tach's regression, she found that, compared to majority high income and majority low income neighborhoods, mixed income neighborhoods were more likely to transition. She also saw that most of the transitions among mixed income neighborhoods were to an adjacent neighborhood classification. She argues that this indicates more common, but small scale, neighborhood changes regarding mixed income neighborhoods. Next, Tach examines the impact of race on the probability that a mixed income neighborhood will transition. Among majority low income neighborhoods, Tach found that predominantly black neighborhoods, classified as a tract with greater than 50% of its residents being black, were less

likely to transition compared to predominantly white neighborhoods. Hence, majority low income neighborhoods that are predominantly black are less likely to transition to a different neighborhood income classification compared to majority low income neighborhoods that are predominantly white. She also found that racially diverse neighborhoods fall at a level of stability in between predominantly black and predominantly white neighborhoods. However, outside of majority low income neighborhoods, predominantly black neighborhoods were more likely to transition than predominantly white neighborhoods.

In testing the interaction of independent variables proxying for the Life-Cycle model, Tach found that MSA tracts with higher rates of homeownership and new housing construction led to a decreased likelihood that the neighborhood would transition towards a lower income neighborhood classification. Additionally, Tach determined that neighborhoods with a greater amount of affordable housing construction and neighborhoods located in central cities were more likely to transition to a lower income classification and less likely to transition to a higher income classification. Based on the interactions with the two theories on the probability of a mixed income neighborhood transitioning, Tach concludes that mixed income neighborhoods are less stable. This is, in part, because the definitions for mixed income neighborhood classifications are closely classified such that it does not take a great amount of change for a mixed income neighborhood to move to an adjacent classification. Despite this, she argues that mixed income neighborhoods are perpetuated through a process of moving into and out of each of the mixed income neighborhood classifications. She also states that the findings from both of the theoretical models were accurate predictions of mixed income neighborhood transitions (Tach, 2009).

Tach's research is significant for understanding mixed income neighborhoods because of its difficulty in defining and specifying mixed income neighborhoods. Tach acknowledged this difficulty when she found that mixed income neighborhoods were moving rapidly between the specifications that were narrowly defined. Thus, the neighborhood specifications being closely defined can overestimate the amount of neighborhood change taking place, hence leading to different conclusions being drawn. Another important consideration raised by Tach was that overall incomes could rise which could make a neighborhood appear like it is transitioning. Tach also chose to use Metropolitan areas as opposed to central cities. These MSA tracts could potentially be affected by zoning and density variations. As Tach was looking at neighborhood transitions to lower or higher income classifications, she did not mention, specifically, the presence of gentrification in the research design. However, her application of the Chicago School theories of neighborhood change and housing stock characteristics directly relates to the Concentric Zone theory and filtering model mentioned previously in this study. She found that the variables for these theories had significant explanatory power in explaining the transitions of mixed income neighborhoods. This means that variables for the housing stock and demographic change have an impact on mixed income neighborhoods transitioning.

3.4. Achieving the Middle Ground in an Age of Concentrated Extremes: Mixed Middle-Income Neighborhoods and Emerging Adulthood

In the article titled "Achieving the Middle Ground in an Age of Concentrated Extremes: Mixed Middle-Income Neighborhoods and Emerging Adulthood" by Sampson et al. (2015), the authors seek to better understand the durability of mixed income neighborhoods. Before conducting their tests, the authors predict that, because neighborhood poverty has proven to be

durable, mixed income neighborhoods will exist in a similar fashion. In addition to charting neighborhood changes, Sampson et al. also look at individual level data to observe life trajectory in regards to whether or not an individual chooses to move to a mixed income neighborhood when they are coming of age. Like other studies of mixed income neighborhoods, the authors inquire if mixed income neighborhoods are a self contained form of a neighborhood or if it is in transition; either through gentrification or through neighborhood decline. The authors also note that the research into mixed income neighborhoods is only concerned with naturally occurring mixed income neighborhoods as opposed to Federal policies, such as HOPE VI. They argue that HOPE VI did not provide enough of a sample size to understand mixed income neighborhoods.

Before testing their hypothesis, the authors begin by defining mixed income neighborhoods. They argue that measures of income inequality, such as the Gini coefficient, do not properly represent a mixed income neighborhood. This is because, according to Sampson et al., the Gini coefficient can have a high value in both low income neighborhoods and high income neighborhoods. This is because they argue that income inequality is a separate measure from income mixing. In the context of mixed income neighborhoods, it is income mixing that most accurately depicts economic diversity, according to the authors. Thus, Sampson et al. (2015) define mixed income neighborhoods as, "...areas that are more evenly balanced than those at the extremes of either concentrated poverty or concentrated affluence and that have a reasonable mix among income groups, especially exposure of the poor to the middle and upper classes" (Sampson et al., 2015, p. 157). This definition provided by the authors states the importance of including both extremes of the income distribution in order to measure income mixing and mixed income neighborhoods. The authors also emphasize that the mixed income

neighborhood must have a low income population as well. In establishing their research methods, Sampson et al. use Chicago and Cook County, IL as a case study. They use the time period of 1990 and 2010. In specifying their dependent variable, the authors use the Index for Concentrated Extremes (ICE). This measure of income mixing in a census tract is calculated by beginning with the upper and lower quintile of the income distribution. They then, for each tract, find the number of residents that fall within each income quintile and subtract the number of residents in the highest quintile with the number of residents in the lowest quintile. This value is then divided by the total number of residents in the tract to yield a value between -1 and 1. In interpreting this index, a value of -1 is considered a tract that is overwhelmingly low income and a value of 1 is considered a tract that is overwhelmingly high income. The authors, in describing the index, argue that the inability to determine if a neighborhood is homogeneously middle income requires them to also refer to the Gini coefficient as well.

Given the use of the Index of Concentrated Extremes, the authors next calculate the ICE for each of the census tracts in Chicago and Cook County for their 30 year time frame. After doing so, with the distribution of ICE values, the authors use quintiles to create cut offs in the dataset. They define a mixed income neighborhood as a tract that falls within the second and third quintiles. After this definition, Sampson et al. arrange a transition matrix for the ICE quintiles which compares the data in two different time periods: 1990 and 2005-2009. In examining the findings, the authors find that just above 65% of the census tracts in both the highest ICE and lowest ICE quintiles remained in their original ICE quintile. Because of this, the authors determine that this finding is representative of how individuals are probably more likely to experience a mixed income neighborhood through moving to one as opposed to their

neighborhood transitioning into a mixed income neighborhood. The authors further state that neighborhood income, based on their transition matrix, does not change as much as originally expected.

For the second component of their research, Sampson et al. examined individual level data to look at the relationship of individuals moving into and out of mixed income neighborhoods. For their research design, between the years of 1995 and 2013, the authors documented 671 adolescents between the ages of 9-15 to when they have reached adulthood between the ages of 25-32. The researchers' goal was to compare the neighborhood that they were raised in with the neighborhood that they moved into as an adult. Similar to the neighborhood change research component, the authors begin with arranging a transition matrix of ICE values between the census tracts involved with the first wave of individuals in 1995 and the census tract involved with the fourth and final wave of individuals in 2013. At the individual level, Sampson et al. found that there was further evidence of little transitioning at the highest and lowest ICE. The authors conclude that this demonstrates the effects of concentrated poverty and concentrated affluence over the course of the adolescents' life trajectory. However, the authors note that the results for the 2nd and 3rd ICE quintiles in the individual level transition matrix demonstrate that individuals were moving interchangeably between the two quintiles. This means that outside of concentrated poverty and affluence, the trajectory of the adolescents provided evidence of moving between the mixed income neighborhoods classifications.

The next part of the individual level research included a logistic regression that was used to observe the likelihood that an individual lives in a mixed income neighborhood in the last wave of the sample data. They began by interacting the model with variables for age and race,

specifically black individuals and Latino individuals. Their findings indicate that living in a mixed income neighborhood in the first wave did not have any statistical significance on the probability of living in a mixed income neighborhood in the last wave. When looking at the variables for race, Sampson et al. found that Latino individuals are more likely to live in a mixed income neighborhood than white residents. Their findings also state that there was no statistical significance between black individuals and the probability of living in a mixed income neighborhood in the final wave of the sample data. When including immigration status of the individual's parents, specifically being first or second generation immigrants, the researchers also found no significant relationship on the probability. Sampson et al. also tested for a statistical impact from homeownership and living in a public housing unit. This also yielded no statistical significance. The last finding that the researchers found from the regression was that there was a decreased probability of living in a mixed income neighborhood if the individual moved out of the city of Chicago. Given the results from the neighborhood change transition matrix, individual level transition matrix, and logistic regression, the authors conclude that both concentrated affluence and concentrated poverty are durable. In regards to mixed income neighborhoods, the authors find that mixed income neighborhoods are unstable while existing through a movement into and out of mixed income status (Sampson et al., 2015)

Sampson et al., in contrast with Tach (2009), chose to examine mixed income neighborhoods with individual level analyses in addition to a logistic regression. Their conclusions are in agreement with Tach's, such that mixed income neighborhoods are constantly undergoing changes to their mixed income status. The findings from the research are also aligned with how Tach concluded that mixed income neighborhoods are unstable, but the levels of

transition were of a small magnitude. In looking at the relationship between mixed income neighborhoods and gentrification, Sampson indirectly addresses this when the authors state that individuals are most likely to live in a mixed income neighborhood by moving to one, as opposed to having a neighborhood transition into a mixed income neighborhood. Sampson's emphasis on concentrated poverty and affluence would need additional research to understand what makes them durable, but the results indicate that mixed income neighborhoods are not stable.

3.5. Gentrification and Displacement: New York City in the 1990s

In the article titled "Gentrification and Displacement: New York City in the 1990s" by Freeman and Braconi (2004), the authors seek to explore the relationship between gentrification and displacement, with particular attention given to its impact on low income residents. In reviewing previous literature related to gentrification and displacement, the authors argue that the literature is lacking in regards to the causal relationship between gentrification and displacement. Furthermore, the authors theorize that gentrification has the potential to provide neighborhood improvements for low income residents, specifically in neighborhoods that were disinvested due to suburbanization and exit of higher income residents. These potential benefits, according to Freeman and Braconi, include: decreasing segregation, increased investment, deconcentration of poverty, improved job networks, and better public services. The authors argue that these improvements are possible due to gentrification and that it provides enough of an incentive for low income residents to remain in gentrifying neighborhoods.

In testing this hypothesis and theory, Freeman and Braconi use New York City during the 1990s as a case study. In describing the context, they state that New York City experienced a

recession in 1993. Also, the city is unique in that it has a large population of residents living in rent regulated housing units, specifically in rent stabilized units. Given this fact, the authors explain that the relationship between rent regulation and displacement will be addressed in their research methodology. Regarding data, the authors use New York City Housing and Vacancy Survey (NYCHVS). This survey has a dataset of 16,000 housing units in which 70% are rental units. The survey takes place every three years by the U.S. Census Bureau in the following years: 1991, 1993, 1996, and 1999. Within the NYCHVS, the survey identifies 55 sub-borough areas. Among these areas, the authors, based on their own familiarity, define the following neighborhoods as gentrifying: Chelsea, Harlem, the Lower East Side, Morningside Heights, Fort Greene, Park Slope, and Williamsburg. In defining mobility, the authors were able to observe, based on the survey, if the housing unit has a new occupant. Regarding the research design, the authors choose to conduct a logistic regression in order to determine the likelihood of a resident to move. In proxying for a resident's disadvantage, the researchers used variables for education, not having a college degree, and income, being below the Federal poverty line. Their control variables include what they reference as Life-Cycle variables, which they provide as significant life events, such as marriage. Because of this, the authors predict that these factors will have an impact on the residents' likelihood of moving. In order to control for this, the authors include the following variables: age, marital status, and the presence of children. Also, the researchers include independent variables for demographic characteristics and physical characteristics. Freeman and Braconi also note that they excluded occupants of public housing units, but included occupants of rent regulated apartments who may be facing harassment from landlords in gentrifying neighborhoods. The authors acknowledge that their data set does not account for

intra-neighborhood mobility. This could cause the mobility rate and level of displacement to be underestimated in the model

With the logistic regression, Freeman and Braconi ran two separate tests: one including gentrification as the main explanatory variable and the other including rental inflation as the main explanatory variable. The variable for gentrification, as discussed previously, are those residents living in the sub-borough areas defined as being gentrified by the researchers. The authors do not provide specific criteria in defining gentrification. Within the regression results, the authors found that rent stabilization did not have a significant impact on low income resident's likelihood of moving. However, they found that rent stabilization did have a significant, negative impact on the likelihood of residents without a college degree to move. The authors also found that, within gentrifying neighborhoods, low income residents are 19% less likely to move compared to non-gentrifying neighborhoods. Freeman and Braconi also report that, in gentrifying neighborhoods, residents without a college degree are 15% less likely to move compared to non-gentrifying neighborhoods. The second component of their regression methodology used rental inflation, specifically the average rate of rental increases, as the main explanatory variable. They argue that, if gentrification is occurring, it would be assumed that rents would increase, given that the housing market accurately reflects the neighborhood change. They predict that the residents' likelihood of moving will increase with rising rents. However, the authors were surprised to find that an increase in rental inflation leads to a decreased likelihood that a low income resident or resident without a college degree will move. In discussing their conclusion, the authors state that the decreased likelihood from disadvantaged residents indicate that there are benefits to gentrification that could be influencing disadvantaged

residents' likelihood of moving. They also state that there are other reasons, outside of gentrification and rent increases, that could explain why individuals change residences. This connects back to their earlier ideas, which is that life events could determine moving from a residence, such as marriage or divorce, change of job, wanting a bigger unit, or wanting to own their residence. Freeman and Braconi, in explaining the relationship between gentrification and displacement, argue that there is evidence that neighborhoods are changing due to succession, not displacement. In making this distinction, they write, "A neighborhood can gentrify without direct displacement as long as in-movers are of a higher socioeconomic status than out-movers" (Freeman & Braconi, 2004, p. 50). This explains how the researchers theorize that the socioeconomic composition of neighborhoods can change if the demographics of the residents entering the neighborhood are different than the residents leaving the neighborhood (Freeman & Braconi, 2004).

Understanding the relationship between gentrification and displacement is crucial for examining the full effects of gentrifying neighborhoods. Freeman and Braconi argue that displacement can be and is resisted by low income residents who find that there are benefits to remaining in gentrified neighborhoods. However, in regards to neighborhood change, the authors argue that housing succession occurs, as opposed to residential displacement. This connects with the article by McKinnish and White (2011) who argued that the socioeconomic makeup of in-movers significantly changes the neighborhood composition (McKinnish & White, 2011). However, the main gap in this research is the role of developers. According to the Land-Use Succession model, the in-movement of a higher income group will send signals to the developer. These signals cause the developer to redevelop urban land in order to capture the additional

profits accompanied by the influx of gentrifiers. Thus, in a profit-motivated urban space, the argument in support of housing succession does not account for the role that developers play in redeveloping, converting housing units, or raising rent to capture the inflow of higher income in-movers. As for mixed income neighborhoods and gentrification, the argument that gentrification can occur without displacement leads to the belief that mixed income neighborhoods can form through gentrification. This is theoretically possible through higher income residents moving into a gentrifying neighborhood without displacing low income residents.

3.6. The Right to Stay Put, Revisited: Gentrification and Resistance to Displacement in New York City

In the article titled "The Right to Stay Put, Revisited: Gentrification and Resistance to Displacement in New York City" by Newman and Wyly (2006), the authors further explore the relationship between displacement and gentrification, with more of an emphasis on capturing the full effect of displacement. The research was published after the previous article by Freeman and Braconi (2004) and uses the same data, time period, and case study. The author's main hypothesis is that Freeman and Braconi did not properly address the full effect of gentrification's ability to generate displacement pressures on disadvantaged residents. Their main contention is that gentrification affects urban areas such that there are negative consequences for low income residents outside of those directly displaced.

Newman and Wyly criticize the findings from Freeman and Braconi's research because of issues that they have with the specification of their model. Their first critique is that Freeman and Braconi used cross section data to understand the relationship between gentrification and

displacement. Additionally, they argue that the boundaries chosen by Freeman and Braconi contained few low income residents at the time. According to Newman and Wyly, this leads to bias in the model as the remaining low income residents are those most inclined to resisting displacement pressures. Newman and Wyly also argue that Freeman and Braconi had a control group with a higher rate of mobility. They find that the control group included areas of the city in high poverty which results in higher mobility rates. This causes mobility rates in the experimental group to look comparatively smaller. Newman and Wyly's final criticism of the model run by Freeman and Braconi are the large boundary sizes that they used in regards to sub-borough areas. Newman and Wyly argue that this does not account for the various neighborhoods contained in each of these sub-borough areas, as there could be up to three distinct neighborhoods with different levels of transitioning.

Given these issues, Newman and Wyly use New York City as a case study for their own research in understanding the relationship between gentrification causing displacement. They used a survey of 18,000 residents in the New York City Housing and Vacancy Survey (NYCHVS). The survey years that they used are 1991, 1993, 1996, 1999, and 2002. The authors explain that the survey regarding displacement allows for the surveyee to choose 1 of 30 reasons explaining why they moved residences. Newman and Wyly argue that this is a limitation of their model as they claim that there are often more than one reason for why a resident chooses to move. Based on the survey responses, the authors define displacement as moving residences due to: housing costs, landlord harassment, and the private market, such as the conversion to owner occupied housing. They found that, for each of the survey years, the displacement rate ranged from 6.22% to 9.87%. Through further analyzing the displacement rates, the authors found that it

fluctuated in accordance to the overall housing market. They also found variations of displacement within boroughs such that the authors conclude that the area context matters.

In running their logistic regression, Newman and Wyly test for the likelihood that a resident is displaced. They control for a series of variables which include: demographics, human capital, labor market characteristics, race, ethnicity, household income, status of regulatory housing, housing quality, and housing costs. According to the regression results, Newman and Wyly found that black, asian, and Hispanic residents are less likely to be displaced. They also found that foreign-born, female-headed households, residents in poverty, and older residents are more likely to be displaced. The authors also discovered that socioeconomic characteristics had a small impact on the residents' likelihood of being displaced, which the authors argue demonstrate how displacement affects a wide range of people. In further understanding their hypothesis that area context matters, the researchers add three additional independent variables to the model: the borough the resident moved from, the borough the resident moved to, and the HVS (Housing and Vacancy Survey) panel year. The authors found that some of the sub-borough areas impact the likelihood of displacement, thus indicating evidence of variation across neighborhoods.

The second component of Newman and Wyly's methodology included a qualitative section of interviews that the researchers conducted among community residents and community organizers. These interviews were conducted in the same neighborhoods identified as gentrifying by Freeman and Braconi. The authors conducted 33 interviews that asked questions about their observations of gentrification and the methods in which disadvantaged residents are able to remain in the gentrifying neighborhood. One transcript described how Harlem, because of its close proximity to Midtown Manhattan, has been undergoing gentrification. Other excerpts from

the interview highlighted a collective frustration among residents who feel like they have put considerable effort into improving their neighborhood and are now facing housing affordability issues which threaten their ability to stay in the neighborhood. Other issues mentioned in the qualitative section are issues of overcrowding in housing units in order to remain in the gentrifying neighborhood. Residents have also reported difficulty in paying rising rents on a fixed income. Also, the authors reported the presence of homelessness and residents having to seek housing in the city's shelter program. The interviewees also noted residents moving to low cost areas outside of New York City, such as Upstate New York or the South. The researchers found that, regarding public intervention, rent regulation was the most widespread tool used in this case study. However, the qualitative research indicated landlord harassment continued to take place in rent stabilized units. Additionally, the authors observed that homeowners were also susceptible to displacement because of rising property taxes. With these displacement pressures, Newman and Wyly found that community based organizations (CBOs) have undergone an active role in the community. In formulating their conclusion, the authors argue that neoliberal housing policies have exacerbated the displacement pressures and that the media is not attuned to the issues that displacement creates. In referencing mixed income neighborhoods, Newman and Wyly (2006) write, "...revitalisation of mixed income/mixed race neighbourhoods will not produce the beneficial changes policy-makers seek if protections for low-income residents are not also included" (Newman & Wyly, 2006, p. 52). The authors argue that displacement is one of the main barriers for creating mixed income neighborhoods. Because of this, the authors advocate for renewed attention on how displacement affects low income residents (Newman & Wyly, 2006).

Newman and Wyly set the intention of their research with the goal of understanding the effects of displacement not captured in the research of Freeman and Braconi (2004). As mentioned previously, one of the main critiques of the Freeman and Braconi article is their inability to account for the actions of landlords and developers to achieve profit in a gentrifying neighborhood. As evidenced by Newman and Wyly, among rent stabilized units, landlords engaged in harassment in order to allow their housing units to be leased at market rate. Additionally, the findings from Newman and Wyly are significant because it accounts for a larger impact of displacement, as they highlight the costs of staying in a gentrified neighborhood. The article theorizes that there is a class conflict in gentrifying neighborhoods as they argue that mixed income neighborhoods do not provide a positive outcome for low income residents because of displacement. Thus, this article provides evidence and an argument that mixed income neighborhoods are unattainable in the long run because of the unabated displacement of low income residents.

3.7. Conclusion

The overall findings from the literature review indicates that mixed income neighborhoods are in a constant state of fluctuation and transition. This is seen by the evidence provided in the research from Tach (2009) and Sampson et al. (2015) which noticed that there was an interchangeable movement between the mixed income neighborhood classifications in both of their models. Research regarding the diversity of in-movers, such as by McKinnish and White (2011) determined that mixed income neighborhoods attract economically diverse residents. Furthermore, the literature highlights a contested debate over the impact that gentrification has on low income residents, particularly in regards to displacement. From a

theoretical perspective, neighborhood transitions will result in higher housing costs that will cause low income residents to be displaced. However, the article by Freeman and Braconi (2004) refutes this causal relationship when it argues that the neighborhood improvements provide an incentive for low income residents to remain in the neighborhood. They also state that housing succession can explain upward neighborhood transition without displacement. This connects with the research by McKinnish and White (2011) which also argued that the influx of residents entering the neighborhood play a key role in determining neighborhood transition. Their research found that mixed income neighborhoods attract economically diverse residents, albeit at a diminishing rate. These two studies claim that neighborhood change, or neighborhood maintenance, is based on the characteristics of in-movers and less on the displacement of low income residents. In response to the link between gentrification and displacement, Newman and Wyly (2006) posit that the housing affordability crisis and costs of gentrification will negatively affect low income residents through displacement pressures that may not be captured statistically. The overall findings from the literature inform the relationship between gentrification, displacement, and mixed income neighborhoods because it provides evidence that mixed income neighborhoods are not persistent over time.

Chapter 4: Methodology

4.1. Introduction

The purpose of this research is to examine the likelihood of an upward transition among mixed income neighborhoods. The particular focus of this study is if mixed income neighborhoods are a self-sustaining, persistent neighborhood type over time or if mixed income neighborhoods exist in the middle of a transition to a homogeneous high or low income neighborhood. Previous research by Tach (2009) and Sampson et al. (2015) have found that mixed income neighborhoods exist due to a constant period of transitioning over time. Thus, based on their findings alone, mixed income neighborhoods are not a long term neighborhood phenomenon and are instead a short term occurrence. Regarding my own research design, the city of Chicago, IL was chosen as a case study between the years 2010 and 2017 because it provides a diversity of distinct neighborhoods, a large enough population for empirical analysis, and constant census tract boundaries. The main research component in this study is a logit regression that will test the likelihood that a 2010 mixed income neighborhood will transition to a homogenous high income neighborhood in 2017. This regression was preferred because it models a full neighborhood transition, which will provide evidence regarding the persistence of mixed income neighborhoods between 2010 and 2017. This research will also include a series of ArcGIS maps to observe the spatial distribution of neighborhood classifications across the census tracts. The final component of the methodology used in this study will be a spatial autoregressive linear probability model. This model incorporates spatial lags for select independent variables in order to determine if there is a surrounding spatial effect influencing the model. The

consideration of these models are intended to further understand the persistence of mixed income neighborhoods in Chicago between 2010 and 2017.

4.2. Maps

This study incorporated ArcGIS maps in order to better understand the level of spatial clustering among neighborhood types in the city of Chicago. The first and second maps, using census tracts, will look at the spatial concentration of the three neighborhood classifications: homogeneous low income, homogeneous high income, and mixed income. The third and final map will highlight only the tracts that transitioned from a mixed income neighborhood in 2010 to a homogenous high or low income neighborhood in 2017. These maps are limited in their explanatory power because they are descriptive in nature, such that they do not empirically test causal forces. The empirical testing of spatial influences will be addressed with the spatial autoregressive model, which will be discussed later. However, because of this, the maps alone cannot determine if surrounding spatial effects contribute to the geographic pattern of upward transitions shown in the maps. Despite this, the use of ArcGIS maps is included in this study in order to observe the level of segregation among neighborhood classifications and neighborhood transitions in Chicago.

4.3. Dependent Variable

The dependent variable selected for this research methodology is a dummy dependent variable indicating the likelihood that a mixed income neighborhood tract experiences an upward neighborhood transition into a higher income neighborhood classification between the years 2010 and 2017. An upward neighborhood transition is defined as a mixed income census tract in 2010 becoming a homogenous high income census tract in 2017. If the mixed income

neighborhood experienced an upward transition, the dependent variable would yield a value of 1. A value of 0 would indicate that an upward neighborhood transition did not occur between 2010 and 2017. This dependent variable was chosen because it captures a full neighborhood transition as opposed to a change in the ICE value which would not demonstrate a full neighborhood transition. The non-linear logit regression, using a dummy dependent variable, was chosen as it models full neighborhood transitions between 2010 and 2017 in Chicago.

In classifying mixed income neighborhoods, this study uses the Index for Concentrated Extremes (ICE). This index is calculated by finding the difference between the number of high income residents and low income residents in the census tract which is then divided by the total number of residents in the census tract. The equation for the ICE calculation is provided below:

> Index of Concentrated Extremes (ICE) = (number of high income residents in census tract - number of low income residents in census tract) / number of total residents in census tract

The index yields a value between -1 and 1 in which a value of -1 represents a census tract composed of entirely low income residents and a value of 1 represents a census tract composed of entirely high income residents. A value closer to 0 would represent a mixed income neighborhood. This index for defining mixed income neighborhoods is introduced in an article by Sampson et al. (2015) who argues that the measure captures the coexistence between residents in the upper and lower tails of the income distribution. They argue that the ICE is more suitable for defining mixed income neighborhoods as opposed to the Gini coefficient which measures income inequality at the tract level (Sampson et al., 2015). For defining high income and low income residents, the top four and bottom four income intervals were used in American Community Survey reporting. This provides a limitation in which, ideally, it would be preferable

to have a continuous income distribution that would allow for the top and bottom quartile or quintile to be used. After the ICE value is calculated for each census tract in both time periods, the middle 50% of the ICE distribution was classified as a mixed income neighborhood. Then, the top quartile and the bottom quartile of the ICE distribution are classified as homogeneous high income and homogenous low income neighborhood types.

4.4. Independent Variables

The following independent variables were chosen due to their expected explanatory power in predicting the likelihood that a mixed income neighborhood will transition upwards. Each independent variable and its corresponding definition is shown in Table 4.1. The first independent variable in the model is the median housing value in 2010 for the census tract. This variable has an expected positive impact on the likelihood of an upward transition because higher housing values would attract greater developer activity, according to the Land Use Succession model (Clapp, 1977). Additionally, the higher housing values in the census tract indicates that there is a higher willingness to locate in the neighborhood among consumers. The Rent-Bid model argues that housing values are determined and allocated among competing consumers based on a process of bidding for urban land (Alonso, 1964). The developers, seeking to maximize profits, would react to these consumer preferences by building for-profit, market rate development, therefore leading to a higher likelihood of an upward neighborhood transition.

The second independent variable is the percentage of residents in the same residence from one year ago. The expected impact on the likelihood of transitioning is indeterminate as a result of two possible outcomes. The first being that a higher level of commitment to the neighborhood among current residents in the tract could be an indicator of future expectations for

Figure 4.1.

Variable Name	Expected Sign	Variable Description
up_transition	N/A	Probability that a 2010 mixed income neighborhood transitions to a homogenous high income neighborhood in 2017
Housing Characteristics		
median_housing	+	Median housing value in 2010
perc_oneyear	+/-	Percentage of residents in same residence in past year in 2010
perc_own	+/-	Homeownership rate in 2010
Socioeconomic Characteristics		
perc_black	-	Percentage of black residents in 2010
perc_hispanic	-	Percentage of Hispanic / Latino residents in 2010
perc_foreign	-	Percentage of foreign-born residents in 2010
perc_college	+	Percentage of residents with a Bachelor's degree or above in 2010
percap_inc	+	Per capita income in 2010
Spatially Weighted Variables		
(spwt_s001) median_housing	N/A	median_housing weighted with spatial weight matrix
(spwt_s001) perc_black	N/A	perc_black weighted with spatial weight matrix
(spwt_s001) perc_hispanic	N/A	perc_hispanic weighted with spatial weight matrix
(spwt_s001) perc_foreign	N/A	perc_foreign weighted with spatial weight matrix
(spwt_s001) percap_inc	N/A	percap_inc weighted with spatial weight matrix

neighborhood economic growth. This future economic growth could be a sign that the mixed income neighborhood is about to transition upwards, which would have a positive effect on the

likelihood of transitioning upwards. The second possible outcome is that a higher percentage of residents remaining in the neighborhood could lead to a decrease in the likelihood of transitioning upwards because fewer residents are entering the neighborhood. This would disallow an influx of higher income residents to enter the neighborhood, therefore decreasing the likelihood that an upward transition will occur in the census tract.

The third independent variable is the percentage of homeownership which is also indeterminate in its expected impact on the likelihood of an upward neighborhood transition. According to the filtering model, higher levels of homeownership would translate to a higher willingness of maintenance and repair among homeowners as compared to the renting population (Keating et al., 1996). Due to the resulting decreased deterioration of the housing stock, this could cause a higher likelihood of that the mixed income neighborhood will transition upwards. However, a neighborhood with fewer housing rentals could also mean that fewer residents are able to enter the neighborhood. Thus, it would restrict the ability for high income residents to enter the neighborhood, which would decrease the likelihood of an upwards transition. Because of this, the expected sign for homeownership is indeterminate.

The fourth, fifth, and sixth independent variables are proxies for race, ethnicity, and immigration in the census tract. There is an expected negative effect of these variables on the likelihood that the neighborhood would transition upwards due to the prevalence of discrimination and the Concentric Zone theory. This theory argues that neighborhood change occurs through the outward movement of socioeconomic groups away from the central business district. In the context of racial preferences, this theory concludes that zones are homogeneous in respect to race and income due to the out-movement of white and high income residents when a

neighborhood begins to diversify (Park et al., 1925). In addition to this, communities of color have experienced historical disinvestment and discrimination within the segregated housing market. Because of these factors, the three independent variables would have an expected negative effect on the likelihood that the neighborhood will transition upwards.

The seventh independent variable is the percentage of residents with a Bachelor's degree or above. This would have an expected positive impact on the dependent variable because a greater level of educational attainment will be an indicator of early gentrification to developers. Developers, hoping to take advantage of this future economic development, would increase market-rate housing, therefore increasing the likelihood that the neighborhood would transition upwards.

The eighth and final independent variable is per capita income. The expected impact of this variable would be a positive effect on the likelihood that an upward neighborhood transition occurs. This is because a neighborhood tract with a high level of income would attract a greater amount of market-rate developer activity. Developers would regard a high income neighborhood tract as an indicator for favorable market conditions in order to maximize profits, hence positively contributing to the probability that the neighborhood would transition.

These independent variables would empirically test my research question because it would allow me to see which factors would influence the likelihood that a 2010 mixed income neighborhood transitions into a homogeneous high income neighborhood in 2017. If the independent variables have an insignificant or negative impact on the likelihood of an upwards transition, it would be concluded that mixed income neighborhoods of Chicago are persistent within the studied time frame.

4.5. Spatial Influences

In order to examine the influence of surrounding spatial factors, this research will include a spatial autoregressive linear probability model. As mentioned previously, the maps alone do not provide evidence regarding the causality of spatial effects from adjacent census tracts. This is important for the validity of the model because the logit model does not control for this influence and would therefore include spatial effects in the error term. In order to remedy that, this research will include an additional regression that applies spatial weights to each of the predicted independent variables that could be affected by surrounding characteristics to determine if spatial influences are in the model.

The spatially weighted independent variables, seen in Table 4.1, were selected based on their predicted spatial influence. The first variable, the median housing value in the census tract, would be expected to be spatially defined because of the Rent-Bid model. In this model, the value of land is determined in relation to the proximity to the central business district and the consumers' value of accessibility (Alonso, 1964). Therefore, the median housing value of a census tract would be expected to be dependent, in part, to its distance from the CBD. As mentioned previously, the Concentric Zone theory states that geographic zones radiating from the CBD remain racially and economically homogeneous because of an outward movement from the previous socioeconomic group (Park et al., 1925). Given this theoretical explanation, the socioeconomic makeup of a census tract would be influenced by the socioeconomic characteristics of the surrounding census tracts. This possible relationship warrants that the independent variables proxying for race, income, and immigrant status be included in the spatial

autoregressive model. The spatial autoregressive model results will then determine statistically if nearby spatial effects are impacting the independent variables in the model.

4.6. Conclusion

This research design is structured around understanding the persistence of mixed income neighborhoods within the given study. This research question will be explored through modeling factors that will predict upward neighborhood transitions among mixed income census tracts in a logit regression. The methodology uses the city of Chicago as a case study between the years of 2010 and 2017. In the model, independent variables were selected in order to test theoretical explanations, relating to housing and socioeconomic characteristics, which could have an impact on the likelihood that a mixed income neighborhood in 2010 will transition to a homogenous high income neighborhood in 2017. Additionally, the research will incorporate a spatial autoregressive model and ArcGIS maps to observe and empirically test the influence of surrounding spatial effects in the model. Using these methods, this research intends to conclude if mixed income neighborhoods in Chicago are persistent or if these neighborhoods are undergoing a transition across the given time frame.

Chapter 5: Findings

5.1. Introduction

The research undertaken in this study will model neighborhood transition in order to determine the persistence of mixed income neighborhoods in Chicago. This analysis will incorporate a logit regression to predict the likelihood that a mixed income neighborhood in 2010 will transition to a homogenous high income neighborhood in 2017. The second regression included in this research is a spatial autoregressive linear probability model which will test the statistical significance of spatial factors in the model. The analysis will also consist of a series of maps to observe the spatial patterns across Chicago census tracts in 2010 and 2017. The objective of this empirical research is to better understand if mixed income neighborhoods are neighborhoods in undergoing transition or if they are a persistent neighborhood type within the studied time frame.

5.2. Maps

Across the Chicago census tracts, the maps demonstrate that neighborhood classifications are spatially concentrated. This is seen in the first two maps, Figure 5.1 and Figure 5.2, which display the spatial distribution of the homogenous low income, mixed income, and homogenous high income classifications for census tracts between the years 2010 and 2017 in Chicago. The clustering of neighborhood classifications are aligned with previous expectations of Chicago as the North side is composed of concentrated homogenous high income neighborhoods and the South and West sides are composed of concentrated homogeneous low income neighborhoods. Additionally, many of the neighborhood transitions that did occur, seen in Figure 5.3, are located adjacent to the neighborhood clusters in 2010. Thus, many of the census tracts that

Figure 5.1.

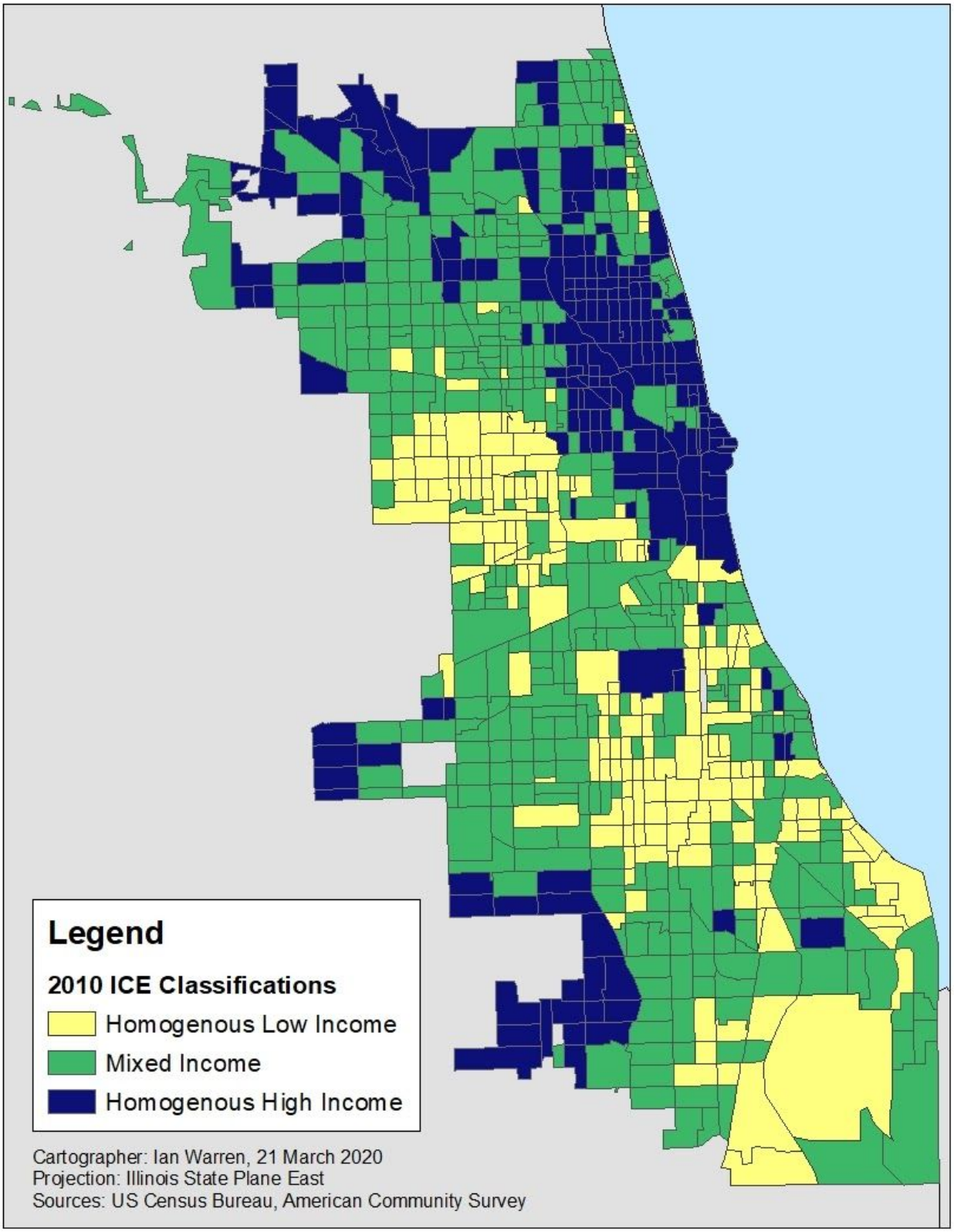

Legend
2010 ICE Classifications
Homogenous Low Income
Mixed Income
Homogenous High Income
Cartographer: Ian Warren, 21 March 2020
Projection: Illinois State Plane East
Sources: US Census Bureau, American Community Survey

Figure 5.2.

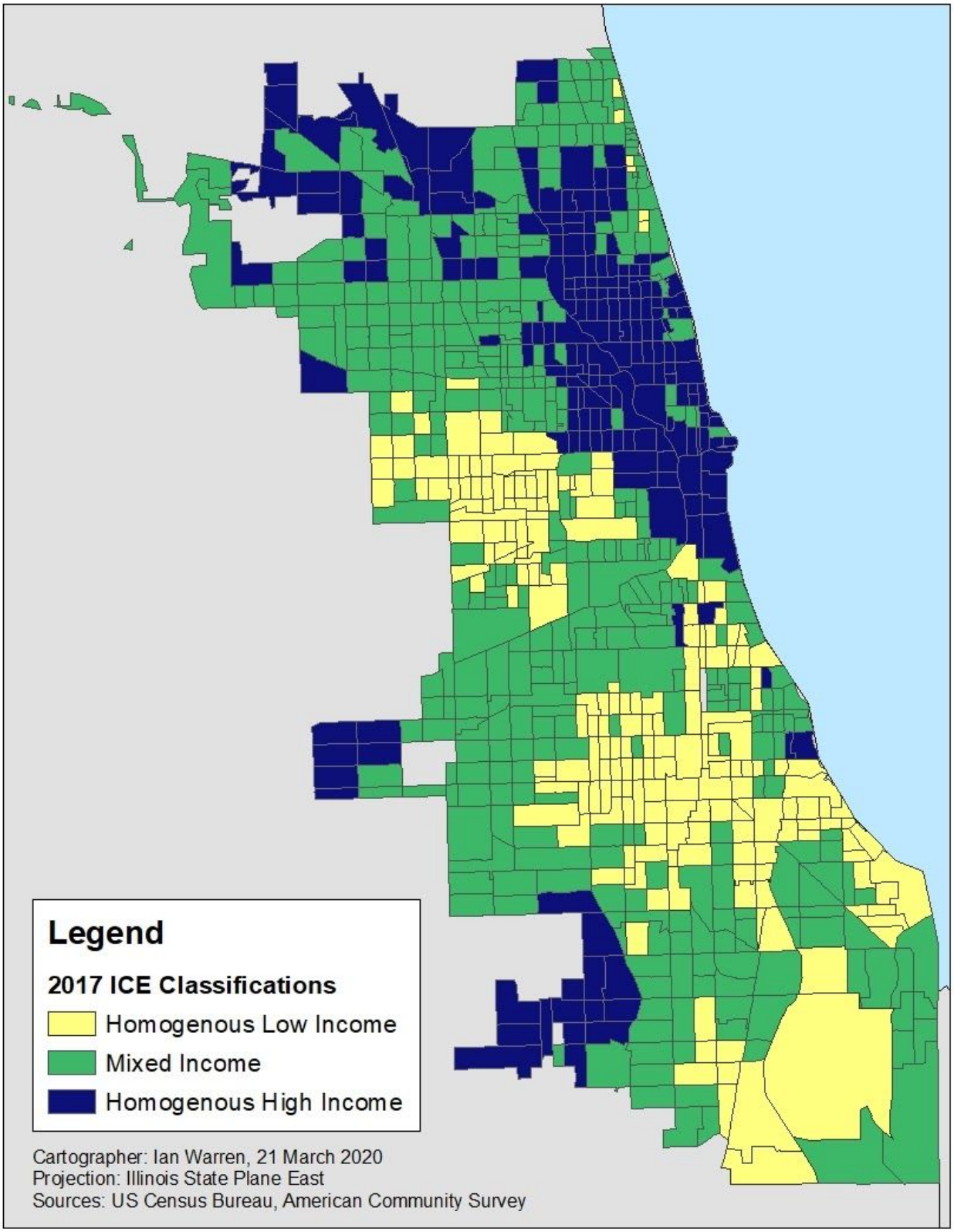
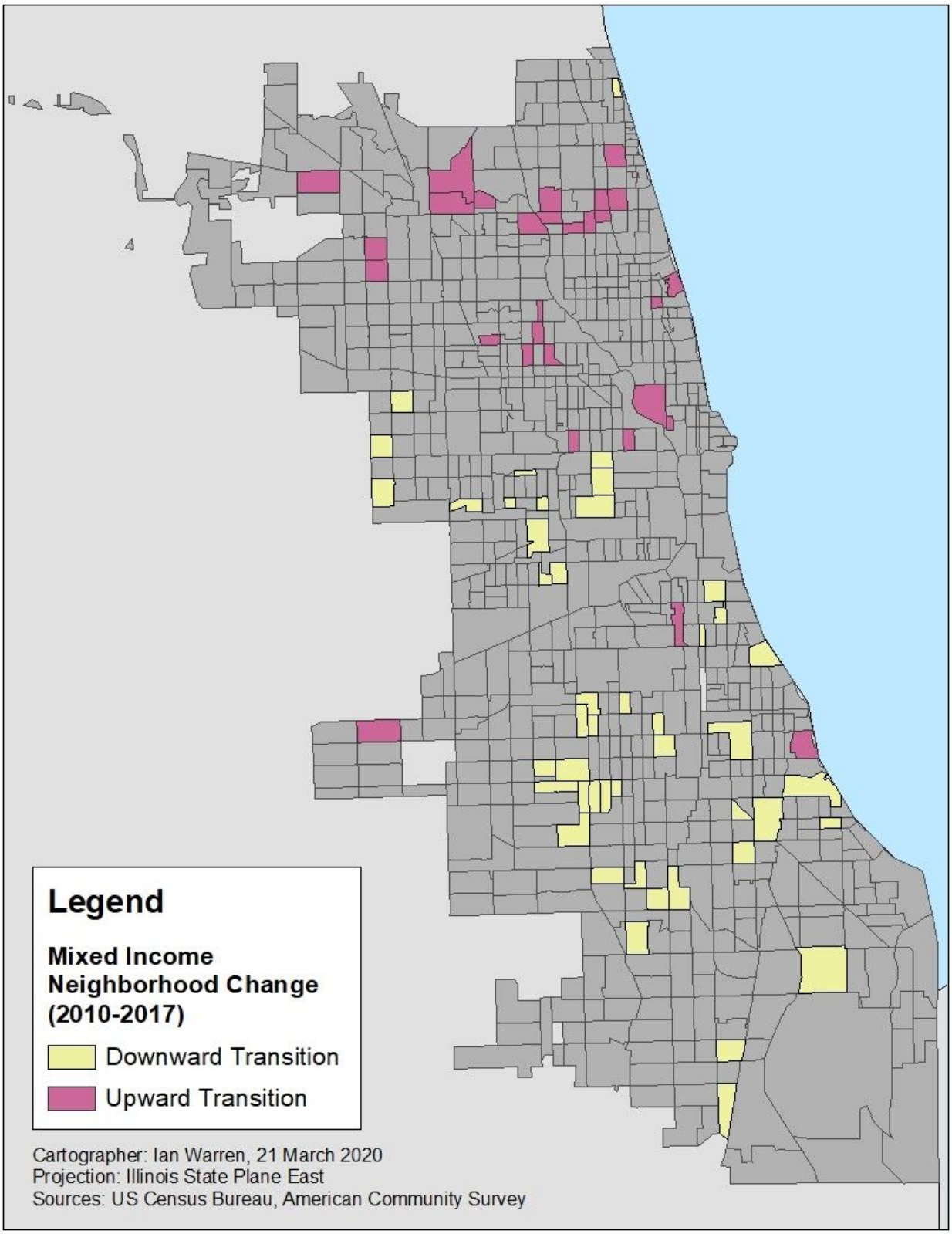

Legend
2017 ICE Classifications
Homogenous Low Income
Mixed Income
Homogenous High Income
Cartographer: Ian Warren, 21 March 2020
Projection: Illinois State Plane East
Sources: US Census Bureau, American Community Survey

Figure 5.3.


Legend
Mixed Income Neighborhood Change (2010-2017)
Downward Transition
Upward Transition
Cartographer: Ian Warren, 21 March 2020
Projection: Illinois State Plane East
Sources: US Census Bureau, American Community Survey

experienced an upward transition were located predominantly near homogenous high income neighborhood clusters, specifically on the North side. Of the 29 upward transitions that occurred among 2010 mixed income neighborhoods, 28 of these transitions were adjacent to a homogenous high income census tract. In contrast, only 5 of these upward transitions were adjacent to a homogenous low income census tract. This spatial pattern remains true for downward transitions as well in which 44 of the 46 census tracts that experienced a downward transition were adjacent to a homogenous low income census tract. Additionally, 9 of these 46 census tracts were adjacent to a homogenous high income census tract. This connection between neighborhood transitions and the concentration of neighborhood homogeneity indicate that neighborhood transitions could be dependent on the location of the census tract.

The maps demonstrate that, between the years of 2010 and 2017, the location of neighborhood transitions has solidified a segregated pattern of concentrated census tracts on the basis of income. One possible explanation for this observation is the Rent-Bid model from Alonso (1964). In this theory, urban land is allocated to the highest bidder, or the consumer with the highest willingness to locate (Alonso, 1964). Under the assumption that a homogenous high income neighborhood is a desirable amenity, consumers may have a higher willingness to locate in a mixed income census tract that is in close proximity to a high income census tract. This would be reflected by consumers increasing their bids for residing in the adjacent census tract. As high income residents have a greater ability to outbid lower income residents, the land would be allocated to the higher bids from high income residents. In response to this, developers would maximize this opportunity by constructing market rate housing in order to capture greater economic profit, according to the Land Use Succession model (Clapp, 1977). This would result

in a decrease in the supply of housing rentals, therefore lowering the availability of affordable housing and contributing to the displacement of low income renters in the mixed income census tract. This would lead to an upward neighborhood transition due to an influx of high income residents and the displacement of low income residents. The combination of consumer preferences, neighborhood amenities, and displacement of low income renters provide an explanatory framework for why mixed income neighborhoods overwhelmingly transition upwards near concentrated, homogeneous high income clusters. As discussed in the previous chapter, the maps alone cannot explain the causal effect of spatial influences on the likelihood of a neighborhood transition. Because of this, the results from the spatial autoregressive model will be considered to further determine the spatial influences in the model.

5.3. Regression Results: Logit Model

In the logit model, the model uses a dummy dependent variable of 0 and 1 with a value of 1 representing that a mixed income neighborhood in 2010 has transitioned to a homogenous income neighborhood. The model tests the impact of each independent variable on the probability of an upward transition among 2010 mixed income neighborhoods in Chicago. The summary statistics is provided in Figure 5.4 for the mixed income neighborhoods that transitioned upwards. The regression results for the logit model are provided in Figure 5.5. In this figure, Model 1 corresponds with the logit regression results for the full sample size of approximately 800 census tracts. Model 2 corresponds with the logit regression results for the approximately 400 mixed income neighborhoods in 2010. In addressing the research question, the main focus will be on Model 2 because it isolates neighborhood change among 2010 mixed income neighborhoods.

Figure 5.4.

Variable	Count	Mean	Standard Deviation	Minimum	Maximum
Mixed Income Neighborhoods (Upward Transition)					
median_housing	29	364,193	85,316	179,000	637,200
perc_oneyear	29	82.01	7.62	57.92	95.77
perc_own	29	43.82	16.96	13.53	82.18
perc_black	29	8.00	14.71	0.00	58.08
perc_hispanic	29	27.59	20.22	3.83	74.24
perc_foreign	29	30.72	15.44	2.19	57.53
perc_college	29	46.14	18.98	14.53	80.84
percap_inc	29	33,287	10,621	16,570	64,481
Mixed Income Neighborhoods (No Transition & Downward Transition)					
median _housing	362	254,330	81,754	97,000	638,500
perc_oneyear	368	85.41	8.36	37.71	99.71
perc_own	367	49.85	18.93	0.00	97.52
perc_black	367	35.56	40.13	0.00	100.00
perc_hispanic	367	35.79	33.06	0.00	98.84
perc_foreign	367	33.33	24.24	0.00	81.68
perc_college	367	23.63	17.43	0.00	95.88
percap_inc	367	21,411	9,292	10,020	74,671
Note: The reported data is from 2010 American Community Survey 5-Year Estimates					

In Model 2, the only significant independent variable for housing characteristics is median housing. This provides evidence that mixed income census tracts with higher home values have a greater likelihood of transitioning to a homogenous high income neighborhood.

Figure 5.5.

Variable	Model 1	Model 2	Model 3	Model 4
Housing Characteristics				
median_housing	5.81e-9 (0.21)	**1.56e-7*** (1.92)	-4.20e-8 (-0.38)	4.13e-7 (1.38)
perc_oneyear	0.0006053 (1.30)	0.0009022 (1.02)	0.0012236 (1.42)	0.0015176 (0.81)
perc_own	**-0.0005287**** (-2.09)	0.0000782 (0.21)	**-0.0007923**** (-2.02)	0.0007372 (0.85)
Socioeconomic Characteristics				
perc_black	**-0.0008038***** (-3.28)	**-0.0009504***** (-2.66)	**-0.0009286*** (-1.88)	-0.0014997 (-1.55)
perc_hispanic	-0.0002352 (-1.33)	-0.000384 (-0.13)	0.0003271 (0.39)	0.000983 (0.76)
perc_foreign	-0.000291 (-1.21)	-0.0007966 (-1.50)	-0.0011741 (-1.27)	-0.0023825 (-1.46)
perc_college	0.0002524 (1.00)	**0.0008813*** (1.67)	0.0012384 (1.56)	0.0025487 (1.32)
percap_inc	-6.20e-7 (-1.64)	-3.25e-7 (-0.53)	**-1.64e-6*** (-1.88)	3.56e-7 (0.10)
Spatially Weighted Variables				
(spwt_s001) median_housing			1.48e-7 (1.09)	5.12e-7 (1.03)
(spwt_s001) perc_black			-0.0003905 (-1.23)	-0.0008576 (-0.88)
(spwt_s001) perc_hispanic			-0.0014292 (-1.19)	-0.001511 (-0.69)
(spwt_s001) perc_foreign			0.0009187 (0.65)	-0.001645 (-0.56)
(spwt_s001) percap_inc			-9.39e-7 (-0.80)	9.15e-8 (0.01)
* = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level Note: table reports coefficient estimates with z-values in parentheses				

This is in agreement with the variable's predicted effect because of the Land-Use Succession model. This model argues that market rate developers face a decision point in determining where to build market rate housing. As developers are profit motivated, they will attempt to build where the value of the new land use and the cost of development is greater than the value of the previous land use and cost of demolition (Clapp, 1977). It is worth noting that developers engaging in redevelopment are responding to market outcomes which is driven by consumer demand for living in the census tract. This higher willingness to live in the census tract among consumers is seen through higher housing values of the neighborhood. Thus, the developers, thinking at the margin, see higher home values as an indication for future economic growth in the mixed income neighborhood. This expectation of future consumer demand and rising home values would lead to greater market rate development from developers, thus contributing to a greater likelihood of an upward neighborhood transition in the mixed income census tract.

Regarding the socioeconomic independent variables in Model 2 in Figure 5.5, the first significant variable is the percentage of black residents in the census tract. The regression result provides evidence that higher percentages of black residents lead to a lower likelihood that the mixed income neighborhood tract will experience an upward neighborhood transition. This is aligned with the predicted negative effect of a larger black population on the likelihood of a mixed income neighborhood transitioning upwards. In reference to previous findings by McKinnish and White (2011), the authors argue that a high level of economic diversity among neighborhood in-movers is essential for a mixed income neighborhood in maintaining its status. Their results found that predominantly black and Hispanic mixed income neighborhoods were less likely to attract economically diverse in-movers, thus leading those neighborhoods to be

more susceptible to transitioning (McKinnish & White, 2011). When relating this finding to the logit regression results, mixed income neighborhoods that are predominantly black are less susceptible to transitioning than McKinnish and White predicted. The combination of a lower likelihood of upward transition and a lower level of economically diverse in-movers could suggest that predominantly black, mixed income neighborhoods attract a greater number of low income residents. This occurrence could, holding all else constant, increase the likelihood of a downward neighborhood transition. However, this assertion would require additional testing as this regression was not able to incorporate the characteristics of in-movers entering census tracts.

The negative relationship between the percentage of black residents and the likelihood of an upward transition can be further observed in the summary statistics. In Figure 5.4, the average percentage of black residents among mixed income census tracts that transitioned upwards was 8.00%. Among mixed income neighborhoods that did not transition or transitioned downwards, the average percentage of black residents among mixed income census tracts was 35.56%. This provides evidence that mixed income neighborhoods are more likely to transition upwards if it has a low black population. This relates to the process of gentrification in which the dominant demographic among gentrifiers are white, young, and college educated residents (McKinnish et al., 2010). From the perspective of a developer attempting to predict a neighborhood undergoing gentrification, they would most likely focus their activity in census tracts that demonstrate a higher proportion of what they consider signs of gentrification. Thus, census tracts with a greater representation of white and college educated residents would attract greater market rate development, therefore increasing the likelihood that a neighborhood will transition upwards. This is also confirmed in the regression results as the independent variable for the percentage of

residents with a Bachelor's degree had a significant, positive effect on the likelihood that a mixed income neighborhood transitions to a homogenous high income neighborhood.

5.4. Regression Results: Spatial Autoregressive Model

The spatial autoregressive model was used in this research to understand the impact of spatial influences in the model. It attempts to test if the adjacent census tracts have a significant impact on the performance of the independent variables in the model. In Figure 5.5, Model 3 represents the full sample size and Model 4 represents the subsample of the 2010 mixed income neighborhoods. Looking at the results, it can be concluded that there are no significant spatial effects among the spatially lagged independent variables. However, according to the Wald Test, which assesses the significance of the variables as a whole, there is a significant impact in the model. This ambiguous results tells us that the independent variables collectively are statistically significant, but that the model results cannot provide evidence regarding the statistical significance among the individual independent variables. Therefore, the findings indicate that each census tract's select independent variables for housing and socioeconomic characteristics are unaffected by the surrounding census tracts. This model was included in the research to control for surrounding spillover effects that could be influencing the likelihood that a mixed income census tract transitions to a homogenous high income census tract. Based on these findings, the research indicates that there is a possible, indeterminable spatial influence on the likelihood of an upwards transition, but no statement can be made concerning the specific nature of this influence.

5.5. Conclusion

The overall results of this study provides evidence that mixed income neighborhoods are more persistent within the time frame than previously expected. This is due in part to the statistical insignificance of the majority of independent variables used in the logit regression to predict the likelihood that a mixed income neighborhood will transition to a homogenous high income neighborhood. The statistical insignificance tells us that the explanatory factors representing gentrification and neighborhood transition are not impacting the status of mixed income neighborhoods. Additionally, of the 400 census tracts classified as mixed income neighborhoods, only 29 of the census tracts experienced an upwards transition, which demonstrates that only a small proportion of mixed income neighborhoods transitioned upwards. The results of the study provides other significant insights such that upward transitions were overwhelmingly located near homogenous high income census tracts compared to low income census tracts. However, the spatial autoregressive model yielded an ambiguous effect related to the spatial influences of surrounding census tracts. This particular finding indicates that there is a possible overall spatial effect which cannot be specifically determined from the regression results in this study. These factors disprove the notion that the existence of mixed income neighborhoods is inherently based on a neighborhood transition. Thus, mixed income neighborhoods can be considered persistent in the short run, according to the results of this case study.

Chapter 6: Conclusion

The purpose of this research was to better understand the nature of mixed income neighborhoods through an examination of census tract transitions in Chicago. The overall goal was to determine if mixed income neighborhoods are persistent over time or if they exist through transitioning between homogeneous neighborhood classification. This research question was tested empirically through observing neighborhood transitions in Chicago between 2010 and 2017. An upward transition was defined as a 2010 mixed income census tract that transitioned to a homogenous high income census tract in 2017. The methodology included a logit regression that tested the probability that a mixed income neighborhood transitions upwards within the specified time frame. The results of the research demonstrate that the mixed income neighborhoods in the model were more persistent in the short term than originally hypothesized. This was evidenced by the insignificance of the majority of independent variables used to predict upward transitions and the low number of upward transitions that did occur.

The limitations of this research include the selected time frame of the case study. As census boundaries changed between each decade, the model specification was limited to modeling neighborhood change within the census year. Because of this, the model was not able to predict neighborhood change in the long term. This is a significant consideration because neighborhood change is a long process that could transcend the time frame of this study. Another limitation of this research is the size of the boundaries. The goal of examining mixed income neighborhoods is to model neighborhoods in which high income and low income residents live in close proximity. Because of this, census tracts may be too large of a geographic unit to model income mixing. The inclusion of block group data could allow for a more finely tuned analysis

of neighborhood change that would not be incorporated in the larger areas of the census tracts. Additionally, as mentioned before, the classification of high income and low income residents was limited in the American Community Survey reporting. This limitation includes the income distribution being reported as intervals, not a continuous distribution. The continuous income distribution would allow for more exact definitions of the top and bottom quartile, or quintile, of the income distribution.

The results of this research provide evidence that mixed income neighborhoods transition less than expected in the short run. This contrasts with other empirical literature examined as Tach (2009) and Sampson et al. (2015) found that a city's mixed income neighborhoods exist through transitioning across mixed income statuses. However, these studies spanned a longer time period than the seven year time frame of my own research. This provides further evidence that mixed income neighborhoods are possibly less persistent in the long run. Other literature, such as by McKinnish and White (2011), focused on neighborhood in-movers as opposed to modeling full neighborhood transitions. This is an important consideration in thinking about neighborhood change because it accounts for the impact that an influx of residents have on the makeup of the neighborhood. The implications of my own findings provide evidence that gentrification-induced displacement is less prevalent, as seen by the persistence of mixed income neighborhoods. If gentrification-induced displacement was a dominant factor in the case study, we would see a greater number of mixed income neighborhoods transitioning into homogenous high income neighborhoods. However, as argued by Newman and Wyly (2006), displacement pressures are more pervasive than an explicit eviction. This would require additional research into the lived experience of low income renters in the remaining mixed income neighborhoods.

As the literature surrounding the link between gentrification and displacement is divisive, as seen by Newman and Wyly (2006) and Freeman and Braconi (2004), it is important to acknowledge the difficulty in measuring displacement empirically. Because of this, the results from my own research can only speculate as to the extent of gentrification-induced displacement. Thus, the persistence of mixed income neighborhoods in the short term in this model can only provide evidence that displacement is less extensive than theories of neighborhood change would predict.

In connection to the theoretical goals of mixed income neighborhoods, these communities are intended to provide benefits for low income, disadvantaged residents. The benefits from living in close proximity to residents across the income distribution are meant to combat the harmful effects of concentrated poverty in urban neighborhoods through positive social capital and decreasing social isolation (Chaskin & Joseph, 2015; Wilson, 1987). However, assuming that this is a neighborhood type worth pursuing, there are significant barriers for its implementation in the real world. This includes the possibility of racial biases that could limit the propensity for residents of different socioeconomic backgrounds to live together (Massey & Denton, 1993). As mentioned earlier, many of the cities in the U.S. are the product of a legacy of racial segregation and discrimination that has been formulated and perpetuated through a variety of tactics (Massey & Denton, 1993). Other barriers to mixed income neighborhoods formation are market forces in the housing market. The expression of consumer preferences among high income gentrifiers has the ability to instigate a developer response that can profoundly change the housing stock and economic makeup of the neighborhood. This process of gentrification can introduce the possibility of residential displacement among low income renters, therefore transitioning to a homogenous high income neighborhood. The government, in response, is given

little incentive to abate displacement pressures that will jeopardize the persistence of mixed income neighborhoods. This is due to the presence of urban revitalization that results from the influx of high income residents. Despite these obstacles, the findings from this study still found that mixed income neighborhoods were persistent within the time frame. However, as mentioned previously, the short time frame of this study may not capture the full effects of neighborhood change that can cause mixed income neighborhoods to lose their heterogeneity. If mixed income neighborhoods are a desirable outcome, this study suggests that, in the long run, significant steps must be taken in order to preserve the mixed income status of these neighborhoods.

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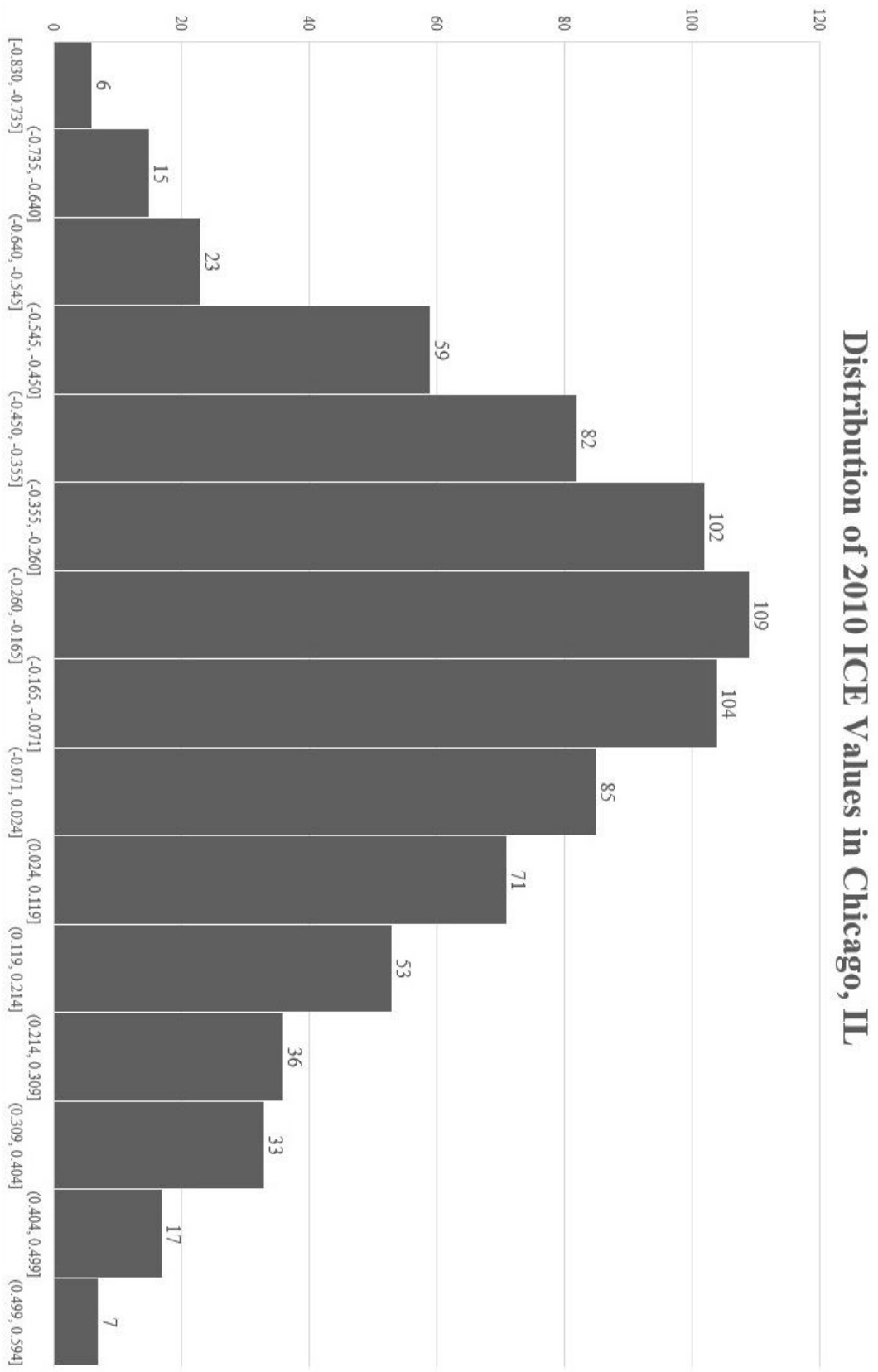
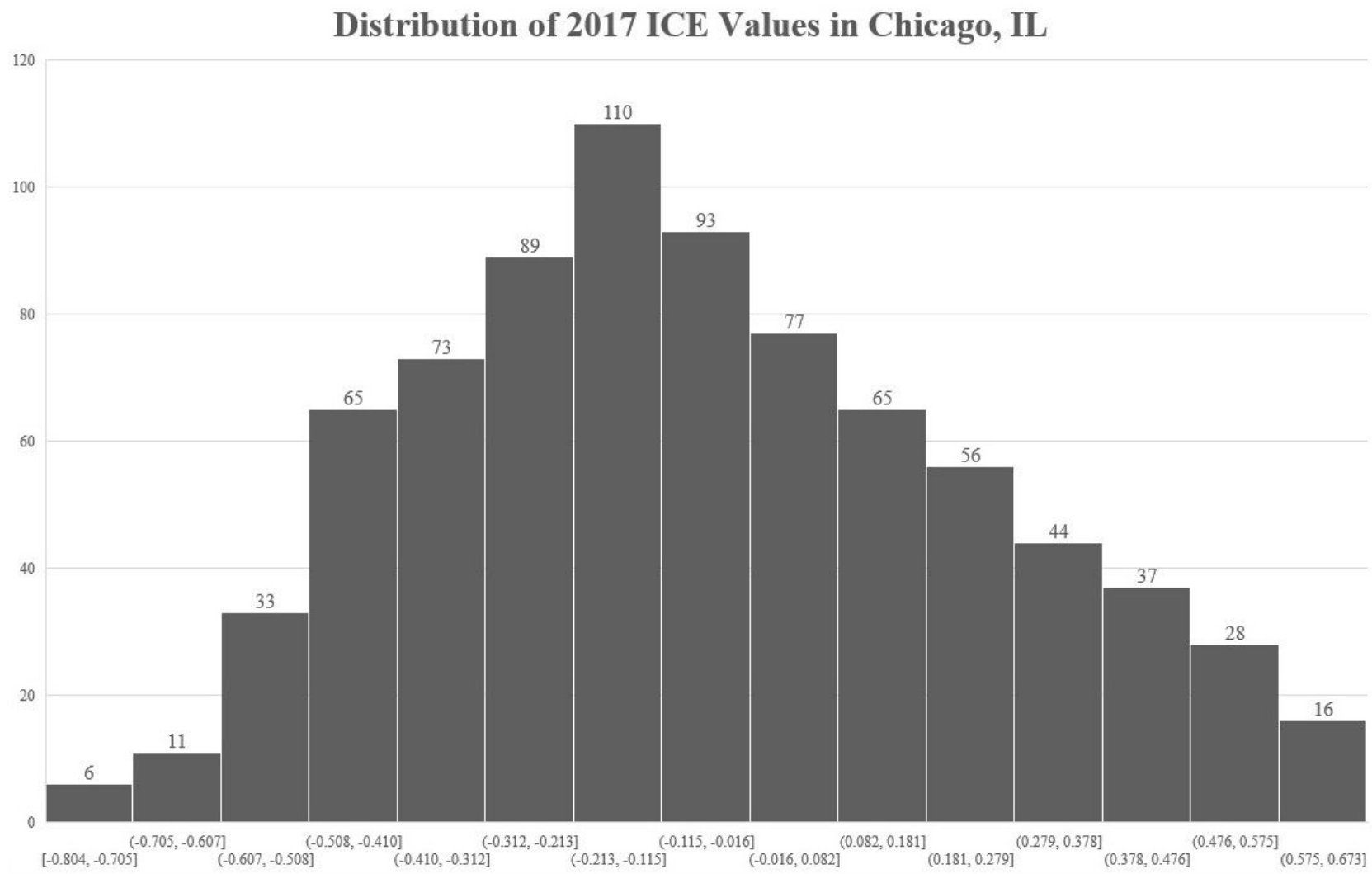
Appendix


Distribution of 2010 ICE Values in Chicago, IL
120
100
80
60
40
20
0
6
15
23
59
82
102
109
104
85
71
53
36
33
17
7
[-0.830, -0.735]
(-0.735, -0.640]
(-0.640, -0.545]
(-0.545, -0.450]
(-0.450, -0.355]
(-0.355, -0.260]
(-0.260, -0.165]
(-0.165, -0.071]
(-0.071, 0.024]
(0.024, 0.119]
(0.119, 0.214]
(0.214, 0.309]
(0.309, 0.404]
(0.404, 0.499]
(0.499, 0.594]


Distribution of 2017 ICE Values in Chicago, IL
120
100
80
60
40
20
0
6
11
33
65
73
89
110
93
77
65
56
44
37
28
16
[-0.804, -0.705]
(-0.705, -0.607]
(-0.607, -0.508]
(-0.508, -0.410]
(-0.410, -0.312]
(-0.312, -0.213]
(-0.213, -0.115]
(-0.115, -0.016]
(-0.016, 0.082]
(0.082, 0.181]
(0.181, 0.279]
(0.279, 0.378]
(0.378, 0.476]
(0.476, 0.575]
(0.575, 0.673]

```
. logistic up_transition median_housing perc_oneyear perc_black perc_hispanic perc_own perc_college perc_foreign percap_i
> nc

Logistic regression                             Number of obs     =        785
                                                LR chi2(8)        =      41.12
                                                Prob > chi2       =     0.0000
Log likelihood = -103.55191                     Pseudo R2         =     0.1656
```

up_transition	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
median_housing	1	2.20e-06	0.21	0.836	.9999961	1.000005
perc_oneyear	1.04869	.0345854	1.44	0.149	.9830485	1.118715
perc_black	.9388261	.0167591	-3.54	0.000	.9065468	.9722548
perc_hispanic	.9816961	.0121265	-1.50	0.135	.958214	1.005754
perc_own	.9593255	.0151504	-2.63	0.009	.9300861	.9894841
perc_college	1.020024	.0186265	1.09	0.278	.9841622	1.057192
perc_foreign	.9774028	.0165114	-1.35	0.176	.9455709	1.010306
percap_inc	.9999513	.0000237	-2.06	0.040	.999905	.9999977
_cons	.096764	.3109905	-0.73	0.467	.0001778	52.64966

Note: **_cons** estimates baseline odds.

```
Marginal effects after logistic
      y  = Pr(up_transition) (predict)
         =  .01289924
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
median~g	5.81e-09	.00000	0.21	0.837	-4.9e-08	6.1e-08	288148
perc_o~r	.0006053	.00047	1.30	0.194	-.000308	.001518	83.6009
perc_b~k	-.0008038	.00024	-3.28	0.001	-.001284	-.000324	37.8451
perc_h~c	-.0002352	.00018	-1.33	0.184	-.000582	.000112	25.1791
perc_own	-.0005287	.00025	-2.09	0.036	-.001024	-.000034	47.1823
perc_c~e	.0002524	.00025	1.00	0.319	-.000244	.000749	30.7956
perc_f~n	-.000291	.00024	-1.21	0.225	-.000761	.000179	24.9909
percap~c	-6.20e-07	.00000	-1.64	0.100	-1.4e-06	1.2e-07	27415.6

```
. pwcorr up_transition median_housing perc_oneyear perc_black perc_hispanic perc_own perc_college perc_foreign percap_inc
```

	up_tra~n	median~g	perc_o~r	perc_b~k	perc_h~c	perc_own	perc_c~e
up_transit~n	1.0000						
median_hou~g	0.1146	1.0000					
perc_oneyear	-0.0296	-0.2732	1.0000				
perc_black	-0.1423	-0.5569	0.0117	1.0000			
perc_hispa~c	0.0176	-0.0295	0.2275	-0.5645	1.0000		
perc_own	-0.0267	0.0517	0.4956	-0.2830	0.0802	1.0000	
perc_college	0.1217	0.7193	-0.4423	-0.4218	-0.3366	0.0656	1.0000
perc_foreign	0.0503	0.0443	0.1662	-0.6862	0.8129	0.0992	-0.1545
percap_inc	0.0594	0.7107	-0.3180	-0.4114	-0.2901	0.1959	0.8640

	perc_f~n	percap~c
perc_foreign	1.0000	
percap_inc	-0.1651	1.0000

```
. spregress up_transition median_housing perc_oneyear perc_black perc_hispanic perc_own perc_college perc_foreign percap_inc, gs2sls ivarlag
> (spwt: median_housing perc_black perc_hispanic perc_foreign percap_inc) heteroskedastic force
  (797 observations)
  (12 observations excluded due to missing values)
  (785 observations (places) used)
  (weighting matrix defines 797 places)
  (you specified -force-)
  (weighting matrix matched 785 places in data)
  (weighting matrix spwt_s001 created)

Spatial autoregressive model                    Number of obs     =        785
GS2SLS estimates                                Wald chi2(13)     =      30.80
                                                Prob > chi2       =     0.0036
                                                Pseudo R2         =     0.0486
```

up_transition	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
up_transition						
median_housing	-4.20e-08	1.11e-07	-0.38	0.706	-2.60e-07	1.76e-07
perc_oneyear	.0012236	.0008593	1.42	0.154	-.0004607	.0029078
perc_black	-.0009286	.0004928	-1.88	0.060	-.0018946	.0000373
perc_hispanic	.0003271	.0008436	0.39	0.698	-.0013263	.0019806
perc_own	-.0007923	.0003928	-2.02	0.044	-.0015622	-.0000223
perc_college	.0012384	.0007919	1.56	0.118	-.0003138	.0027905
perc_foreign	-.0011741	.0009281	-1.27	0.206	-.0029931	.0006449
percap_inc	-1.64e-06	8.76e-07	-1.88	0.061	-3.36e-06	7.34e-08
_cons	.0573492	.0838847	0.68	0.494	-.1070617	.2217601
spwt_s001						
median_housing	1.48e-07	1.36e-07	1.09	0.277	-1.19e-07	4.16e-07
perc_black	-.0003905	.0003172	-1.23	0.218	-.0010122	.0002312
perc_hispanic	-.0014292	.0011966	-1.19	0.232	-.0037744	.0009161
perc_foreign	.0009187	.001408	0.65	0.514	-.0018408	.0036783
percap_inc	-9.39e-07	1.17e-06	-0.80	0.422	-3.23e-06	1.36e-06

```
Wald test of spatial terms:          chi2(5) = 3.49       Prob > chi2 = 0.6254
```

```
. logistic up_transition median_housing perc_oneyear perc_black perc_hispanic perc_own perc_college perc_foreign percap_inc

Logistic regression                             Number of obs     =        391
                                                LR chi2(8)        =      65.49
                                                Prob > chi2       =     0.0000
Log likelihood = -70.594036                     Pseudo R2         =     0.3169
```

up_transition	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
median_housing	1.000008	3.13e-06	2.55	0.011	1.000002	1.000014
perc_oneyear	1.047227	.0458266	1.05	0.292	.9611521	1.141009
perc_black	.9525529	.0170362	-2.72	0.007	.919741	.9865352
perc_hispanic	.9980374	.0153569	-0.13	0.898	.9683878	1.028595
perc_own	1.004008	.0191564	0.21	0.834	.9671551	1.042264
perc_college	1.046107	.0227757	2.07	0.038	1.002406	1.091712
perc_foreign	.9600776	.0207071	-1.89	0.059	.9203382	1.001533
percap_inc	.9999834	.0000303	-0.55	0.583	.9999241	1.000043
_cons	.0003841	.0017077	-1.77	0.077	6.31e-08	2.339217

Note: **_cons** estimates baseline odds.

```
Marginal effects after logistic
      y  = Pr(up_transition) (predict)
         =   .0199501
```

variable	dy/dx	Std. Err.	z	P>|z|	[	95% C.I.	]	X
median~g	1.56e-07	.00000	1.92	0.055	-3.3e-09	3.2e-07		262478
perc_o~r	.0009022	.00089	1.02	0.308	-.000834	.002638		85.4222
perc_b~k	-.0009504	.00036	-2.66	0.008	-.001651	-.00025		33.0033
perc_h~c	-.0000384	.0003	-0.13	0.899	-.00063	.000554		35.5581
perc_own	.0000782	.00038	0.21	0.836	-.000661	.000817		49.9608
perc_c~e	.0008813	.00053	1.67	0.095	-.000154	.001917		25.1814
perc_f~n	-.0007966	.00053	-1.50	0.133	-.001836	.000243		33.2828
percap~c	-3.25e-07	.00000	-0.53	0.595	-1.5e-06	8.7e-07		22306.1

```
. pwcorr up_transition median_housing perc_oneyear perc_black perc_hispanic perc_own perc_college perc_foreign percap_inc
```

	up_tra~n	median~g	perc_o~r	perc_b~k	perc_h~c	perc_own	perc_c~e
up_transit~n	1.0000						
median_hou~g	0.3320	1.0000					
perc_oneyear	-0.1062	-0.2439	1.0000				
perc_black	-0.1821	-0.4871	-0.0213	1.0000			
perc_hispa~c	-0.0662	0.1194	0.2319	-0.6833	1.0000		
perc_own	-0.0835	-0.3799	0.6015	0.0522	0.0421	1.0000	
perc_college	0.3179	0.4235	-0.5412	-0.0922	-0.4614	-0.3599	1.0000
perc_foreign	-0.0287	0.1944	0.1381	-0.8173	0.7891	-0.0217	-0.2233
percap_inc	0.3136	0.4571	-0.3899	-0.0806	-0.4501	-0.1966	0.8250

	perc_f~n	percap~c
perc_foreign	1.0000	
percap_inc	-0.2861	1.0000

```
. spregress up_transition median_housing perc_oneyear perc_black perc_hispanic perc_own perc_college perc_foreign percap_inc, gs2sls
> ivarlag(spwt: median_housing perc_black perc_hispanic perc_foreign percap_inc) heteroskedastic force
  (399 observations)
  (8 observations excluded due to missing values)
  (391 observations (places) used)
  (weighting matrix defines 399 places)
  (you specified -force-)
  (weighting matrix matched 391 places in data)
  (weighting matrix spwt_s001 created)

Spatial autoregressive model                    Number of obs     =        391
GS2SLS estimates                                Wald chi2(13)     =      42.16
                                                Prob > chi2       =     0.0001
                                                Pseudo R2         =     0.1850
```

up_transition	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
up_transition						
median_housing	4.13e-07	3.00e-07	1.38	0.169	-1.75e-07	1.00e-06
perc_oneyear	.0015176	.0018634	0.81	0.415	-.0021347	.0051699
perc_black	-.0014997	.0009675	-1.55	0.121	-.003396	.0003965
perc_hispanic	.000983	.0012929	0.76	0.447	-.001551	.003517
perc_own	.0007372	.0008713	0.85	0.398	-.0009706	.002445
perc_college	.0025487	.0019372	1.32	0.188	-.0012482	.0063455
perc_foreign	-.0023825	.0016268	-1.46	0.143	-.005571	.000806
percap_inc	3.56e-07	3.51e-06	0.10	0.919	-6.52e-06	7.23e-06
_cons	-.1703732	.2025967	-0.84	0.400	-.5674555	.2267091
spwt_s001						
median_housing	5.12e-07	4.99e-07	1.03	0.305	-4.66e-07	1.49e-06
perc_black	-.0008576	.0009749	-0.88	0.379	-.0027684	.0010533
perc_hispanic	-.001511	.0021908	-0.69	0.490	-.005805	.0027829
perc_foreign	-.001645	.0029278	-0.56	0.574	-.0073833	.0040934
percap_inc	9.15e-08	6.56e-06	0.01	0.989	-.0000128	.0000129

Wald test of spatial terms: chi2(5) = 3.27 Prob > chi2 = 0.6583