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Trajectories of Neighborhood Racial and Ethnic Composition Change in Chicago Metropolitan Neighborhoods from 1970 to 2000 [*]

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ABSTRACT
Although the process of racial transition or "white flight" was clearly articulated in the work of sociologists following World War II, emerging types of neighborhood change driven by gentrification and immigration challenge the idea that there is a single trajectory of racial and ethnic composition that neighborhoods follow. This paper uses growth mixture models and a dataset of tracts in the greater Chicago metropolitan area that were normalized to their 2000 census tract boundaries to empirically identify patterns of change in neighborhood racial and ethnic composition from 1970 to 2000. The model identifies nine types— or trajectories – of neighborhood racial and ethnic change. These trajectories indicate that racial succession from white to black neighborhoods still occurs, albeit much more slowly in later decades compared to earlier ones, and that Latino growth follows a number of trajectories, including displacement from gentrifying neighborhoods.

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The persistent racial residential segregation that remains prevalent in most American metropolitan areas continues to have negative consequences on minorities' opportunities and recalls a legacy of overt racism that was deeply damaging to American ideals of justice and equality (Massey and Denton 1993). The segregation of American metropolitan neighborhoods by race is one of the institutional mechanisms through which racial disparities are perpetuated (Massey and Mullan 1984). Segregation has, for example, been linked to poorer health outcomes (Grady 2006; Acevedo-Garcia et al. 2003; Collins and Williams 1999), less financial security (Massey 1990; Flippen 2004), and a greater exposure to crime and disorder among minority residents (Pattillo-McCoy 1999; Adelman 2004), although the negative effects of segregation differ by race and ethnicity (Klinenberg 2003; Flippen 2001).

In this context evidence that blacks are becoming less segregated from whites has been met with some optimism while the increases in Latino-white segregation have been cause for some concern (Logan, Stults, and Farley 2004). Systematic variations in the rates of change across metropolitan areas also suggest that the neighborhood-level processes underlying these changing rates of segregation differ across – and potentially within – metropolitan areas (Logan et al. 2004; Timberlake and Iceland 2007; Frey and Farley 1996). However, because they study patterns at the metropolitan-level, these studies cannot reveal the types of changes that, in aggregate, create metropolitan-level shifts in racial and ethnic segregation.

Studies examining neighborhood-level changes in racial and ethnic composition have provided evidence regarding how neighborhood-level changes are creating "shifting geographies" (Fischer 2008) of metropolitan racial and ethnic residential patterns. Most studies have defined

neighborhoods into categories based on their racial and ethnic composition and examined the transition of neighborhoods among these categories over time and have shown and increasing number of diverse metropolitan neighborhoods. The definitions are generally broad because the categorical methods used to explore transitions are difficult to examine with more than a limited number of categories.

Some studies have moved beyond the categorical framework and have examined the levels of racial and ethnic change in diverse tracts; however, they have tended to limit their studies to examining change in particular types of neighborhoods. Ellen (2000) examined the correlates of white loss in integrated black-white neighborhoods and Swaroop (2005) extended this strategy to examine the trends of white loss in multiple types of integrated neighborhoods (e.g. Latino-white, black-white-Latino). Denton and Massey (1991) also analyzed what tract level characteristics predicted growth in proportion black, Latino, and Asian. These studies conclude that racial succession or "tipping" models do not describe the process of neighborhood change as accurately as they have in the past, particularly for blacks, but that tracts are likely to continue to grow in minority population and slowly transition to being predominantly non-white ((Lee 1985; Ellen 2000; Taub, Taylor, and Dunham 1984; Denton and Massey 1991).

While these studies have provided valuable insights regarding the changing patterns of racial and ethnic composition, it is possible that these studies do not capture the full extenent of the increasing diversity of metropolitan neighborhoods. The use of broad racial and ethnic categories, although necessary for categorical analysis, also masks a substantial amount of information about the distribution of racial and ethnic groups within these categories. Although multiple racial or ethnic groups might be present in a neighborhood, they could be present at very different levels that would imply different experiences of residential integration.

For those studies that look at change in racial and ethnic composition of groups over time could also mask a substantial amount of diversity in the trends that neighborhoods follow. By modeling the changes in the proportions of a racial or ethnic group using a single trend,

researchers overlook the potential heterogeneity in the types of changes that racial and ethnic compositions follow; some tracts might regress towards more segregation while others remain stable. Models using only a single trend to convey this change will smooth over the two trends that have distinct implications for racial and ethnic segregation to some average level of change. Furthermore, as metropolitan areas become more diverse, models predicting the changing composition of a single racial or ethnic group do not provide any information about the changing composition of other racial or ethnic groups. For example, a decreasing proportion of white residents in a mixed Latino-white tract might mean that the tract is becoming increasingly Latino or that blacks might be replacing whites.

To more fully understand the changing nature of diversity in a multiethnic context, I describe and analyze the patterns of racial and ethnic change in metropolitan Chicago neighborhoods from 1970-2000. To do so I employ tools – ternary plots and growth mixture models – that have not been previously used to explore patterns of racial and ethnic change and that permit comparisons across tracts using continuous measures of racial and ethnic change. Using these tools and a dataset specially designed to track neighborhood-level changes across the 1970, 1980, 1990, and 2000 decennial censuses, I find that much of the diversity that is found in many metropolitan neighborhoods comes from within the broadly defined categories typically used to describe neighborhood racial and ethnic composition. I also show that neighborhoods sometimes follow very different trajectories of racial and ethnic change that belie a single path of neighborhood change.

HISTORICAL DEVELOPMENT OF THE RACIAL SUCCESSION MODEL

One of the dominant ways that the neighborhood has been conceived to change with respect to its racial and ethnic composition is the invasion/succession model that is based on Park's (1936) human ecological model of urban development (Schwirian 1983). In this model, racial and ethnic groups compete for urban space and separate into functionally specialized units such as neighborhoods to form the urban environment in much the same way that species compete to

form ecosystems. As urban environments developed, racial and ethnic groups could also be described as being sorted through a similar process. In large part, the competition for space and dominance in areas by particular ethnic groups was seen as a function of their length of duration in the city and degree of social mobility among members of the group.

Studies following the Second World War noted that the process of racial transition for blacks did not seem to follow the general trend of improved neighborhood conditions and assimilation concomitant with increases in socioeconomic status (Duncan and Duncan 1957; Taeuber and Taeuber 1965; Farley et al. 1978). Instead, they found that African Americans were uniquely segregated from whites. Neighborhoods, once "invaded" by a small number of African American residents, were likely to completely transition from being majority white to almost exclusively black within a short time as whites fled these neighborhoods and blacks entered. This model was formalized and researchers explored the point at which neighborhoods could be expected to "tip" towards rapid increases in black population (Schelling 1971). The conclusions from these studies were clear: the entrance of blacks into a neighborhood would inevitably lead to a predominantly black neighborhood and implied that blacks would, despite the legal and political victories that reduced formal barriers to integration, largely remain segregated from whites.

Despite the fact that the neighborhood racial succession or tipping-point model has become the predominant way that social scientists have conceptualized neighborhood racial and ethnic change, the continued efficacy of this model to describe contemporary patterns of neighborhood racial change has been questioned. Some have highlighted the fact that the prevalence of this model could have been the product of the unique conditions that existed in the post-war era. The combination of the discrimination faced by blacks in the housing market that was already tight because of the Depression and then World War II contributed substantially to the racial turnover that was caused by the crowding of traditional black areas (Taeuber and Taeuber 1965; Massey and Denton 1993). Housing supply problems were exacerbated by local and federal local policies that tended to further artificially limit housing supply and destabilize

prices in predominantly African American communities (Hirsch 1983; Sugrue 1996). With the passage of the Fair Housing Act in 1968, decreasing evidence of housing discrimination (Ross and Turner 2005), and the increasing access of blacks to the growing suburban rings that encircle metropolitan areas, the racial succession model could be less applicable. Indeed, metropolitan-level studies find that rates of black suburbanization are inversely associated with black-white segregation (Fischer 2008; Timberlake and Iceland 2007). However, it is unclear whether the tipping model no longer applies or simply that the tipping point is higher and neighborhoods take longer to transition.

Patterns of neighborhood ethnic change involving Latinos are less understood. While traditionally being less segregated than blacks, rates of segregation have been increasing in recent decades (Logan et al. 2004; Timberlake and Iceland 2007). Some have suggested that this might be the result of increased Latino immigration to U.S. metro areas. The rapid increase of Latino residents from large-scale migration patterns might create the structural conditions that lead to residential invasion and succession in that housing supply diminishes in already established Latino communities. The expansion out of established Latino communities can lead residents of other races, especially whites, to fear becoming a minority and leave neighborhoods adjacent to Latino enclaves or barrios. Indeed, both Denton and Massey (1991) and Clark (1993) find evidence that this is occurring. In Los Angeles, however, Clark (1993) finds that this process slows considerably, though not completely, after the 1970s. Los Angeles' sprawling form might provide an avenue through which immigrants can be absorbed in a way that might not be possible in Chicago given its denser urban form.

CHANGING RACIAL ATTITUDES AND RESIDENTIAL PREFERENCES

Another important point to consider is the changing racial attitudes of the American population and especially those of whites. The negative attitudes towards blacks have declined considerably in the past half century (Schuman et al. 1997) and this is also true with respect to white American's views towards racially integrated housing. A series of studies of Detroit metropolitan

residents show that the number of whites willing to consider moving to a neighborhood with 20 percent black residents increased from 58 percent in 1976 to 70 percent in 1992 to 78 percent in 2004 (Farley et al. 1978, 1994; Krysan and Bader 2007). Perhaps more importantly, the number of residents who would try to move out of a neighborhood that became increasingly black also declined, though only for low levels of racial integration (Farley et al. 1994). Although these gains have been substantial, it is still true that almost one in four whites would not consider a neighborhood that is reasonably integrated and the number falls precipitously as the percentage of minority residents increases and limits the possibilities for maintaining stably integrated neighborhoods (Krysan and Bader 2007).

There is some debate, however, about how well these measures capture pure racial bias that is likely to influence patterns of racial and ethnic change. Since black neighborhoods tend to have fewer amenities and more problems such as crime or poor schools, the racial composition of a neighborhood could serve as a proxy for these non-racial, but racially correlated, neighborhood conditions (Harris 1999, 2001). Home-seekers might use these racially-based proxies or stereotypes to project the types of neighborhood change they believe are likely to occur; but, these stereotypes are likely overcome if other institutions or neighborhood conditions imply that the neighborhood is socioeconomically stable (Ellen 2000; Taub et al. 1984).

Furthermore, some have argued that white avoidance of minorities has been blamed disproportionately for the racial succession of neighborhoods since minority preferences for mixed neighborhoods theoretically help to propel the process of racial turnover (Fossett 2006; Clark 1992). Studies using alternative methods of assessing racial bias in residential preferences net of other community characteristics have still found strong racial effects on white residential preferences and much more muted racial effects on black preferences (Emerson, Chai, and Yancey 2001; Krysan and Bader 2007). In aggregate, the research regarding residential preferences implies that the mere entrance of blacks to a neighborhood is no longer likely to precipitate an immediate racial transition; but, they do suggest that long-term racial transition is

likely in the long run due to the large proportion of whites would not consider a neighborhood beyond a small proportion of minorities.

RACIAL AND ETHNIC PATTERNS OF CHANGE IN A MULTIETHNIC CONTEXT

As the previous discussion of the literature suggests, the majority of studies exploring changes in the racial and ethnic composition of neighborhoods have done so using solely a black and white framework. Yet, as the nation's population becomes more diverse, this diversity must be reflected in the studies of neighborhood racial and ethnic change. Although less numerous than studies of racial transitions between whites and blacks, a number of studies have begun to explore and reveal the complexity of neighborhood racial and ethnic change in multiethnic metropolitan areas.

These studies have generally examined transitions among various neighborhood types defined as having particular combinations of present in the tract. Typically, transition matrices are created by defining some arbitrary cut-point that determines a neighborhood type by which racial and ethnic groups are "present" in the tract. Tracts are then placed in rows according to their typology and charted against columns using the same typology at some later point in time. Patterns of stability or change can be examined by determining the relative frequency of cells that either remain stable (on the main diagonal) or transition from particular types of racial and ethnic combinations to other types between time points. Overall, these studies reveal an increasing diversity of neighborhood types experienced by metropolitan residents, particularly whites (Alba et al. 1995; Swaroop 2005; Denton and Massey 1991); however, there is also evidence that the increases in diversity were mostly experienced in tracts sharing whites and Asians as the number of all-minority tracts for both blacks and Latinos increased (Clark 1993; Alba et al. 1995).

Measuring only the presence of various groups does not provide any evidence about the levels of exposure to different groups within tracts that are just as important for understanding the nature of racial and ethnic contact in multiethnic metropolitan areas. Denton and Massey (1991) model levels of loss in white racial composition as well as gains in proportion black, Latino, and

Asian; however, by examining each group independently they do not examine the multiple patterns of relationships that could be causing white loss or minority gain. Ironically, the series of studies that best examine this phenomenon were nominally only interested in the stability or succession of black and white integration. In their studies, Lee and Wood (Lee and Wood 1990, 1991) find that tracts with stable black populations, which are more likely to be found in multiethnic and western metropolitan areas, do not maintain integration with whites. Rather, tracts with a relatively stable black population tend to gain other minority (i.e., non-white) residents.

In whole, these results suggest that whites in multiethnic metropolitan areas tend to have an increasing amount of exposure to other races and ethnicities but that this trend is most pronounced for Asians and least so for blacks, with Latinos in between. Minorities tend to have increasing contact with each other, particularly for blacks and Latinos. These patterns conform well to residential preferences expressed in multiethnic metropolitan areas that show a hierarchy of preferences with whites as the most desirable neighborhoods, then Asians, then Latinos, and blacks being the least desirable (Zubrinsky and Bobo 1996). But, without comparing the levels of changes across multiple racial and ethnic groups over time, it is difficult to discern whether these patterns represent temporary shifts toward resegregation among multiple racial and ethnic groups or whether these analyses represent the prospect of stable integration.

In the present study, I examine patterns of neighborhood racial and ethnic composition changes across non-Latino whites, non-Latino blacks, and Latinos in the increasingly diverse Chicago metropolitan area from 1970 to 2000 (hereafter, whites, blacks, and Latinos). In particular, I am interested in exploring the multiple dimensions of neighborhood change that can occur when looking across these three racial and ethnic groups and the levels at which racial and ethnic groups live with each other. I begin by descriptively exploring the levels at which whites, blacks, and Latinos share the same neighborhoods and how these levels are related to characteristics of the neighborhood. Finally, I formally model the dominant patterns of change

among tracts in the Chicago metropolitan area and the neighborhood characteristics that predict those particular patterns.

DATA AND METHODS

Data Source and Study Region

Data for this study come from the Neighborhood Change Database (NCDB) created by the Urban Institute and published by Geolytics, Inc. (Tatian 2003). The NCDB takes data from the United States Census long form for the 1970, 1980, 1990, and 2000 decennial censuses and normalizes the data from each decade to the 2000 census tract boundaries using geographical apportionment (for details, see Tatian 2003). This process yields data across three decades and four censuses for tracts defined with geographically constant boundaries. Using these data and accepting tract boundaries as reasonable approximations of neighborhoods makes the NCDB well-suited to investigate changes in neighborhood racial and ethnic composition over this span of time.

I use all tracts from the Chicago metropolitan area, which I define as any tract in the Chicago-Gary-Kenosha, IL-IN-WI Consolidated Metropolitan Statistical Area (CMSA). I choose to use the more expansive definition of consolidated metropolitan area (as opposed to the Chicago, IL Primary Metropolitan Statistical Area) because tight housing supply has been hypothesized as a major contributor to racial succession (Taeuber and Taeuber 1965; Taub et al. 1984). Since a substantial portion of the Chicago housing market has expanded into the "Chicagoland" area to the city's south and past the state line in Wisconsin to the north, the CMSA capturing this area was used. Therefore, a tract was included in the sample if it was in any of the counties included in the 1999 definition of the Chicago-Gary-Kenosha, IL-IN-WI CMSA.[1]

Although the results from an analysis of a single metropolitan area cannot be generalized beyond the neighborhoods in that metropolitan area, there are strong theoretical justifications for

[1] The counties include: Cook Co., IL; DeKalb Co., IL, DuPage Co., IL; Grundy Co, IL; Kane Co., IL; Kendall Co., IL; Lake Co., IL; McHenry Co., IL; Will Co., IL; Lake Co., IN; Porter Co., IN; Kenosha Co., WI.

investigating the patterns of neighborhood racial and ethnic change the greater Chicago area. First, from Park's (1936) original formulation of the ecological model, Chicago has been the site of some of the most influential studies on the causes, patterns, and consequences of neighborhood racial change (Duncan and Duncan 1957; Suttles 1972; Taub et al. 1984; Wilson 1987). The present study provides an opportunity to build on this previous work to examine how the increasingly multiethnic population influences these well-established patterns.

Second, although the Chicago School and its contemporary descendents have been accused of improperly applying models of urban development developed based on Chicago to other metropolitan areas (Dear 2001; Dear and Flusty 1998), the same criticism could be made of research exploring the effect of multiculturalism based solely on the experience of Los Angeles (Lee and Wood 1991; Clark 1993; Zubrinsky and Bobo 1996). While there is good reason to study the development of multicultural forms in Los Angeles, the fact that Chicago's multiethnic population is growing based on urban forms of "modern" development might suggest that the experience of multiculturalism and neighborhood racial and ethnic transition could be very different than that experienced in Los Angeles or other newer, western metropolises (Betancur 1996).

Description of Measures

Racial and Ethnic Composition. Racial and ethnic composition was measured as the proportion of residents that identify as non-Latino whites, non-Latino blacks, and Latinos of any race. Together, these three racial and ethnic groups comprised 98.4, 97.9, 96.7, and 95.0 percent of all residents in 1970, 1980, 1990, and 2000, respectively. Because of the overwhelming proportion of residents these three categories represent in the Chicago metropolitan area and the large increase in complexity required to include a fourth "other" category, analyses were only conducted with these three groups. Therefore, the proportion of each group is defined as the number of the group divded by the sum of whites, blacks, and Latinos.

Creating these categories was somewhat problematic because the Census Bureau did not start tabulating Latinos by race until 1980, meaning that Latinos are included in the counts of whites and blacks in 1970. I used the same strategy as that used by Timberlake and Iceland (2007) and allocated Latinos to racial categories in 1970 based on the proportion of Latinos identifying by each race in the same tract in 1980. This will have the potential effect of understating the level of change between proportions Latinos and whites and blacks in the 1970s and potentially overstate the level of stability. All tracts were included that had at least 100 residents that identified as any of the three racial groups.

Socioeconomic and ecological characteristics. I also examine how changes in the socioeconomic and ecological characteristics change along with the various racial and ethnic composition change trajectories. The first of these characteristics is the average home value of owner-occupied units of the tract in 1999 dollars, adjusting values from the 1970, 1980, and 1990 Censuses using the consumer price index. This provides a measure of potential wealth accumulation for home owners and potential financial hardship for renters since higher housing values are typically associated with higher rents. While home values can provide a measure of wealth for homeowners, changes in the neighborhood mean household income (also measured in constant 1999 dollars) can provide information about the immediate financial situations of neighborhood residents. I also include the percentage of residents who are least 25 years old that have a bachelor's or advanced degree as a measure of socioeconomic status as well as the percentage of neighborhood residents who are in poverty. To assess the ecological characteristics of the neighborhood, I include measures of the vacancy rate as a measure of housing supply, the percentage of housing units that are owner occupied to measure investment in the neighborhood, and whether the tract is in one of the two central cities in the Chicago metropolitan area (Chicago, Illinois and Gary, Indiana).

Analytic Methods

To explore the levels of integration and change in neighborhood racial and ethnic composition, I begin by examining basic descriptive statistics and the transition matrix among categories of racial and ethnic composition. I start with these analyses for two reasons. First, although categorizing race solely by typologies defined by some arbitrary level of racial composition that is deemed integrated can mask important differences in the level of integration within these broadly defined categories, they are useful tools for observing gross changes in the distribution of racial and ethnic composition over time. Second, since most studies exploring neighborhood racial and ethnic change have used transitions matrices, first exploring changes with the transition matrix should prove to be helpful when examining patterns of changes in the level of racial and ethnic integration (or segregation) over time.

Tables are ill-suited, however, to discern the level of heterogeneity that exists in racial and ethnic composition within neighborhood categories. The number of categories could be expanded to provide a finer break-down of racial and ethnic composition, but as the number of cells increases to add more categories, tables become increasingly unwieldy and less helpful in summarizing important results. As an alternative, I use ternary plots such as those shown in Figure 2.2. Ternary plots of non-Latino white, non-Latino black, and Latino racial and ethnic composition in 1970, 1980, 1990, and 2000 for tracts in the Chicago-Gary-Kenosha, IL-IN-WI CMSA to summarize and explore the distributions of racial and ethnic composition within neighborhoods.

Ternary plots can be read by locating where a point falls relative to the three axes. The plots in Figure 2.2. Ternary plots of non-Latino white, non-Latino black, and Latino racial and ethnic composition in 1970, 1980, 1990, and 2000 for tracts in the Chicago-Gary-Kenosha, IL-IN-WI CMSA display Latinos on the left axis, whites on the right, and blacks along the bottom. Labels are shown along the axis marking the proportion of each group present in a tract. To obtain the proportion of residents identifying as one of the three racial or ethnic groups, one

would draw a line from the point that extends parallel to the side counter-clockwise of the side measuring the race of interest. Where this line crosses the side measuring the race of interest indicates the percentage of residents of the race in the tract. For example, in the plots presented in this chapter, the percentage of Latinos in tracts is always listed on the left axis; therefore, the percentage of Latinos in a particular tract can be found by tracing a line parallel to the bottom of the page (since the bottom of the triangle is counter-clockwise to the Latino axis) to the left side of the graph.

After looking at changes in the overall distribution of whites, blacks, and Latinos from 1970 to 2000, I turn my focus to attempting to understand how the racial and ethnic composition patterns change in individual neighborhoods over time. Just as I did looking at the change in overall distribution of tracts, I begin this analysis by examining tract-level changes in racial and ethnic composition using the racial and ethnic categories described above by calculating the mean percentage of residents of the three racial and ethnic groups in each category of the racial/ethnic break-down. To discover the degree to which these summary statistics might mask the diversity of ways that neighborhood racial and ethnic composition changes over time, I again use ternary plots to visually describe the change present in tracts. In this second set of ternary plots, I follow the trajectory of racial and ethnic change in individual tracts by tracing the same tracts over time and connecting where a tract fell in the plot in 1970, 1980, 1990, and 2000.

Finally, I turn my attention to formally modeling the multiple trajectories of neighborhood racial and ethnic change. I use growth mixture models (Kreuter and Muthén 2008) to determine the typical trajectories of neighborhood racial and ethnic change from 1970 to 2000 are in the Chicago metropolitan area. In addition to providing information about what types of neighborhood racial and ethnic composition patterns are typical, I can also assess the proportion of tracts that are best characterized by each of the trajectories to examine what patterns of neighborhood change are more common than others. Finally, based on the predicted posterior probabilities of class membership, I classify each tract into the trajectory that it most likely

belongs. Using this classification, I plot the racial and ethnic composition of all tracts by the different trajectories as well as examine the socioeconomic and ecological characteristics of tracts by their various racial and ethnic change trajectories.

Growth mixture models extend the framework of latent growth modeling. In latent growth models, the components of a growth trajectory (e.g. an intercept and slope in a linear model) are modeled from available data over multiple time points. Because observations are made at multiple time points, latent growth models can account for measurement error or random variation that occurs at any one time of observation (Raudenbush and Bryk 2002; Singer and Willett 2003). However, traditional latent growth models assume that the population being modeled follows a single underlying growth pattern. Often, this is an untenable assumption, as is the case here. We would not, for example, think that a tract that starts off 90 percent black in 1970 will have the same underlying growth trajectory as one that is 90 percent white. Growth mixture models empirically detect and model the multiple underlying populations evident from the data.

Thus, while previous findings have found that tracts tend to stay integrated (Ellen 2000), these findings overlook the potential heterogeneity in types of neighborhood racial composition that exist. While a substantial proportion of integrated tracts might retain long-term, stably integrated populations, it is possible that, for another significant number of tracts, the level of integration does simply mark a period at the midpoint of racial turnover. This becomes even more of a problem in a multiethnic context like the one presently under investigation since the multiple racial and ethnic compositions that could result from a single starting point vary in two dimensions rather than one.

A schematic depiction of the growth mixture model used in this study can be found in Figure 0.1 In the schematic, straight lines indicate the regression of one variable on another variable, curved lines indicate that the two variables were allowed to randomly co-vary in the model, and small arrows pointing to a single variable mean that the variable was allowed to have

residual variation unaccounted for by the model. For each decennial census, there are two outcomes measured: the tract proportion black and the tract proportion Latino, labeled as blkYR and latYR in the diagram (respectively) where "YR" is replaced by the year of observation. From these eight outcomes, four each for the two racial and ethnic groups, six growth factors are estimated: an intercept factor for proportion black (iblk), a linear slope factor for proportion black (sblk), a quadratic slope factor for the proportion black (qblk), an intercept factor for proportion Latino (ilat), a linear slope factor for proportion Latino (slat), and a quadratic slope factor for proportion Latino (qlat). A latent categorical variable, labeled "c" on the diagram, is a categorical variable indicating the predicted latent trajectory class of the neighborhood.

There are two things worth noting about this model. First, one can see that the quadriatic slope growth factor for proportion black (qblk) is fixed, meaning that it has no residual variance and does not co-vary with any of the other growth factors. This growth factor had very little residual variation in the model once tracts were assigned to classes and was estimated to have negative covariance estimates with other factors in the model. Since the variances was very low and was not significantly different than zero, I fixed this factor in the model. Similarly, the covariance between proportion non-Latino black in 2000 (pnhb0) and proportion Latino in 2000 (plat0) was difficult to estimate within classes – meaning assignment to classes controlled for the residual covariance between these two terms – and, since the covariance term was not significantly different than zero, I fixed this covariance to be zero as well.. The second notable element of the model is the fact that I model proportions as a continuous function. Because all three proportion variables sum to one and are not, therefore, continuous and normally distributed measures since each depends on the distribution of the others, modeling the outcomes using a multinomial distribution would be the most appropriate strategy; however, because the computational demands of these models are exceedingly high, I modeled the two outcomes as continuous measures and using a transformation of the dependent variable to break the reliance

between the mean and the variance.[2]

Mplus version 5.2 was used to model the growth mixture models. The remaining analyses were conducted in Stata version 10.2.[3]

RESULTS

Changes in the Distribution of Tract-Level Racial and Ethnic Composition

I begin by examining changes in the distribution of tracts in broad racial and ethnic categories. I define categories for tracts labeled as having "all" one race if there is fewer than ten percent of each of the other two groups in the tract. Tracts are classified as being integrated across two groups if both groups represent 10 percent or more of the tract population. Finally, a tract is considered integrated across all three races if each represents more than 10 percent of the population. Table 0.1. Count of tracts by racial and ethnic composition, 1970, 1980, 1990, 2000 reports, by decade, the number of tracts falling in each of these categories.

The figures in Table 0.1 echo the findings from other studies that metropolitan neighborhoods are becoming more racially and ethnically diverse. While there were 1,366 all-white tracts in 1970, that number had diminished to 747 by 2000. Meanwhile, the number of all-black tracts expanded in both absolute and relative terms during the three decades: from 231 tracts (12 percent of all tracts) in 1970 to 353 tracts in 2000 (17 percent of all tracts), with the largest jump occurring in the 1970s (231 tracts to 315 tracts, a gain in four percentage points). Interestingly, there were no all-Latino tracts in 1970 still and relatively few in 2000 (N=42). The most marked rise, however, is among tracts that are shared between whites and Latinos. These tracts represented just fewer than ten percent of all tracts in 1970 and more than doubled over the

[2] Specifically, I used the transformation $\arcsin(p_r^{1/2})$, where p_r is the proportion of people that identify as race r in the tract.

[3] Ternary plots were constructed using Nicholas J. Cox's TRIPLOT program created for Stata, which is available at http://ideas.repec.org/c/boc/bocode/s342401.html. The program was modified slightly for plotting lines on the ternary plot; the downloaded version was used for all point plots and the modified version for line plots.

course of the next 30 years.[4]

The transition matrix in Table 0.2 helps us investigate what types of changes are occurring that, in aggregate, make the overall trends we saw in Table 0.1. Count of tracts by racial and ethnic composition, 1970, 1980, 1990, 2000

The rows of Table 0.2 represent the initial category of the neighborhood racial and ethnic category in 1970 and the columns represent the destination. Therefore, a neighborhood represented on the diagonal of the matrix indicates a tract with the same initial and destination racial and ethnic category. The row marginals (the column labeled "Total") report the number of tracts in each row category in 1970 and the column marginals (the row labeled "Total") report the number of tracts in each column category in 2000.[5]

The first row of the table demonstrates again the remarkable decline in all-white tracts over the thirty-year period. Of the 1,364 tracts that start out as all-white in 1970, only 666 (49 percent) remained all-white by 2000. Also, one can note the trend towards all-black neighborhoods in the transition matrix as well. In part, this is due to the racial stability of all-black neighborhoods: of 227 all-black tracts in 1970, 219 – or 96 percent – remained all-black in 2000. There was also an increase in the number of all-black neighborhoods. Most of the neighborhoods that became all-black were originally in the white-black mixed tracts in 1970 (N=62); however, this number was only slightly larger than the number of tracts that became all-black from 1970 to 2000 came from the all-white category (N=56). This, combined with the fact that only 61 percent of neighborhoods that were mixed black-white in 1970 retained both blacks and whites, seems to suggest that a fair amount of racial succession could still be observed and the number of all-white tracts that became all-black by the end of three decades provides

[4] Since the proportion non-Latino white and Latino were estimated using 1980 proportions applied to the values, these results might *understate* the magnitude of this change.

[5] The values for the marginals in this table to not exactly correspond to the number of tracts reported in Table 0.1. This is due to the fact that tracts with a population of white, black, and Latino residents fewer than 100 people were removed from all analyses involving the decade that they fell below this threshold. In Table 0.2, there are 77 tracts that were not included in 1970 and ten in 2000 with one overlapping tract that was missing in both decades.

evidence that some of these transitions likely happened relatively quickly.

The final trend that is apparent in Table 0.2 is the growth of neighborhoods that are mixed with Latinos. By 2000, 715 of the tracts measured in 1970 had enough Latinos to be considered mixed while only 42 had enough Latinos to be considered all-Latino. The growth largely comes from an expansion in the number of tracts considered to be mixed between Latinos and whites from those that were all-white in 1970. 387 tracts, about 20 percent of all of the tracts measured in both 1970 and 2000, were in this category having. These findings stand in contrast to the previous literature which has highlighted the growth of mixed black-Latino neighborhoods, not white-Latino neighborhoods (Lee and Wood 1991; Alba et al. 1995).

Levels of Diversity Within Racial and Ethnic Categories

As I discussed previously, transition matrices are helpful to understand the gross patterns of neighborhood racial and ethnic change over time. They cannot be used to describe or evaluate the levels of exposure residents have to different racial and ethnic groups within the broadly defined racial and ethnic categories. It is impossible to tell, for example, whether the growth of white-Latino mixed neighborhoods has resulted in neighborhoods with a relatively even balance of whites and Latinos, a clustering of tracts that are predominantly Latino, or tracts that have just enough Latinos to make them mixed but are still predominantly white. This requires knowing not only into which racial and ethnic category a neighborhood falls, but also where in the distribution among whites, Latinos, and blacks that it falls.

Figure 2.2 displays ternary plots of the distribution of whites, blacks, and Latinos for each decade from 1970 to 2000. Again, each point maps to the proportions of Latinos, whites, and blacks in tracts for each decade. The primary purpose for this plot is to summarize the overall distribution of racial and ethnic compositions of neighborhoods over time, and so it would be helpful to describe the intuition behind these plots in some detail. First, the closer to a vertex that a point falls, the more the tract is dominated by a single race or ethnicity. Points near the left

vertex represent tracts that are predominantly black, those near the top represent predominantly Latino tracts, and those near the right represent predominantly white tracts. Second, points falling on a side of the triangle are composed solely of two groups: tracts represented by points falling on the left side are mixed black-Latino (i.e. no whites), points falling on the right side are mixed Latino-white (i.e. no blacks), and those falling on the bottom side are mixed white-black (i.e. no Latinos). The closer a point is plotted to one of the sides, the greater the proportion of residents in the tract that come from those two groups and, consequently, the fewer that come from the third. Finally, the closer a point falls to the middle of the plot, marked by the intersection of the dashed lines, the more equally blacks, Latinos, and whites are represented.

The broad patterns that were described using the transition matrix can be seen in the series of four ternary plots displayed in Figure 2.2. Perhaps most notably, one can see the predominance of all-white and all-black tracts in 1970 by the clustering of points near the lower-right and lower-left vertices in the plot and the gradual dissipation of points away from the all-white tracts in the decades following. The increasing frequency of points in the center of the plots for later decades is evidence of the increasingly diverse setting of most metropolitan Chicago neighborhoods. The growth of white-Latino tracts can also be seen by the greater number of points that fall along the right side of the plots in later decades. It appears that, while there has been an increase in white-Latino tracts since 1970, there was a relatively larger dispersion in the 1990s than in previous decades. Finally, the relative infrequency of neighborhoods that are shared by blacks and Latinos can be seen by the scarcity of points along the left side of the plots, even into 2000.

The ternary plots can also reveal a great deal more information about the diversity of neighborhoods than is available from the transition matrix. For tracts that are shared predominantly between blacks and whites, the plot of 1970 data shows a pattern of bifurcation.

With the exception of a small cluster of tracts around 50 percent black and 50 percent white,[6] tracts are generally over sixty percent black (with a stronger clustering towards 100) or under 40 (with a stronger clustering towards 0). Also masked in the transition matrix is the increasing level at which neighborhoods shared predominantly by blacks and whites have a growing proportions of Latinos , even if the proportions are not large enough to carry the tract into the white-black-Latino mixed neighborhoods category. This can be seen by the greater distance from the bottom of the plot neighborhoods are in later decades. The level at which Latinos are present is not constant, however. The distance that tracts shared predominantly by blacks and whites are pulled away from the bottom line (indicating a larger Latino presence) varies as a function of the relative proportion of whites decreases: as whites make up a lesser proportion of the population in mixed black-white tracts, the fewer Latinos share those tracts.

Tracts shared predominantly between whites and Latinos also have a remarkable amount of diversity that is hidden by the figures in the transition matrix. The most noticeable trend in white-Latino neighborhoods is the temporal pattern showing a drift of neighborhoods toward the top vertex of the plot that indicates a greater Latino presence within neighborhoods shared predominantly by whites and Latinos. The increasing black presence in white-Latino neighborhoods over time is also evident from the growing distance from the right side of the triangle in successive decades; however, there remain a sizeable number of tracts that fall on (or close to) the right side of the plot meaning that there are no (or few) blacks present. This stands in contrast to the paucity of tracts that fall on the bottom line, possibly suggesting that whites might be more willing to live with Latinos than they are with blacks. Similar to Latinos in white-black neighborhoods, blacks are more likely to share tracts with Latinos where whites make up a

[6] The dashed line extending up perpendicular to the bottom of the triangle indicates where blacks and whites are evenly split in a tract. As the line extends toward the middle of the triangle, the percentage of blacks and whites remains equal but Latinos constitute a larger share of the tract population. Thus, wthere there are no Latinos (i.e., at the base of the triangle), blacks and whites are split at 50 percent each. Where the three dashed lines intersect, blacks, whites, and Latinos each constitute an equal share, or 33 percent, of the tract population. This means that the line extending perpendicular to the left side indicates where blacks and Latinos are evenly split and the line extending from the right marks an even split between whites and Latinos.

greater proportion of the two-race/ethnicity split between whites and Latinos, although the trend appears to be less pronounced than the trend for Latinos living in mixed white-black neighborhoods.

In summary, these results suggest that metropolitan neighborhoods are becoming more diverse and that much of the diversity comes from within the broadly defined racial and ethnic categories defined for use in the transition matrix. Specifically, neighborhoods shared by blacks and whites are less likely to be clustered toward either end of the distribution in 2000 than they were in 1970 and neighborhoods shared between whites and Latinos have been shifting to contain a greater proportion of Latino residents in recent decades. Additionally, in neighborhoods that are mixed between two races (i.e. white-black and white-Latino), residents identifying as the third race are more likely to live in those neighborhoods where whites have a greater share of the population.

Changing Levels of Diversity Within Racial and Ethnic Categories

Although the transition matrix in Table 0.1 Table 0.1. Count of tracts by racial and ethnic composition, 1970, 1980, 1990, 2000
and the plots in Figure 2.2 reveal the increasing diversity of neighborhoods in metropolitan Chicago over time and suggest possible patterns of neighborhood change, they do not provide evidence regarding how the racial and ethnic composition of individual neighborhoods changed over time. This means that it is impossible from these analyses alone to discern the degree to which neighborhood racial and ethnic composition remains stable or changes over time. In order to evaluate these patterns, I turn now to examining the changes of racial and ethnic composition within tracts over time.

Table 0.2 reports the mean percent white, black, and Latino in 1970 of tracts within each racial and ethnic category as well as the mean percentage-point change from 1970 to 2000. Starting with the last row, the aggregate pattern for all metropolitan tracts is to lose whites, and gain both blacks and Latinos. We would expect these trends from both the changes in the racial

and ethnic composition of the metropolitan area as a whole and the patterns observed from both the transition matrix and ternary plots. The overall patterns within racial and ethnic groups also reveal interesting aggregate patterns. Tracts that were all-white in 1970 lost an average of 24.9 percentage points of whites from 1970 to 2000 (8.3 points per decade). This marks a substantial decline that appears to be evenly split between blacks – who gained 11.1 percentage points in previously all-white neighborhoods (3.7 per decade) – and Latinos who gained 13.8 percentage points (4.6 per decade). In contrast, all-black tracts saw very little population change. Whites were slightly less prevalent in all-black neighborhoods and the black and Latino populations remained relatively stable.

In mixed neighborhoods, there are essentially two trends in these data.[7] First, for neighborhoods mixed between whites and blacks in 1970, whites decline substantially and are replaced almost exclusively by blacks, though there is a small gain by Latinos. The second trend is one shared by neighborhoods in the mixed white-Latino and mixed white-black-Latino neighborhoods that experience a loss in the proportion of white residents and a gain in proportions of both Latinos and blacks with the former larger than the latter. One noticeable difference between these two categories is that the increase in the percentage of blacks is substantially higher in neighborhoods shared by whites and Latinos than those shared among all three groups. This could simply reflect the lower starting points for the percentage of blacks that live in each type of tract (1.6 percent for white-Latino and 29.2 for white-black-Latino neighborhoods), but could also indicate a trend that neighborhoods starting out as predominantly mixed between whites and Latinos follow a trajectory of becoming more multiethnically diverse as blacks increasingly replace whites in those communities.

However, just as the transition matrix masked much of the underlying diversity of neighborhood racial and ethnic composition, it is possible that Table 0.2 masks the heterogeneity

[7] I do not discuss the trend for neighborhoods mixed between blacks and Latinos because this category contains only two tracts.

in the trajectories of changes of racial and ethnic composition followed by tracts over time. Indeed, Figure 2.3. Ternary plots showing trend in decadal racial and ethnic change from 1970 to 2000, by racial and ethnic composition in 1970 shows that this is the case. Figure 2.3 plots the level of whites, blacks, and Latinos for tracts in 1970, 1980, 1990, and 2000 and then, for each tract, connects the point plotted at each decade with a line by category of racial and ethnic composition in 1970.[8] Therefore, the changing racial and ethnic composition of a tract can be traced by following the lines in the graph.[9]

Starting first with tracts that were all white in 1970, it is obvious that neighborhoods do not follow a single trajectory. In fact, the large increases for both blacks and Latinos in the all-white category reported in Table 0.3 appear to represent two different trends: either a large increase in the proportion black *or* a large increase in proportion Latino. There are a fair number of tracts that fall in between (more of these types of tracts can be found in other samples drawn) gaining both blacks and Latinos; however, the dominant trajectories for tracts that were all-white in 1970 is to gain either blacks or Latinos. In contrast to all-white neighborhoods, neighborhoods in the all-black category in 1970 showed very little change. Although a few tracts lost a very small proportion of blacks, the proportion living in all-black neighborhoods generally increased.

Mixed black-white neighborhoods more closely follow a single trajectory and gain in proportion black over the three decades. In this category, there are some neighborhoods that maintain the level of black residents and gain a greater proportion of Latino residents, but they are rarer than neighborhoods that increase in proportion black and decrease in proportion white. Conversely, mixed white-Latino neighborhoods had a large increase in proportion black over the time period. Although some became all-Latino or all-white, most gained in proportion black.

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[8] There were no all-Latino tracts in 1970, so there is no plot for all-Latino tracts.

[9] Due to limitations in the software, only 98 graphs can be plotted at a time. Therefore, for the all-white, all-black, mixed white-black, and mixed white-Latino plots, the trajectories of a random sample of 98 tracts were plotted. The plots shown are representative of the trajectories within each category. Additionally, arrows would be helpful to show which way the trajectories move; unfortunately, it is also not possible to include arrows in the software.

Interestingly, for most tracts, the increase in proportion black came as the proportion of Latinos became greater in the tract. This could suggest that as the tracts become increasing Latino, whites either flee or become unwilling to move to these neighborhoods and blacks then move to the homes vacated by whites. Finally, neighborhoods shared by all three groups demonstrate the least systematic patterns of neighborhood change. Most gain either in proportion black or proportion Latino, but some gain in both to become split between blacks and Latinos while decreasing in proportion white.

LATENT TRAJECTORIES OF NEIGHBORHOOD RACIAL AND ETHNIC CHANGE

Table 0.4 reports the results of the growth mixture model. Using the standard technique of comparing the Bayesian information criterion (BIC) across models with successive numbers of classes, I found that nine classes minimized the value of the BIC. This means that nine is likely the optimal number of distinct neighborhood racial and ethnic composition trajectories in the Chicago metropolitan area. The top row of Table 0.4 contains a description of the class and the second row reports the percentage of tracts best described by that trajectory. The next group of rows reports the coefficients of the black and Latino growth factors predicted for each growth factor transformed to percentage-point units.[10] The following two groups of rows report the predicted percentage of blacks and Latinos, respectively, at each decade for tracts identified in the class.

In addition to the estimates reported in Table 0.4, I also plotted the empirical racial composition by decade for the tracts in each class. To do this, I used the posterior probabilities of class membership to determine which one of the classes each tract was most likely to be a member. After classifying the tracts into classes in this manner, I plotted the observed racial composition of tracts by class for each decade on ternary plots. A matrix of these plots can be

[10] As mentioned previously, the model was estimated using the transformation $\arcsin(p_r^{1/2})$, where p_r is the proportion of the tract composed of race, r. The coefficients reported in TABLE XX are transformed by taking the sine of the growth factor coefficient, β_{fr}, estimated for growth factor, f, of race, r, squaring the result, and retaining the sign of the coefficient, i.e. $p_{\beta r}* = \sin(\beta_{fr})^2 * \text{sign}(\beta_{fr})$.

viewed in Figure 0.4. Each of the nine rows, one for each of the nine different classes, contains four plots, one for each decade from 1970 to 2000. The matrix of plots can be read across the rows to show the changes in the observed racial and ethnic composition of tracts classified into each tract.

Description of Racial and Ethnic Composition Trajectories

Racially stable neighborhoods. The two most abundant types of neighborhoods in the Chicago metropolitan area are racially stable white and black neighborhoods. Neighborhoods that follow a *stable white* trajectory are by far the most common and comprise a majority (53 percent) of neighborhoods. These tracts are predicted to have essentially no blacks and very few Latinos with no growth in either minority group from 1970 to 2000. Although the model predicts almost no growth in the non-white population in the stable white neighborhoods, the first row of plots in Figure 0.4 reveals that all-white tracts in this trajectory have become more diverse in subsequent decades so that many are no longer strictly all-white. The majority of neighborhoods in this category, however, still have a very small proportion of minority residents. *Stable black* is the next most frequent trajectory of neighborhood change with 14 percent of tracts falling in this category. They are predicted to be almost all-black in 1970 (94 percent black) and grow in the percentage black across the three decades to 98 percent black in 2000. Figure 0.4 reveals that the percentage of non-black residents increased for a small proportion of these neighborhoods, particularly in the 1990s, the majority of neighborhoods in this category remain almost exclusively black from 1970 to 2000 and do increase in the concentration of black residents.

In addition to these larger categories, a third and much smaller category of tracts have maintained a relatively *stable racially and ethnically integrated* composition from 1970 to 2000. Just over four percent of neighborhoods in the Chicago metropolitan area are predicted to belong to this trajectory with an estimated 32 percent black predicted in 1970 that increases to just below 40 percent by 2000. Latinos are predicted to be about seven percent of the population with very

little growth. However, the empirical distributions of neighborhood racial and ethnic composition of tracts following this trajectory show that Latinos are increasing as a percentage of the population in many of these neighborhoods so that, by 2000, they can be accurately described as integrated multiethnic neighborhoods.

Black growth. I group the following two racial and ethnic composition trajectories together because they both start with nearly all-white populations in 1970 and then experience growth in the black share of the population; however, the two paths of black growth are very different.[11] The first can be described as following the complete racial succession described by the Duncans' (1957). In the nearly four percent of neighborhoods following this *all-white to all-black succession* trajectory, blacks were predicted to have a very small presence in 1970 – less than four percent – and then increase so rapidly that predicted values of black racial composition end up greater than 100 percent by 1990 using the continuous and normal approximation of the outcomes. Although this highlights one of the problems using this approximation for a multinomial model, looking at the empirical distribution of neighborhood racial and ethnic composition for neighborhoods classified in this trajectory in Figure 0.4, the results reveal that the model is correct in its predication of the speed of this transition. Most of the neighborhoods in this trajectory were all-white in 1970 and many had already transitioned to being all-black by 1980, and almost all had done so by 2000. Few of the neighborhoods following this trajectory contained more than a small proportion of Latinos, especially by the later decades.

The second type of black growth occurred much more slowly. In fact, it is not completely appropriate to call these neighborhoods solely "black growth" as many became places

[11] Although these two trajectories can be grouped by their increasing black presence, describing these neighborhoods as trajectories following "black growth" does not imply that the black share of the population does not grow for neighborhoods following other trajectories. Instead, the majority of the minority growth in these neighborhoods comes from an increasing black share of the population compared to other trajectories where the majority of minority growth comes from an increasing Latino share of the population. Additionally, this does not mean that there is not some Latino growth in "black growth" neighborhoods and vice-versa, only that these broad categories broadly describe the most prevalent type of racial and ethnic change.

with a large enough proportion of whites, blacks, and Latinos to be considered "multiethnic." Neighborhoods in this *all white to multiethnic integration* trajectory were predicted to start with no blacks and two percent Latinos and grow to have 14 percent black and five percent Latino respectively in 2000. Looking at the ternary plots in Figure 0.4, these figures underestimate the share of the black population in 2000, with most tracts having substantially more than 14 black. In fact, it appears that most have a black majority by 2000. Despite this black majority in many tracts, most retain a multiethnically diverse population that shows a distinctly different pattern of change from the all-white to all-black transition trajectory.

Latino growth. The four trajectories in the next group describe different patterns of Latino growth from 1970 to 2000. The first of these four trajectories can be described as *integrated white-Latino to all-Latino* trajectory. Neighborhoods in this trajectory are expected to be just over half Latino in 1970 and become 73 percent Latino by 2000. These tracts are expected to have a small proportion of blacks initially and to have virtually no growth over the entire three decades. Observing the empirical trends of neighborhoods in this category, we find that there are more blacks than would be predicted from the coefficients for this class in the model such that some tracts could be considered multiethnically diverse by 2000; however, the majority of growth in the minority population is from an increase in the Latino share of the population. Neighborhoods in the second Latino growth trajectory are tracts that are *mostly white and become predominantly Latino*. These tracts are predicted to be composed of 12 percent Latinos in 1970 that grows to a predicted value of 48 percent by 2000. Blacks grow from almost no presence (less than one percent) to a very small presence (3.5 percent) by 2000. Empirically, from Figure 0.4 we see that, again, the models likely underestimate the growth in the percentage Latino and the expansion of blacks in neighborhoods, but overall describe the trend relatively well. These neighborhoods appear to be undergoing a slow transition from white to Latino over the entire three decade period.

The next racial and ethnic composition change trajectory, late Latino growth, to be very similar to the stable all-white racial trajectory: blacks and Latinos combined are expected to compose less than three percent of the population in these tracts in 1970 and still less than seven percent in 2000. However, the ternary plots in Figure 0.4reveal that the low levels of predicted minority population for neighborhoods following this trajectory are likely the result of a somewhat dramatic growth in the Latino population during the 1990s. One can see that, although Latinos has been becoming a larger proportion of these tracts since the 1980s, a substantial number of tracts were still predominantly or very close to all-white in 1990. By 2000, there were no tracts following this trajectory that had more than 80 percent white in the tract. Thus, the growth mixture model was likely fit closer to the trajectory from the 1970s and 1980s and did not capture the increase of Latinos in the 1990s. Although the predicted values were not terribly precise because of the quadratic functional form used in the model, the model did identify this unique trajectory from the other Latino growth trajectories.

The final growth trajectory class also follows a discontinuous pattern that is revealed by looking at the ternary plots in Figure 0.4. Neighborhoods in this trajectory can be described as having *Latino growth followed by displacement* of Latinos. The model predicts a moderate percentage of Latinos with a reasonably large amount of growth such that neighborhoods are predicted to initially have about 18 percent Latino in 1970 that increases to 29 percent by 2000. Blacks are predicted to have a small presence (one percent) in these neighborhoods that slowly grows over the three decades ending with about six percent of the population. However, again looking at the plots in Figure 0.4, we see that neighborhoods in this trajectory start out as tracts that are predominantly white with some Latinos and become increasingly Latino during the 1970s and 1980s. The black share of the population grows in some neighborhoods, though most can still be relatively accurately described as mixed between whites and Latinos. Yet, after this period of Latino growth, we see a dramatic shift in the 1990s as a substantial number of tracts gain in the white share of the population and some become almost- or all-white by 2000. These

figures would suggest that these tracts might be undergoing gentrification and Latinos are being displaced by white residents.

Demographic, Socioeconomic, and Ecological Characteristics of Tracts Following Racial and Ethnic Composition Change Trajectories

Beyond comparing the distribution of observed racial and ethnic composition for neighborhoods classified into each of the underlying latent trajectories, it is also instructive to examine the observed changes in socioeconomic status and ecological characteristics of neighborhoods by the different latent trajectories. Examining how racial and ethnic change is associated with changes in other characteristics of the neighborhood can provide insight about how neighborhood racial and ethnic change might be experienced on a broader level by residents and provide researchers and policy makers with a more extensive knowledge about how neighborhood racial and economic changes are related. To explore these trends, neighborhood demographic, socioeconomic, and ecological characteristics were summarized by decade for neighborhoods classified into each of the latent racial and ethnic composition trajectories. Table 0.1 reports the mean value of neighborhood characteristics for each decade from 1970 to 2000 as well as the change in means for each characteristic from the 1970 to 2000 for neighborhoods classified by their underlying latent trajectory of racial and ethnic composition change.

Racially stable neighborhoods. Looking first at neighborhoods with stable racial and ethnic populations, we find – unsurprisingly – that neighborhoods in different trajectories have very different patterns of neighborhood socioeconomic and ecological characteristics. The first three columns report the means of the racial and ethnic composition by race in each decade and summarize the patterns depicted in Figure 0.4. Looking at the values of racial composition for the stable white neighborhoods, we find evidence of what was suggested in the ternary plots: Chicago metropolitan neighborhoods, even those that are stably white, are becoming more diverse. By 2000, whites in this group of neighborhoods comprised, on average, less than 90

percent of the population. This provides further evidence of the pattern of increasing diversity that could be seen in the transition matrices. At the same time, this could indicate that some of the neighborhoods that would be included in the integrated categories (e.g., white-Latino mixed or white-black-Latino mixed neighborhoods) in the transition matrix remain, on the whole, overwhelmingly white. We find that home values among owner-occupied homes increased by almost $70,000 over three decades and the incomes of residents in these tracts increased by over $16,000.[12] These neighborhoods have a high and increasing percentage of college graduates, little poverty, high occupancy, and high levels of homeownership such that in the average stable white tract, three quarters of owners own their own home. In all, they are socioeconomically very well off.

Stable black neighborhoods have followed very different pattern of change. The absolute monetary value of home appreciation (in constant dollars) was only half that for homeowners in stable black neighborhoods compared to stable white neighborhoods. Although the rate of return is higher in the stable black neighborhoods than the stable white neighborhoods – the average home value in 2000 is 112 percent higher than the 1970 compared to a 61 percent increase in stable white neighborhoods – most of this increase came in the 1990s. Because almost 95 percent of stable black tracts are in central cities, it is possible that home values could have been driven by speculation on central-city real-estate prices. Furthermore, a far fewer proportion of residents own their own home compared to white residents. Therefore, increases in home values probably mean higher rents for those who are renting. Along with the reduction of $919 in household income among residents, this could suggest that many residents are facing more financial hardship, and the high level of growth in poverty, particularly through the 1980s, suggests that this might be the case.

Finally, the changes in the socioeconomic and ecological characteristics of stably

[12] The values of mean home value and mean household income in Table 0.5 are reported in constant 1999 dollars adjusted using the national consumer price index inflation factors.

integrated neighborhoods indicate a marked improvement during the 1990s. For example, the mean home value grew slowly, about $10,000 in constant 1999 dollars per decade from 1970 to 1990, but jumped by over $20,000 from 1990 to 2000. Thus, over half of the appreciation of home values in stably integrated came after 1990. Incomes, after declining in the 1970s and regaining those losses in the 1980s, increased in the 1990s almost twice as fast as they did in the 1980s. Similarly trends toward increased poverty, vacancy, and decreased homeownership all reversed in the 1990s. These results imply that the prospects of stably integrated neighborhoods might have improved in recent decades.

Black growth neighborhoods. The next two panels in Table 0.5 report the change in socioeconomic and ecological characteristics for the two neighborhood trajectories that experience black growth. The first, those tracts that transition rapidly from nearly all-white to all-black have modest levels of appreciation in home values but declining incomes. In constant dollars, households in neighborhoods following this trajectory made an average of $40,410 in 1990, representing a loss of almost $7,000 compared to neighborhood households in 1970. During the 1990s, neighborhood households increased their incomes by $3,000 over the 1990 level, representing a net total loss of $4,000 dollars from 1970 to 2000. Poverty also expanded in these neighborhoods from the 1970 to 1990 and leveled off in 1990 such that almost one in every four people was in poverty. Levels of homeownership declined very modestly, but the vacancy rate expanded considerably, over doubling from the 1990 rate. Thus, tracts following the rapid racial succession trajectory experienced declines in socioeconomic status, particularly in the decades when the racial transition was most pronounced.

Neighborhoods undergoing a transition from all-white to diverse integrated neighborhoods showed an interesting trend in their average racial composition. Having virtually no blacks and very few Latinos in 1970, neighborhoods following this trajectory increased in the share of black residents to seven percent in 1980 and then underwent a large increase in 1990 to

an average of 36 percent black. The comparison with tracts that underwent a complete racial transition in the 1970s is instructive for understanding how racial and ethnic trajectories might have changed: neighborhoods following the complete racial transition trajectory were also about seven percent black in 1970 and transitioned to 75 percent black in a single decade. This suggests that, at least through the 1980s, large racial transitions still occurred with some frequency; however, the far smaller level of transition over a single decade (a change from seven to 35 percent black compared to a change from seven percent to 75 percent) might suggest that racial transition, when it does occur, is much more muted in the 1980s compared to the 1970s. The share of white residents continues to decline, but whites remain one in every four residents which means that these tracts remain relatively well-integrated and it appears that they might maintain that diversity.

Changes in the racial composition are also associated with neighborhood socioeconomic changes. As the share of black residents increased in the 1980s, home values underwent a dramatic $14,000 drop in home values (in constant dollars) over the decade; however, prices recovered more than $12,000 of that loss in the subsequent decade. Similarly, household incomes dropped during the 1980s and rebounded in the 1990s, though they did not completely recover to the income levels of residents in the 1970s. The percentage of residents in poverty also nearly doubled in the 1980s, but remained relatively stable into the 1990s and increased less than a percentage point. The changes in these socioeconomic conditions provide further evidence that racial transition continued to occur through the 1980s with many of the negative consequences associated with racial change (Ellen 2000; Harris 2001) but that many of these trends reversed or slowed in the 1990s suggesting that there was a greater possibility for a sustained level multiethnic integration.

Latino growth neighborhoods. The final four panels in Table 0.5 report the socioeconomic and ecological characteristics of neighborhoods following one of the trajectories

of Latino growth. Examining the socioeconomic characteristics of residents living in neighborhoods following the first trajectory, those that were integrated between whites and Latinos in 1970 and became all- or mostly-Latino by 2000, show that they were relatively socioeconomically stable from 1970 to 2000. The average income of households, calculated in 1999 dollars, increased by only $770 dollars in the three decades and the percent poor, after jumping some in the 1970s remained relatively constant in the 1980s and 1990s. There was an increase in the percent of residents with a college degree in the 1990s, though the absolute value of 13 percent remained relatively low. The one socioeconomic indicator that was instable during this period was the average home value. Neighborhoods following this racial and ethnic trajectory had the lowest home values of all of the trajectories in 1970 at $12,000 in 1999 dollars and appreciated very little through the 1970s and 1980s. In the 1990s, however, the average home value increased 2.5 times from $19,024 in 1990 to $47,570. Only about 30 percent of residents lived in homes that they owned, so this increase in home values probably represented a financial hardship for many residents especially since the income of residents in this period did not increase. Just as with stable black neighborhoods, almost all of the neighborhoods in this trajectory are in a central city and could suggest that the dramatic increase in prices could represent rising real estate values and speculation by developers that could lead to displacement of Latino residents.

Neighborhoods following the next two Latino growth trajectories, those that went from mostly white to predominantly Latino and those that experienced late Latino growth, experienced similar changes in socioeconomic changes. However, neighborhoods following the late Latino growth trajectory generally neighborhoods experiencing late Latino growth started from a more socioeconomically advantaged position. Household incomes were relatively stable in both types of neighborhoods, increasing by just under $600 for households in the mostly white to predominantly Latino neighborhoods and by only $41 in the late Latino growth neighborhoods, though the latter started with incomes almost $8,000 higher than the neighborhoods with a larger

Latino population. There was a jump in the poverty rate in from 1980 to 1990 for neighborhoods in the mostly white to predominantly Latino neighborhoods which resulted in poverty rates that were twice as high those in the late Latino growth neighborhoods by 2000.

Both types of neighborhoods experienced a decline in household income during the 1980s and 1990s compared to 1970 incomes. Neighborhoods following both trajectories saw increases in home values of over $20,000; however, in neighborhoods that had late Latino growth, home values experienced a decline in the 1980s just as the percentage of Latinos increased. During this decade, the percent Latino increased from eight percent to almost 23 percent at the same time that home values declined from $81,530 to $78,746. Most of the $21,000 increase in home values in these neighborhoods came after 1990. The one area of major difference between these two trajectories is that the mostly white to predominantly Latino neighborhoods were much more likely to be in the central city compared to the late Latino growth neighborhoods: 73 percent of the former were located in the central city while only 48 percent of late Latino growth neighborhoods were located there.

The final trajectory of neighborhood racial and ethnic composition change is that of Latino growth followed by displacement. The first three columns show the shifting racial composition of neighborhoods that follow this trajectory. The proportion of neighborhoods Latinos comprised increased from just less than 20 percent in 1970 to more than 34 percent in 1980 followed by a relatively stable racial and ethnic composition when the percentage Latino declined slightly and percent black increased slightly while the white share or residents remained constant. In the 1990s, whites increased their share of the population from the 58 percent present in 1990 to just over 70 percent in 2000 while the Latino proportion dropped from 31 percent to 20 percent in the same time. Changes in the socioeconomic characteristics of the neighborhood definitely suggest that this racial and ethnic change was indeed related to gentrification. Housing prices nearly doubled every decade from 1970 to 2000 so that housing prices, in constant 1999 dollars, jumped from $15,000 in 1970 to $129,000 in 2000. Additionally, household incomes of

residents nearly doubled from 1970 to 2000 and *over half* of the residents 25 and older had college degrees, far greater than the percentage of residents having college degrees in any other trajectory. Vacancy rates were declining, and owner-occupied units increasing in these neighborhoods as well, providing indications that the ecological characteristics of the neighborhood were changing as well. Despite these overall increases, 14 percent of residents still live in poverty meaning that there could be a bifurcation of residents' socioeconomic status in these neighborhoods, which would also be typical of gentrifying neighborhoods.

DISCUSSION

The results presented here point to the fact that neighborhoods in Chicago, like many multiethnic metropolitan areas, are becoming more diverse. The increased diversity, however, does not necessarily suggest that we are likely to see substantially lower levels of segregation in the Chicago metropolitan area's future. The number of all-white neighborhoods in the metropolitan area has substantially declined. Even those that still are all-white tend to have at least a small proportion of non-whites which was not true in the past. As the number and proportion of all-white neighborhoods decline, the number and proportion of mixed-race neighborhoods increased. The number of all-black neighborhoods has, however, remained very high and the probability of it becoming more diverse after moving to the all-black category is very small. Also, in the period from 1970 to 2000 marked the advent of the all-Latino tract in the Chicago metropolitan area. Although the number of these tracts is still small in comparison to all-black neighborhoods, it does potentially point to a worrisome trend.

Although transition matrices are helpful to see the broad trends of racial and ethnic change, they miss much of the diversity *within* these broad categories that is also revealing about the patterns of racial and ethnic integration. Looking at the distribution of the three racial and ethnic groups within the categories suggests that whites and Latinos are relatively evenly distributed within the white-Latino neighborhood type. Whites and blacks, on the other hand, tend to be clumped at either end of the distribution; that is, there are many tracts that are almost

all-black and many that are almost all-white and very few in between. This suggests that whites' tolerance for Latinos is higher than their tolerance for blacks, which supports the idea of a racial hierarchy (Zubrinsky and Bobo 1996).

More support comes from the finding that while blacks and Latinos are sharing more neighborhoods, the level at which they do so depends on how prevalent whites are in the tract. Both blacks and Latinos have a greater presence in 2000 than in 1970 – or even 1990 – in neighborhoods shared between whites and the other race; however, as the share of whites decreases, so does the proportion of the other minority. Examining the trajectories of racial and ethnic change over time within each neighborhood reveals how these patterns might come about. It appears like it is less about blacks leaving white-Latino neighborhoods or Latinos leaving white-black neighborhoods as much as it is about whites leaving both types of neighborhoods. Because the whites leaving tend to be replaced by either blacks or Latinos, this pushes the neighborhood much closer to either an all-minority tract or a tract shared between the two minority groups. This trend appears to be more the case for white-Latino neighborhoods than white-black neighborhoods as a substantial number of neighborhoods still transition from white to black without gaining a significant number of Latinos.

That blacks and Latinos do not very frequently share neighborhoods in Chicago stands in contrast to research from both Los Angeles (Lee and Wood 1991; Clark 1993) and New York (Alba et al. 1995). In both of those locations, investigators found a substantial increase in the growth of shared black-Latino neighborhoods. There could be a number of reasons that I did not find the same in Chicago. First, the race of Latino residents might be important. Black Latinos might be doubly disadvantaged on the housing market for both their ethnicity (and potentially language difficulties) and their race. This might mean that they end up in largely black neighborhoods. Second, the older age of Chicago than Los Angeles might have made it easier for Latinos to remain segregated from whites, particularly as they moved into some neighborhoods where whites maintained segregation.

The latent class growth models reveal that the racial and ethnic compositional change in the Chicago metropolitan area follow nine separate trajectories that can be conceptually grouped into three larger categories: stable racial and ethnic compositions, black growth, and Latino growth. By far, the most common trajectories are stable white and stable black neighborhoods meaning that the majority of all tracts retain a constant racial composition and, given how racially segregated Chicago has been and continues to be, the inertia of these trajectories could indicate that there will be little change in this pattern. Further evidence that neighborhood trajectories could lead to persistent segregation is the fact that four percent of all metropolitan tracts underwent complete racial succession during these three decades as well as the increasing share of Latino residents and declining share of white residents in mixed Latino-white neighborhoods.

On the other hand, the observed levels of racial and ethnic composition in many neighborhoods suggest that there is the possibility of a more integrated metropolitan area. Some neighborhoods have retained a multiethnically diverse composition over three decades while others that appeared to be heading toward a path of complete racial transition have, in recent decades, managed to maintain an integrated racial composition. Even many of the stable white neighborhoods now have more than a token proportion of non-white residents in them, though these tend to be Latinos more than blacks. Furthermore, even in areas where the share of white residents has declined, the majority of the decline occurred in the 1970s and 1980s and slowed throughout the 1990s. Thus, while some neighborhoods might still undergo racial transition, this transition is much slower than it has been in past decades and appears to be much less "inevitable."

Socioeconomically, stable white neighborhoods have consistently remain the most advantaged areas in the metropolitan area, though the areas that have undergone Latino displacement and gentrification since 1990 are approaching stable white neighborhoods. Neighborhoods undergoing racial or ethnic transitions to larger minority populations are the most disadvantaged. The socioeconomic position of neighborhoods undergoing black growth has been

declining in absolute terms as well as relative to neighborhoods experiencing other trajectories of neighborhood racial and ethnic change. Neighborhoods experiencing Latino growth have also experienced socioeconomic declines, though not to the degree that neighborhoods experiencing black growth have.

One area in need of further examination is the extent to which increasing real estate values affect residents in neighborhoods undergoing different types of racial and ethnic changes. Although the most obvious example is the trajectory of gentrifying neighborhoods that underwent a recent period of white displacement of Latinos that followed a period of Latino growth, the housing values of several other trajectories increased – sometimes by large amounts – in the 1990s. Determining the extent to which the appreciation in housing values reflects speculation in the housing and real estate market in the 1990s compared to a stronger willingness of metropolitan residents, particularly whites, to live in more multiethnic communities is important. If it is the former, the increasing multiethnic character of some neighborhoods may be fleeting as non-white incumbent residents get displaced in the reverse of the typical racial succession story. If it is the latter, there is a chance that city neighborhoods could become a place where residents of different races can both live together and reap the benefits of homeownership and appreciating housing values that have been so elusive, particularly for blacks (Flippen 2001, 2004).

Furthermore, this analysis only examined the trends in socioeconomic characteristics for the entire population of neighborhoods. Future analyses should consider how the socioeconomic trends in neighborhoods might differ for residents of different races and ethnicities. It is likely that Latinos living in the neighborhoods experiencing Latino growth followed by gentrification and displacement have very different socioeconomic profiles than the incoming white residents. Exploring these differences can provide an provide an important context for understanding the relationships between the shifting patterns of racial, ethnic, and socioeconomic composition of neighborhoods in metropolitan areas.

Conclusion

Although this analysis examined only a single metropolitan area, the results underscore the complexity of racial and economic change occurring in metropolitan neighborhoods and demonstrated the importance of measuring the full context of racial and ethnic diversity in that change. Since a substantial amount can be missed by only exploring neighborhood change using broad categories, I was able to show how alternative methods of analysis can demonstrate the diversity in both types and change of neighborhood racial and ethnic composition in the Chicago metropolitan area. This more detailed picture revealed an increase in the diversity of many tracts in the Chicago metropolitan area, and more diversity than would have been discovered by simply investigating the changes between racial and ethnic composition categories. Blacks, however, still remained in neighborhoods with substantially less diversity – particularly all-black neighborhoods in comparison to all-white neighborhoods – and neighborhoods mixed with blacks were more likely to become all-black. These results suggest that rapid racial succession might be a phenomenon of a bygone era in metropolitan Chicago, but that racial transition in neighborhoods, particularly in Latino growth areas, over the long-run is much more likely.

TABLES AND FIGURES

Table 0.1. Count of tracts by racial and ethnic composition, 1970, 1980, 1990, 2000

	1970		1980		1990		2000	
Racial/Ethnic Composition	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
All white	1,366	69.02	1,127	56.07	965	47.30	747	36.51
All black	231	11.67	315	15.67	329	16.13	353	17.25
All Latino	0	0.00	10	0.50	26	1.27	42	2.05
White-black Mix	134	6.77	161	8.01	191	9.36	174	8.50
White-Latino Mix	196	9.90	276	13.73	353	17.30	481	23.51
Black-Latino Mix	2	0.10	19	0.95	40	1.96	64	3.13
White-black-Latino Mix	50	2.53	102	5.07	136	6.67	185	9.04
Total	1,979	100.00	2,010	100.00	2,040	100.00	2,046	100.00

Note: See text for definition of racial/ethnic categories

Source: Neighborhood Change Database, Geolytics, Inc.

Table 0.2. Matrix of transitions from racial categories in 1970 to 2000

Racial/Ethnic Composition	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**Total**
(1) All white	666	56	10	118	387	16	111	1,364
	(0.49)	(0.04)	(0.01)	(0.09)	(0.28)	(0.01)	(0.08)	(1.00)
(2) All black	0	219	0	5	0	3	0	227
	(0.00)	(0.96)	(0.00)	(0.02)	(0.00)	(0.01)	(0.00)	(1.00)
(3) All Latino	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
(4) W-B Mix	5	62	0	33	4	9	19	132
	(0.04)	(0.47)	(0.00)	(0.25)	(0.03)	(0.07)	(0.14)	(1.00)
(5) W-L Mix	27	5	29	4	75	22	34	196
	(0.14)	(0.03)	(0.15)	(0.02)	(0.38)	(0.11)	(0.17)	(1.00)
(6) B-L Mix	0	1	0	1	0	0	0	2
	(0.00)	(0.50)	(0.00)	(0.50)	(0.00)	(0.00)	(0.00)	(1.00)
(7) W-B-L Mix	2	6	3	3	7	14	14	49
	(0.04)	(0.12)	(0.06)	(0.06)	(0.14)	(0.29)	(0.29)	(1.00)
Total	700	349	42	164	473	64	178	1,970
	(0.36)	(0.18)	(0.02)	(0.08)	(0.24)	(0.03)	(0.09)	(1.00)

Notes: Row proportions in parentheses; no tracts were all-Latino in 1970; see text for description of racial/ethnic categories

Table 0.3. Initial percent and change in percent white, black, and Latino by types of racial compostion in 1970

		WHITE		BLACK		LATINO	
Racial/Ethnic Composition	**N**	**Percent in 1970**	**Change 1970-2000**	**Percent in 1970**	**Change 1970-2000**	**Percent in 1970**	**Change 1970-2000**
All white	1364	97.3	-24.9	0.5	11.1	2.2	13.8
		(2.7)	(27.7)	(1.4)	(22.7)	(2.0)	(19.6)
All black	227	2.6	-1.1	96.4	0.7	1.0	0.3
		(2.3)	(4.5)	(3.0)	(6.4)	(1.3)	(4.0)
W-B Mix	132	47.8	-25.3	48.8	20.4	3.3	4.9
		(25.3)	(23.9)	(25.9)	(24.6)	(2.3)	(13.1)
W-L Mix	196	68.5	-28.3	1.6	11.8	29.8	16.5
		(18.5)	(28.8)	(2.4)	(20.8)	(18.1)	(25.8)
B-L Mix	2	3.5	37.6	77.3	-24.8	19.1	-12.8
		(3.4)	(52.3)	(10.0)	(42.5)	(6.7)	(9.8)
W-B-L Mix	49	43.4	-17.7	29.2	6.6	27.4	11.1
		(20.1)	(25.7)	(16.7)	(24.7)	(14.9)	(26.7)
All tracts	1970	78.7	-22.3	15.7	10.4	5.6	11.8
		(33.3)	(27.1)	(32.7)	(21.9)	(11.1)	(19.7)

Note: See text for description of racial/ethnic categories; no tracts were all-Latino in 1970

Table 0.4. Transformed coefficients of latent growth trajectories and predicted values of tract proportion black and tract proportion Latino populations in metropolitan tracts

	Racially Stable			Black Growth		Latino Growth			
	Stable white	**Stable black**	**Stable multi-ethnic integration**	**All-white to all-black succession**	**All-white to multi-ethnic integration**	**Integrated white-Latino to all-Latino**	**Mostly white to predom-inantly Latino**	**Late Latino growth**	**Latino growth followed by displace-ment**
Percent of tracts	52.50	14.27	4.16	3.86	3.84	3.60	3.92	9.39	4.46
Percent black	0.18	94.22	32.44	3.64	0.04	2.23	0.62	0.15	1.02
Linear change in percent black	0.10	1.60	2.48	72.61	4.14	0.10	1.02	0.04	2.06
Quadratic change in pct. black	0.00	-0.10	-0.11	-4.64	0.12	0.00	-0.02	0.01	-0.10
Percent Latino	1.58	0.90	7.27	3.79	2.03	51.36	11.50	2.54	18.37
Linear change in percent Latino	0.01	-0.12	0.08	-0.01	1.25	8.68	12.94	0.31	5.47
Quadratic change in pct. Latino	0.01	0.01	0.00	0.00	-0.05	-0.50	-0.23	0.29	-0.62
% Black 1970	0.18	94.22	32.44	3.64	0.04	2.23	0.62	0.15	1.02
% Black 1980	0.28	95.73	34.81	71.61	4.30	2.33	1.62	0.20	2.98
% Black 1990	0.38	97.04	36.96	130.32	8.79	2.44	2.59	0.28	4.75
% Black 2000	0.49	98.17	38.89	179.75	13.51	2.55	3.52	0.39	6.33
% Latino 1970	1.58	0.90	7.27	3.79	2.03	51.36	11.50	2.54	18.37
% Latino 1980	1.60	0.79	7.36	3.78	3.23	59.53	24.21	3.14	23.22
% Latino 1990	1.66	0.71	7.44	3.77	4.34	66.70	36.46	4.33	26.82
% Latino 2000	1.74	0.64	7.54	3.76	5.34	72.86	48.26	6.10	29.17

Table 0.5. Observed racial and ethnic composition, socioeconomic characteristics, and ecological characteristics of tracts from 1970-2000 by most likely neighborhood latent trajectory class membership

	Pct. black	Pct. Latino	Pct. white	Mean home value	Mean HH income	Pct. Coll. educ.	Pct. poor	Pct. vacant	Pct. owner-occupied	Pct. central city
Stable white										
1970	0.56	2.03	97.40	$112,255	$62,617	15.68	4.28	4.00	74.45	15.02
1980	1.82	2.95	95.23	$140,288	$58,766	23.06	4.46	4.79	74.60	
1990	2.63	4.32	93.05	$155,871	$72,636	29.10	4.84	4.20	73.77	
2000	4.48	8.21	87.31	$181,348	$78,968	34.77	5.23	3.66	75.76	
Change 1970-2000	3.92	6.18	-10.10	$69,093	$16,350	19.09	0.96	-0.34	1.31	
Stable black										
1970	92.08	1.47	6.45	$31,084	$36,172	4.09	24.55	7.37	36.89	94.56
1980	96.86	1.17	1.96	$34,359	$31,645	5.94	35.04	7.93	29.92	
1990	97.51	0.81	1.68	$44,487	$28,485	7.96	41.22	14.18	31.55	
2000	96.43	1.42	2.16	$65,747	$35,253	11.24	34.51	14.18	34.26	
Change 1970-2000	4.35	-0.05	-4.30	$34,664	-$919	7.15	9.96	6.82	-2.63	
Stable diverse integration										
1970	33.75	9.23	57.02	$44,809	$44,599	12.17	15.33	7.49	50.21	55.29
1980	46.01	11.65	42.33	$54,856	$39,917	18.04	20.59	9.83	40.36	
1990	49.65	12.91	37.44	$64,245	$43,818	22.82	23.77	10.48	41.51	
2000	50.13	17.44	32.43	$87,609	$50,400	25.67	21.06	8.96	46.19	
Change 1970-2000	16.38	8.21	-24.59	$42,800	$5,801	13.49	5.73	1.46	-4.02	
All-white to all-black transition										
1970	6.52	5.06	88.42	$54,895	$48,632	7.33	7.41	3.85	58.55	82.28
1980	74.97	6.21	18.82	$57,280	$44,369	9.13	18.77	5.68	57.05	
1990	89.06	3.60	7.34	$53,653	$41,681	9.72	23.08	9.21	57.00	
2000	90.36	3.71	5.92	$70,194	$44,410	11.45	23.57	8.45	55.58	
Change 1970-2000	83.84	-1.35	-82.49	$15,299	-$4,222	4.12	16.16	4.60	-2.97	
All-white to diverse integration										
1970	0.39	2.43	97.18	$91,581	$56,789	11.61	3.91	2.85	71.90	28.21
1980	7.20	8.24	84.56	$94,032	$53,868	14.80	6.02	3.55	69.59	
1990	35.92	7.77	56.31	$79,651	$52,399	17.11	11.77	5.58	68.20	
2000	64.12	9.38	26.50	$92,057	$54,351	18.89	12.43	5.75	67.42	
Change 1970-2000	63.73	6.94	-70.68	$476	-$2,438	7.28	8.52	2.90	-4.47	

Table 0.5. Observed racial and ethnic composition, socioeconomic characteristics, and ecological characteristics of tracts from 1970-2000 by most likely neighborhood latent trajectory class membership (continued)

	Pct. black	Pct. Latino	Pct. white	Mean home value	Mean HH income	Pct. Coll. educ.	Pct. poor	Pct. vacant	Pct. owner-occupied	Pct. central city
Integrated white-Latino to all-Latino										
1970	4.39	51.18	44.43	$12,110	$37,890	2.48	16.35	7.89	30.62	94.59
1980	6.39	72.40	21.21	$14,003	$34,675	3.79	28.32	10.94	27.54	
1990	8.79	78.74	12.47	$19,024	$32,432	5.42	31.54	12.44	29.24	
2000	11.62	73.64	14.74	$47,570	$38,660	13.06	27.82	10.67	29.79	
Change 1970-2000	7.23	22.46	-29.69	$35,460	$770	10.58	11.47	2.78	-0.83	
Mostly white to predominantly Latino										
1970	2.58	12.66	84.76	$36,935	$43,415	4.28	9.60	4.61	41.24	72.50
1980	4.54	39.37	56.09	$41,852	$40,393	7.44	16.62	7.34	43.00	
1990	9.21	59.40	31.39	$44,592	$38,101	8.08	21.78	8.35	42.21	
2000	9.10	71.86	19.04	$63,581	$44,007	10.16	21.51	6.97	42.58	
Change 1970-2000	6.52	59.19	-65.72	$26,646	$592	5.88	11.91	2.36	1.33	
Late Latino growth										
1970	0.63	3.11	96.26	$71,662	$51,285	6.72	5.39	3.53	60.33	47.62
1980	1.96	8.32	89.72	$81,530	$47,843	10.23	7.10	4.95	58.77	
1990	3.80	22.75	73.45	$78,746	$47,781	12.45	9.15	4.91	59.14	
2000	6.26	53.03	40.71	$92,744	$51,327	13.45	11.59	4.62	59.37	
Change 1970-2000	5.63	49.91	-55.55	$21,082	$41	6.73	6.21	1.09	-0.96	
Latino growth followed by displacement										
1970	2.57	19.49	77.94	$15,369	$38,439	5.86	15.18	6.91	26.71	100.00
1980	7.03	34.63	58.33	$29,849	$37,518	16.38	20.86	11.21	23.77	
1990	10.56	31.25	58.18	$68,820	$46,937	31.02	19.43	11.92	27.30	
2000	9.46	19.90	70.64	$129,460	$71,059	53.20	13.58	7.42	34.71	
Change 1970-2000	6.88	0.41	-7.30	$114,091	$32,620	47.34	-1.60	0.51	8.00	

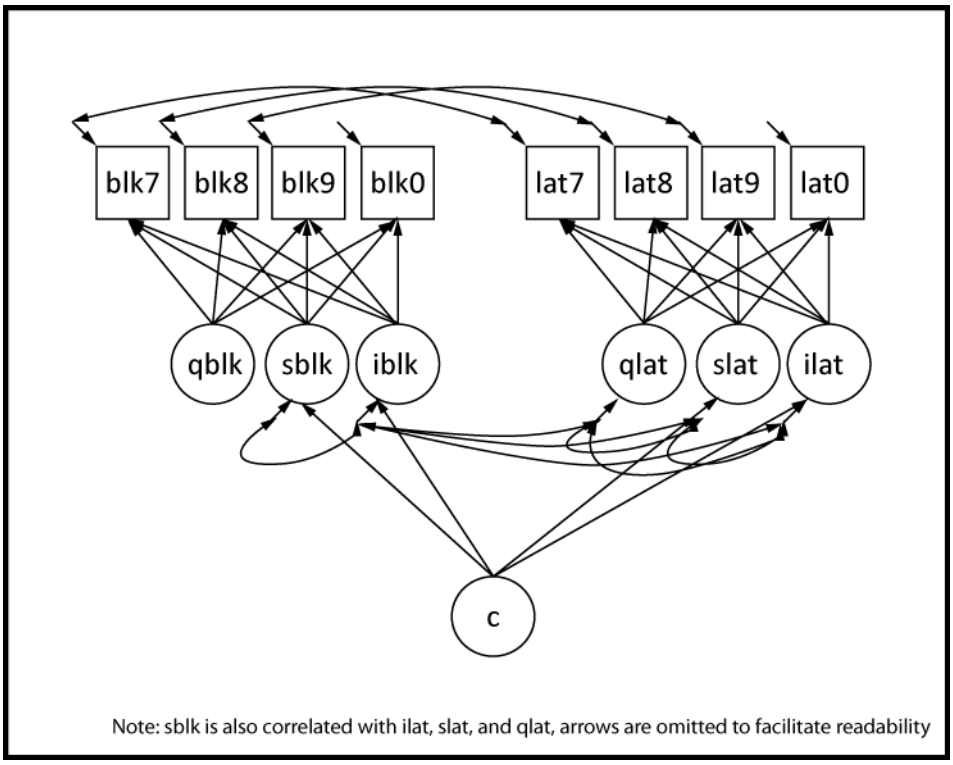

Figure 0.1. Conceptual diagram of growth mixture model

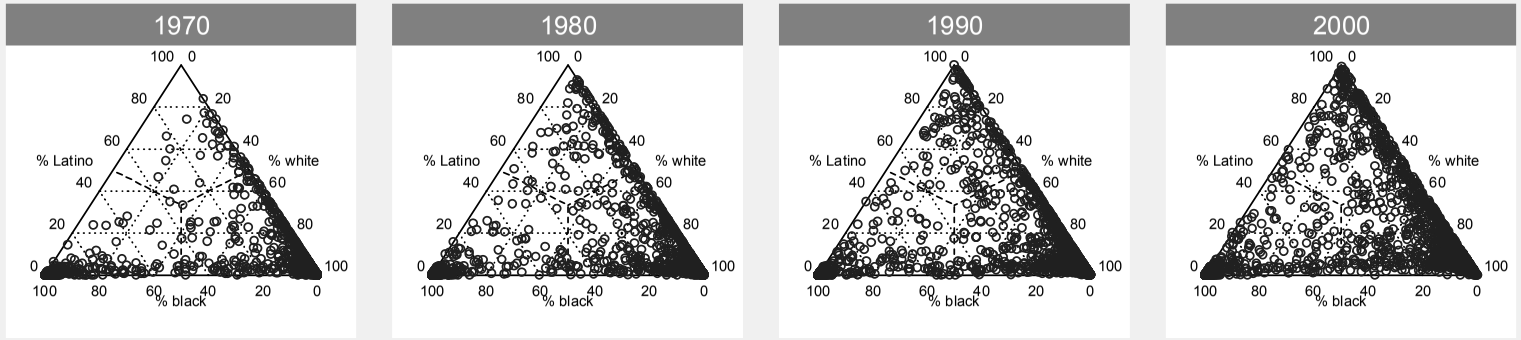

Figure 0.2. Ternary plots of non-Latino white, non-Latino black, and Latino racial and ethnic composition in 1970, 1980, 1990, and 2000 for tracts in the Chicago-Gary-Kenosha, IL-IN-WI CMSA

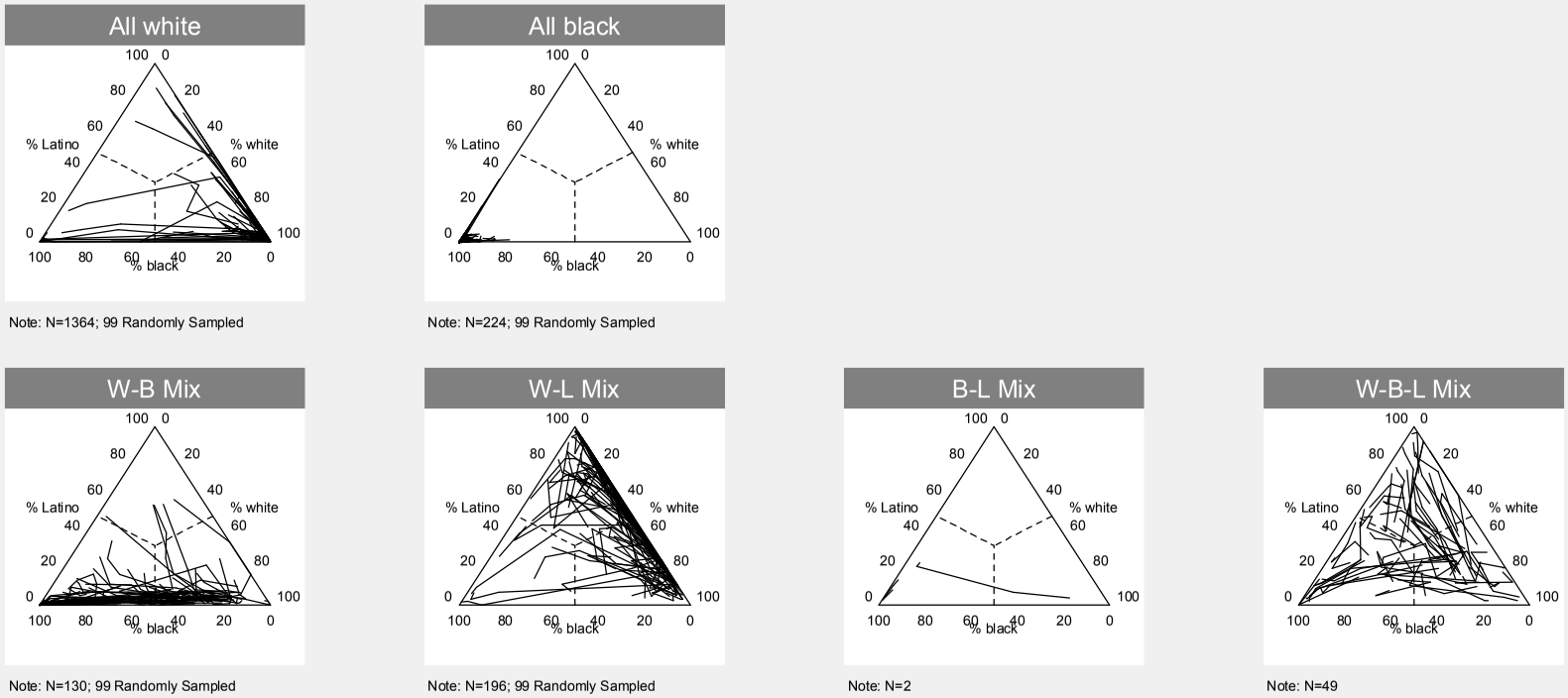

Figure 0.3. Ternary plots showing trend in decadal racial and ethnic change from 1970 to 2000, by racial and ethnic composition in 1970

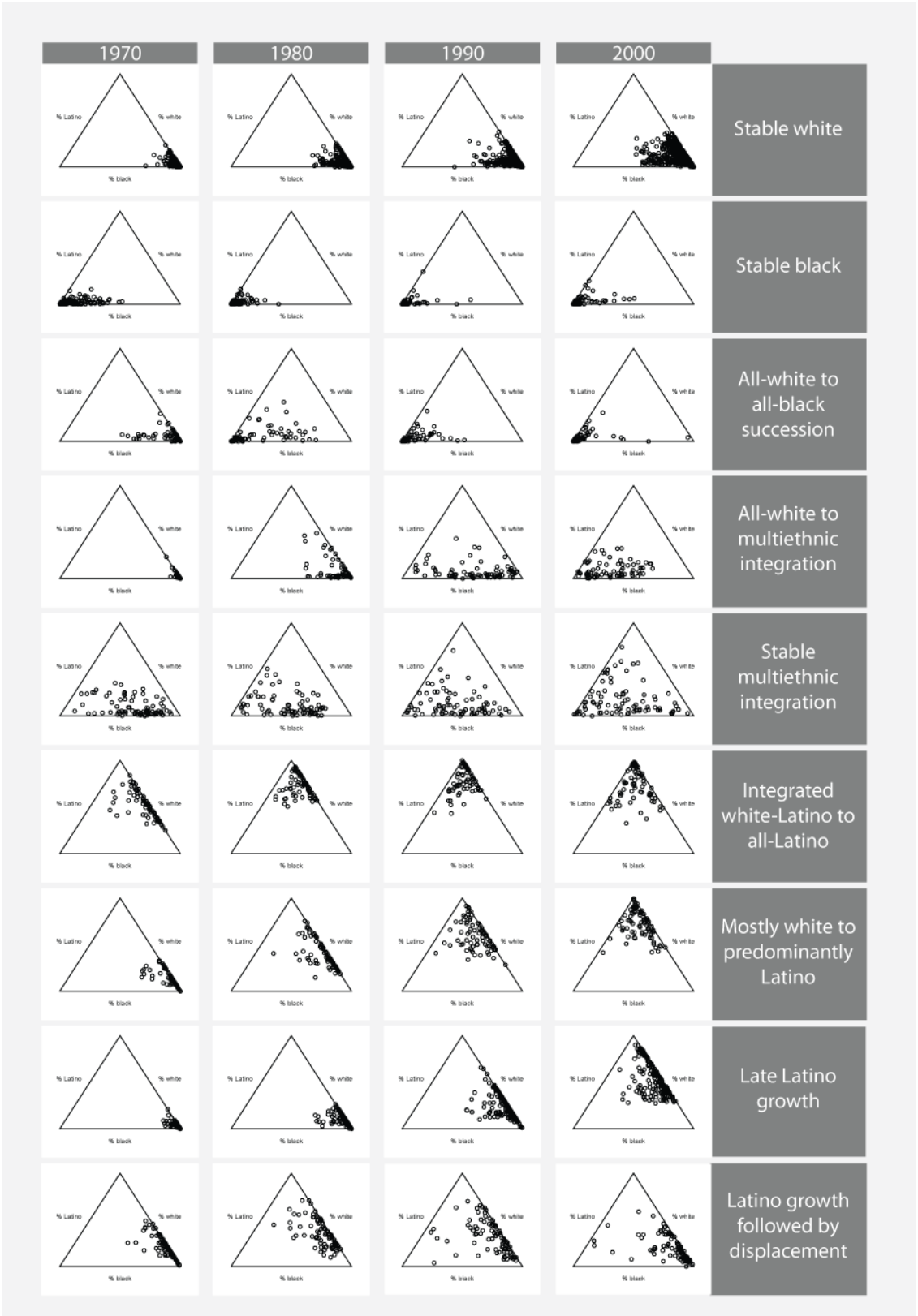

Figure 0.4. Ternary plots of observed racial and ethnic compositions in 1970, 1980, 1990, and 2000 by neighborhood latent growth trajectory class

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