Trajectories of Ethnoracial Diversity in American Communities, 1980-2010

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Introduction: The increasing racial and ethnic diversity of American society is a contemporary demographic master trend. Driven by immigration, differential fertility, youthful age structures, and other forces, minority population gains are visible both 'on the ground' and through media coverage and policy debates. Questions continue to be raised about the consequences of Hispanic and Asian growth for such domains as the economy, education, health care, and civic engagement. So far, the empirical evidence on these issues remains mixed (Lichter 2013; Putnam 2007). But current projections make clear that the white slice of the national population 'pie' will shrink for the foreseeable future while the slices of every non-white panethnic group—blacks and Native Americans as well as Hispanics and Asians—are likely to expand (U.S. Census Bureau 2012). Further ethnoracial diversification, or movement toward more equal-sized slices, thus appears inevitable for the U.S. as a whole.

Below the national level, unevenness in the pace and nature of diversity change is to be expected. Existing research clusters at opposite ends of the 'local' continuum, focusing on either neighborhoods or metropolitan areas. Several neighborhood-oriented studies document a decline in the number of all-white census tracts coupled with a sharp rise in tracts shared by multiple racial-ethnic groups (Farrell & Lee 2011; Logan & Zhang 2010). Yet whites' sensitivity to minority neighbors renders multi-ethnic tracts fragile, in part because whites leave such settings over time and are disinclined to move into them in the first place (Charles 2006; Crowder et al. 2011; Lee et al. 2014). Similarly, large metropolises and their principal cities have trended toward greater diversity due to minority and immigrant growth and, in some instances, white population loss (Berube 2003; Frey 2011b). The suburban portions of many metropolitan areas are also experiencing a rise in black, Hispanic, and Asian representation, albeit to a lesser extent than the metro core (Frey 2011a; Singer et al. 2008). But patterns are far from uniform.

We avoid the neighborhood and metropolitan extremes of local geographic scale, extending research on ethnoracial diversity to census-defined places. Places, which include cities, suburbs, towns, boroughs, and villages, are especially relevant for our purposes. Most of them correspond to governmental jurisdictions and service districts; the largest often approximate housing and labor markets. Incorporated places may take steps to promote or discourage diversification, and they are typically responsible for developing fiscal or policy responses to diversity-related issues that arise within their boundaries. The racial-ethnic mix of locally embedded institutions (e.g., schools, work settings, and political and civic organizations) is also affected by a place's population composition. To a greater degree than tracts or metro areas, then, places constitute 'real' communities as well as convenient statistical aggregations.

Despite their functional importance, places have received scant attention in the diversity literature (for an early exception, see Allen & Turner 1989). A pair of recent investigations shows regular increases in place diversity from 1980 through 2010—the period of interest to us—with some variation by population size, metropolitan/nonmetropolitan status, and regional location (Lee & Hughes 2014; Lee et al. 2012). A key objective of our analysis is to compare subsequent paths of diversity change among four types of places that differed in racial-ethnic composition three decades ago: all-white,

mostly-white, white-black, and white-Hispanic communities. These four types are highlighted in part because of their prevalence at the beginning of the study period. Moreover, the 'combination' places (white-black and white-Hispanic) might be anticipated to exhibit higher levels of and greater gains in diversity over time than the all-white or mostly-white types.

In addition to adopting place as our unit of analysis, we advance the study of local ethnoracial diversity trends in two ways. Conventional practice has been to shed light on such trends by calculating mean diversity levels for multiple census years or by constructing transition matrices, which trace 'moves' of communities from one kind of racial-ethnic structure to another between t_1 and t_2. However, both means and transition matrices may mask the range of paths that places follow. To address this limitation, we employ growth mixture models or GMMs (Preacher et al. 2008) to identify trajectories of diversity change from 1980 through 2010. GMMs do not assume a single trajectory for all places; instead, they offer an empirical strategy to assess the variation in diversity patterns exhibited by subsets of places. Here we emphasize trajectories discerned for communities that were all-white, mostly-white, white-black, or white-Hispanic in 1980. Our analysis builds on the work of Bader and Warkentien (2014), who have used GMMs to investigate neighborhood (tract) trajectories of racial change in New York, Los Angeles, Chicago, and Houston.

The final improvement that we make involves the definition of diversity itself. The concept has often been operationalized rather crudely, as the proportion of minority residents in a community or as the presence of racial-ethnic groups based on some arbitrary size threshold (e.g., 30 or 100 group members). We prefer a more precise, intuitive approach, employing a statistical measure—the entropy index (*E*)—that equates high diversity with a larger number of equal-sized groups (White 1986). While *E* captures diversity magnitude, it reveals nothing about the racial-ethnic structure of a place, i.e., the specific groups that make up the local population. Structure becomes important in its own right when one realizes that a hypothetical place with equal numbers (thirds) of white, Asian, and Hispanic residents would yield the same *E* value as a place where Hispanics, blacks, and Native Americans each constitute a third of the population.

Our research takes both diversity magnitude and structure into account. Drawing on decennial census data, we paint a fine-grained picture of changes in ethnoracial diversity across a large sample of places during the 30 years from 1980 through 2010. Four research questions guide the analysis. First, what does the overall or average trend in diversity magnitude look like, both for the full sample and separately for the places that were all-white, mostly-white, white-black, or white-Hispanic in 1980? Second, how much variation exists in the trajectories identified for each type of place utilizing GMM? Third, do distinctive shifts in racial-ethnic structure accompany the most common trajectories followed by places of each type? And fourth, is the likelihood of exhibiting a particular trajectory associated with population size, metropolitan status, regional location, or other place characteristics?

Data and Methods: We use data from the 1980-2010 decennial censuses to describe patterns of and trends in diversity for U.S. communities over the last three decades. Our file includes all census places with populations of 1,000 or more at each time point. Most of these places are incorporated—i.e., cities, suburbs, towns, villages, and other local municipalities with governing authority—while some are determined by the Census Bureau to resemble incorporated communities even though they lack municipal status. In addition, we omit places that were not established by 1980 or that changed names between 1980 and 2010. Unlike many neighborhood-level studies, we use contemporaneous geographic boundaries in order to capture the actual experience of ethnoracial diversity within the community in a given year.

We allocate the residents of a place to one of five racial-ethnic categories: Hispanics and non-Hispanic whites, blacks, Asians/Pacific Islanders, and all other non-Hispanics. Places in turn are classified into four types based on their 1980 composition. All-white communities were 90% or more

white in 1980. Mostly-white communities were less than 90% white but no other group comprised as much as one-tenth of the population. White-black communities consist of both majority-black places (N=276) and those with substantial numbers of white and black residents (both groups exceeding 10% and no other group more than 10%; N=1,671). In similar fashion, white-Hispanic communities may be either majority-Hispanic (N=218) or include non-trivial proportions of whites and Hispanics (N=625). This classification scheme summarizes the 1980 racial-ethnic structure of American communities in a concise yet thorough manner, capturing all but 341 places. In total, our analysis examines ethnoracial diversity in 10,583 places.

Diversity is measured with the entropy index (symbolized by *E*), which assesses the extent to which the distribution of racial-ethnic groups in each community deviates from a hypothetical (uniform) distribution in which all groups comprise equal shares (20% in our case). The index is expressed as:

$$E_i = \sum_{r=1}^{R} \Pi_{ri} \ln\left(\frac{1}{\Pi_{ri}}\right)$$

where r refers to racial-ethnic groups in community i. When normalized by the log of the number of groups (R=5), the resulting *E* scores range from 0 to 1, with values closer to 1 identifying highly diverse places (i.e., where ethnoracial composition approximates the uniform distribution) and values closer to 0 depicting more homogeneous places (i.e., where a single racial-ethnic group predominates).

As noted earlier, we employ growth mixture models (GMMs) to describe common trajectories of diversity change throughout the 1980-2010 period. An extension of latent class analysis, GMMs improve on simple panel-style descriptions of 'average' change between two time points and extend traditional growth modeling approaches, which assume that a single growth trajectory can describe an entire population of subjects (McCutcheon 1987; Preacher et al. 2008). GMMs relax this assumption and facilitate the estimation of different growth parameters for distinct (unobserved) subpopulations, resulting in separate models for each latent class. The GMM approach allows us to identify subsets of places that have unique diversity trajectories and patterns of change.

Preliminary Results: Our analysis highlights the varied pathways that communities have followed toward (or away from) ethnoracial diversity. This variation in patterns of diversity change is evident from the simple boxplots in Figure 1, which graphically illustrate the year-specific distributions of *E* scores for places with each type of 1980 racial-ethnic structure. The general trend—illustrated by changes in median diversity (the horizontal line in the middle of each box) over time—is one of diversification, but the heterogeneity both across and within types of places is striking. Across pre-existing (1980) racial-ethnic structures, the plots show that diversification accelerated rapidly in all-white and mostly-white communities over the 1980-2010 period. Median levels of ethnoracial diversity also rose in white-black and white-Hispanic places albeit by a comparatively modest amount. The within-type variation—conveyed by the height and spread of the boxplots—is revealing as well. For example, the variation in diversity in all-white communities suggests that some diversified extremely rapidly, with 813 (11.4%) achieving *E* scores in 2010 above 50. Other initially all-white places remained homogenous, with 561 (7.8%) not reaching a diversity score of 10.

Growth mixture models (GMMs) more formally describe the variation in diversity patterns for our sample of places, identifying common trajectories that subsets of places have taken. Figure 2, which graphically summarizes the GMM results, is split into four panels that show estimated trajectories for all-white (Panel A), mostly-white (Panel B), white-black (Panel C), and white-Hispanic (Panel D) communities. Within each panel, the embedded legend reports the percentage of all communities falling within each estimated curve. For those places with all-white populations in 1980, the mixture

models yield six distinct trajectories of change that are differentiated both by their diversity starting points and by their pace of diversity change. The trajectories representing the largest share of places are the brown and blue curves, which begin at relatively low levels of diversity and increase modestly. Combined, these trajectories capture 59% of the all-white communities. Although all-white communities that reached high levels of diversity (portrayed by the red curve) are rare, they do exist. Among the places exhibiting this trajectory is the Seattle suburb of Bellevue, which experienced a rise in racial diversity from 24.3 in 1980 to 66.1 in 2010.

Panel B of Figure 2 shows the estimated trajectories for places that were mostly white in 1980. Four distinct paths of diversity are identified, once again distinguished by their starting points and slopes. Aside from the varied paths that communities of this type took—with a substantial share (18.3%; orange curve) reaching very high diversity levels by 2010 and another sizeable portion (17.0%; blue curve) diversifying slowly—the trajectories in Panel B highlight variability in the timing of diversification: some mostly-white places appear to have diversified much earlier than others.

As shown by the 13 paths estimated from the mixture models in Panel C, communities defined as white-black in 1980 are highly variable in their diversity trajectories. In contrast to all-white and mostly-white communities, where the modal trend was toward greater diversity, white-black places are less monolithic in their overall tendencies. Specifically, a number of paths—those marked in teal, purple, red, and brown—move away from diversity (i.e., toward greater ethnoracial homogeneity). Included in this set of communities are places like Fairfield, AL and Kettering, MD.

The 843 communities identified in 1980 as white-Hispanic are even more variable in their diversity paths. Panel D shows the 15 GMM-generated trajectories for these places. Like white-black places, their diversity trajectories differ in starting points, rates of change, and timing. The dominant path (in orange in Panel D) is one of modest diversification, but it captures a mere 15.1% of all white-Hispanic places. For the most part, other trajectories of change are upward sloping, yet several distinct paths trend in the opposing direction. The yellow, light-brown, purple, and burgundy curves are all downward sloping, representing places that became less diverse over the course of the last three decades. Communities defined by these descending paths are, perhaps not surprisingly, located in California and Texas, including San Joaquin (near Fresno) and Cockrell Hill (surrounded by the city of Dallas).

The trajectories identified via GMM and summarized here are clearly complex. Yet this complexity reflects a demographic reality: while the master trend in the U.S. may be one defined by steady ethnoracial diversification, the timing, pace, and sometimes direction of diversity change are quite uneven at the local level. In the months ahead, we will develop tools to describe the group-specific changes underlying these variable paths. In addition, we will summarize patterns of diversity change according to features of places such as their population size, metropolitan status, and regional location. These analytic exercises will be supplemented with demographic case studies of exceptional places, in the hope of contextualizing both the diversification process itself and the forces driving it.

Figure 1: Diversity Boxplots by 1980 Racial-Ethnic Structure, 1980-2010

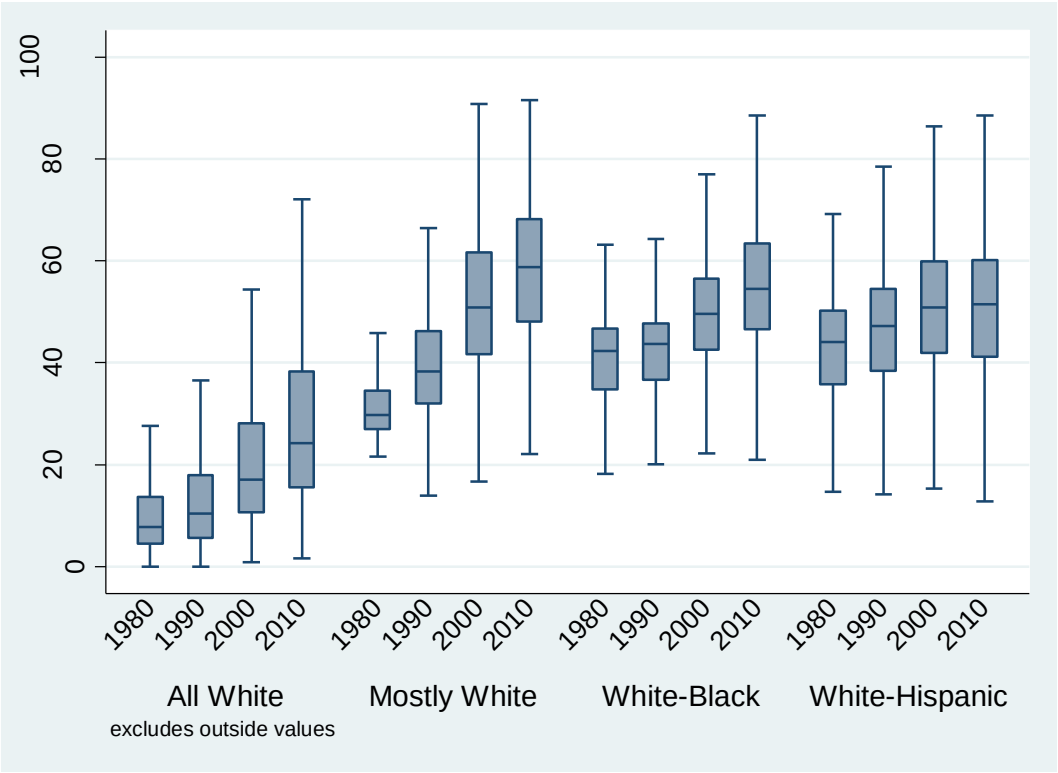
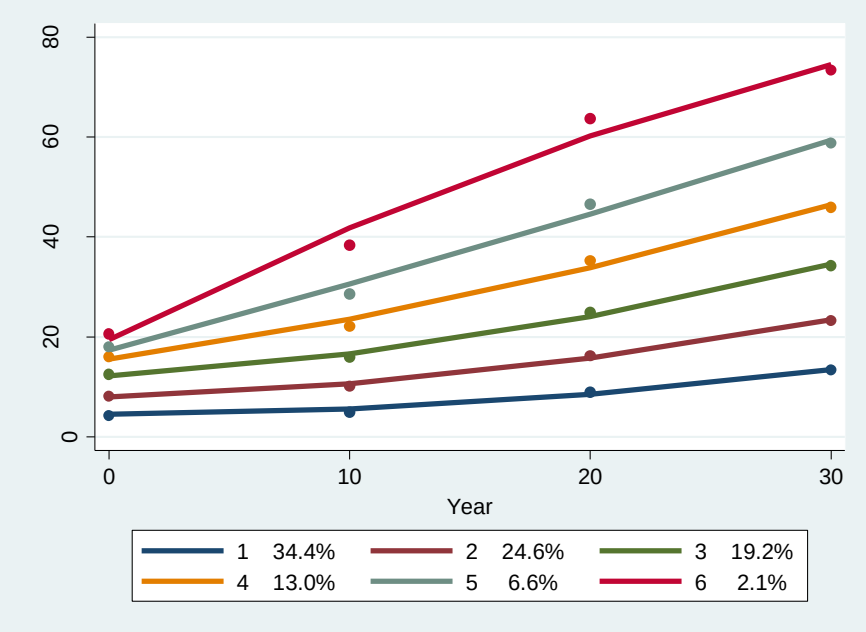
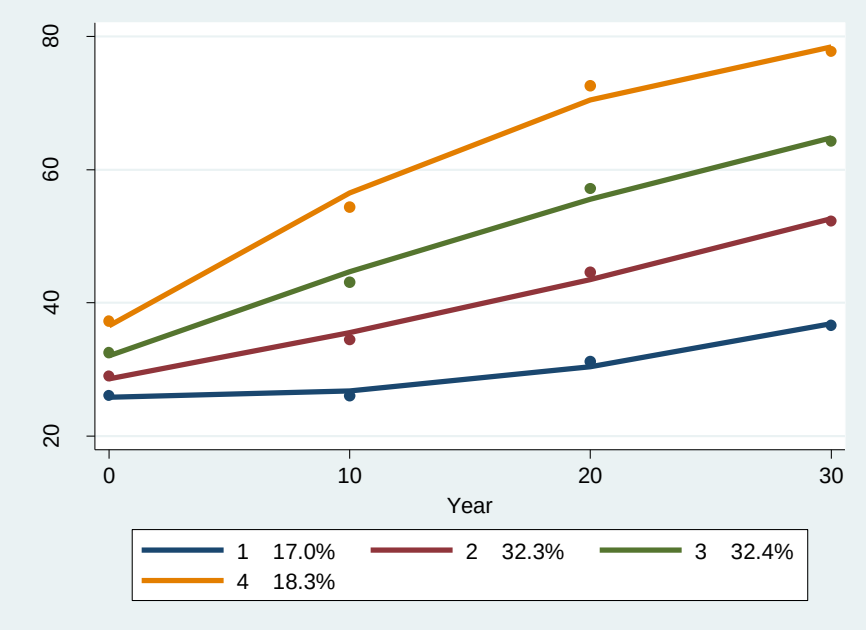


Figure 2: Estimated Diversity Trajectories, by 1980 Racial-Ethnic Structure, 1980-2010

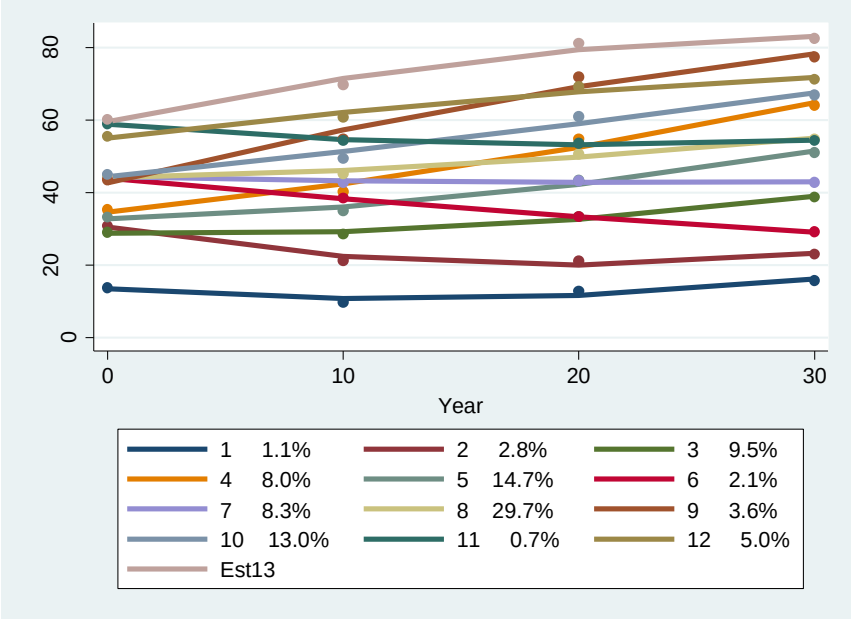
Panel A: All-white communities (N=7,151)



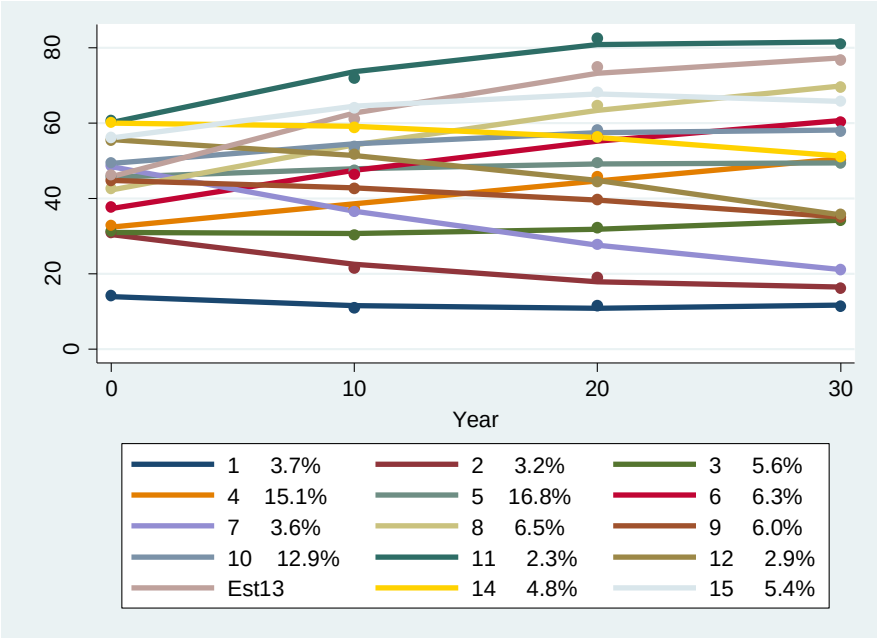
Panel B: Mostly-white communities (N=642)



Panel C: White-black communities (N=1,947)



Panel D: White-Hispanic communities (N=843)



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