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Who moves to mixed-income neighborhoods?☆

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ABSTRACT

This paper uses confidential Census data, specifically the 1990 and 2000 Census Long Form data, to study the income dispersion of recent cohorts of migrants to mixed-income neighborhoods. We investigate whether neighborhoods with high levels of income dispersion attract economically diverse in-migrants. If recent in-migrants to mixed-income neighborhoods exhibit high levels of income dispersion, this is consistent with stable mixed-income neighborhoods. If, however, mixed-income neighborhoods are comprised of homogenous low-income (high-income) cohorts of long-term residents combined with homogenous high-income (low-income) cohorts of recent arrivals, this is consistent with neighborhood transition. Our results indicate that neighborhoods with high levels of income dispersion do in fact attract a much more heterogeneous set of in-migrants, particularly from the tails of the income distribution. Our results also suggest that the residents of mixed-income neighborhoods may be less heterogeneous with respect to *lifetime* income.

1. Introduction

Do neighborhoods with high levels of income dispersion attract economically diverse in-migrants? Or, alternatively, are these neighborhoods simply in transition, so that the income dispersion results from the fact that recent in-migrants have either higher or lower-income than the longer-term residents? This paper analyzes the income dispersion of recent migrants to mixed-income neighborhoods in order to better understand the processes of economic segregation and neighborhood sorting in U.S. urban areas.

There is a sizeable literature measuring economic segregation of U.S. households by neighborhood (Massey and Eggers, 1990; Jargowsky, 1996; Mayer, 2001; Massey and Fischer, 2003; Fischer, 2003; Hardman and Ioannides, 2004; Jargowsky and Yang, 2006). Much of this literature is motivated by an interest in the concentration of poverty. Researchers point out that the degree of economic integration at the neighborhood level can exacerbate or buffer individual-level income inequality by determining the extent to which low-income households experience neighborhoods with a lower tax base, lower levels of public amenities, and reduced access to employment networks (Massey and Fischer, 2003).

There is more generally an interest in how households sort across neighborhoods. Standard economic approaches predict that households will generally sort by income into very homogenous neighborhoods (Tiebout, 1956; Alonso, 1964; Schelling, 1969). The general finding in the literature is that while economic segregation has increased over time, there remains a substantial degree of income heterogeneity at the neighborhood level, much more than observed with respect to racial segregation (Farley, 1977; Massey and Fischer, 2003; Fischer, 2003). Contrary to the predictions of basic economic theory, a very large fraction of the variation in household income within metropolitan areas is within-neighborhood variation compared to between-neighborhood variation (Farley, 1977; Jargowsky, 1996; Mayer, 2001).[1]

The vast majority of work on neighborhood-level income heterogeneity is cross-sectional, likely due to the fact that it has historically been very difficult to link Census tracts over time. Two

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[1] This apparent contradiction between the economic theory and empirical fact has led economic theorists to explore conditions under which equilibriums with mixed-income neighborhoods are possible (de Bartolome 1990; Frankel, 1998; de Bartolome and Ross, 2003).

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recent studies by Krupka (2008) and Tach (2009), however, explore the stability of mixed-income neighborhoods over time. Using data linking Census tracts or block groups over time, both papers explore the extent to which mixed-income neighborhoods in one Census remain mixed-income neighborhoods in the following Census. As Krupka (2008) points out, observing mixed-income neighborhoods in a single-cross section could reflect the fact that these neighborhoods are in the process of transitioning, for example from a lower-income to a higher-income neighborhood, and therefore temporarily contain a mix of longer-term lower-income residents and more recent high-income arrivals. Distinguishing whether the mixed-income neighborhoods observed in a cross-section are stable or transitioning has important implications for both the standard of living of low and middle class households as well as for the theoretical models of neighborhood sorting.

This paper takes a new approach to the analysis of neighborhood income heterogeneity by studying the income dispersion of recent migrants to neighborhoods with high levels of income dispersion. Non-public Census data, specifically the 1990 and 2000 Census Long Form data, are used to identify, within census tracts, cohorts of households who moved in within the year prior to the Census, within 5 years prior to the Census and within 10 years prior to the Census. If recent in-migrants to mixed-income neighborhoods exhibit high levels of income heterogeneity, this is consistent with stable mixed-income neighborhoods. If, however, mixed-income neighborhoods are comprised of homogenous low-income (high-income) cohorts of long-term residents combined with homogenous high-income (low-income) cohorts of recent arrivals, this is consistent with transitioning neighborhoods.

An additional benefit of access to the micro-level data with the Census tract identifiers is that it is possible to investigate the demographic characteristics of the lower-income and higher-income residents of mixed-income neighborhoods. Previous researchers have raised the possibility that income-disperse neighborhoods could have far less heterogeneity in lifetime income dispersion (Fischer, 2003; Hardman and Ioannides, 2004; Krupka, 2008), but there has been little empirical exploration of this issue.

Our key findings are: (1) There is a sizeable positive relationship between the overall income dispersion of a neighborhood and the income dispersion of recent cohorts of migrants; (2) neighborhoods with greater income dispersion attract a disproportionate fraction of both very low-income and very high-income migrants; (3) income dispersion is less persistent in neighborhoods with a high fraction of black or Hispanic residents; (4) the demographic characteristics of migrants to mixed-income neighborhoods with respect to age and education suggest that neighborhoods with higher levels of income dispersion may be much less heterogeneous with respect to *lifetime* income.

Both Krupka (2008) and Tach (2009) find that neighborhood income dispersion is positively, but not perfectly, correlated from one Census to the next. Ours, however, is the first study that can distinguish between the case of high mobility costs, in which long-term residents are slow to exit transitioning neighborhoods but newer in-migrants are a relatively homogenous group, from the case in which more heterogeneous neighborhoods attract more heterogeneous in-migrants.

2. Stable vs transitioning neighborhoods

Krupka (2008) reviews economic models of neighborhood sorting (Tiebout, 1956; Alonso, 1964; Schelling, 1969) and concludes that mixed income neighborhoods are most likely observed in the transition between homogenous equilibrium neighborhoods. Similar predictions are found in the sociological literature (Park, 1952; Hoover and Vernon, 1959; Tach, 2009). Krupka (2008) analyzes data at the Census block group level linked between the 1980, 1990 and 2000 Decennial Censuses. Using the log standard deviation of income and the coefficient of variation of income as measures of neighborhood income dispersion, he finds that the level of neighborhood income dispersion observed in the cross-section is not stable over time. The neighborhoods with above average levels of income dispersion in one census experience large decreases in dispersion over the following decade. He does, however, find that the adjustment process is relatively slow, so that neighborhood dispersion measures are positively correlated from one Census to the next.

Tach (2009) analyzes Census tract-level data linked from 1970 to 2000 from the Neighborhood Change Database. She categorizes households as low, middle or high-income based on the 33rd and 66th percentiles of household income in the metropolitan area. She then defines as mixed-income those neighborhoods that either (a) contain a relatively even fraction (25–40%) of households from each of the three income groups, or (b) those that contain more than 75% high and low-income households, but less than 50% of either. She finds that only about half of these mixed-income neighborhoods remain categorized as mixed-income in the following Census.

These studies and the cross-sectional studies in the literature only examine aggregate dispersion measures, which reflect a combination of in-migration, exit and income changes among incumbent residents. Our analysis focuses specifically on recent in-migrants to mixed-income neighborhoods, to determine whether neighborhoods with high income dispersion attract economically diverse in-migrants.

Fig. 1 illustrates why comparisons of income dispersion by migration cohort are useful. Panel (A) of Fig. 1 illustrates the income distribution of successive migrant cohorts into a neighborhood with a stable income distribution. The income distributions of each cohort are similar in median and dispersion. Panel (B) of Fig. 1 illustrates a potential pattern for a neighborhood going through income transition. In this case, the two cohorts of migrants exhibit similar income dispersion, both to each other and to the cohorts in panel (A), but median income shifts between the two cohorts. As a result, the overall income dispersion for the neighborhood in (B) is larger than that for the neighborhood in (A). If, however, we were to compare income dispersion by migrant cohort, we would find no difference in the income dispersion of recent arrivals between neighborhoods (A) and (B), nor would we find any difference for the longer-term residents.

Fig. 1, therefore, suggests a useful set of comparisons. If the income dispersion of an individual migrant cohort is highly correlated with the overall income dispersion of the neighborhood population, this is consistent with stable neighborhood income distributions of the type illustrated in panel (A). If, however, there is little relationship between the income dispersion of an individual migrant cohort and the overall income dispersion of the neighborhood population, this indicates that neighborhoods with higher income dispersion are merely transitioning, rather than stable mixed-income neighborhoods.

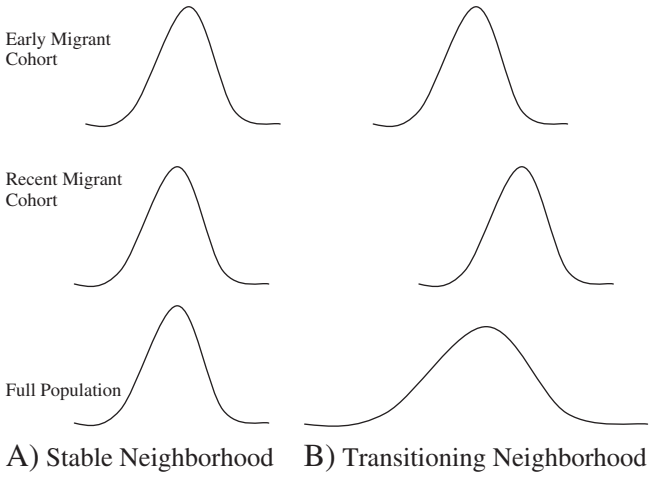

Fig. 1. Neighborhood income dispersion: stable vs transitioning neighborhoods.

Studying income dispersion by migrant cohort allows us to distinguish between two different sets of conditions under which neighborhood income dispersion can be slow to erode. One possibility is that mobility costs are sufficiently high that long-term residents are slow to exit the transitioning neighborhood. In this case, the more recent in-migrants are still a relatively homogenous group. Another possibility is that the more heterogeneous neighborhoods do attract a more heterogeneous group of recent in-migrants. Ours is the first study to explicitly study the income dispersion of recent migrants to neighborhoods in order to determine whether more disperse neighborhoods do in fact attract more diverse migrants.[2]

It should be pointed out that Fig. 1 is highly stylized in that it only considers the role of in-migration and does not consider the role of exit. Non-random exit will also have a large effect on neighborhood income dispersion. Unfortunately, there are no data sources that are well-suited to the study of exit from mixed-income neighborhoods. Therefore this paper will focus on the question of the characteristics of recent arrivals to mixed-income neighborhoods, recognizing that a full picture of the evolution of mixed-income neighborhoods over time includes the characteristics of out-migrants as well.

3. Data

3.1. Census demographic long form data

The analysis in this paper uses the 1990 and 2000 Decennial Census Long Form Data. These are confidential data products of the U.S. Census Bureau that can only be accessed from a Census Research Data Center (CRDC). The Long Form Data contain the population of households that respond to the Long Form survey in the Decennial Census, which is administered to a 1-in-6 sample of all households in the U.S. The samples include 14.3 million households and 38.6 million individuals in the year 1990 and 16.6 million households and 43.5 million individuals in the year 2000.

The analysis in this paper would not be possible with publicly available data. The Public Use Microdata Samples (PUMS) contain a random sample of the Decennial Long Form surveys, but only identify Public Use Microdata Areas (PUMAs), which are areas of at least 100,000 people. In contrast, the confidential Long Form data identify the census tracts, which contain an average of 4000 individuals. The public Census data sets that report aggregate census tract-level characteristics, which have been used in most of the other research on economic segregation, do not disaggregate by key variables such as the migration status of the household.

3.2. Census geography and sample criteria

The U.S. Census Bureau attempts to maintain consistent census tract boundaries over time, but boundaries are sometimes changed as neighborhoods evolve and as tract populations increase or decrease. While much of our key analysis is conducted on separate cross-sections from the 1990 and 2000 Censuses, some of our analyses link tracts across the two census years. The Census Tract Relationship Files from the U.S. Census Bureau show how the 1990 census tracts relate to the 2000 census tracts. This information can be used to develop a concordance file that aggregates tracts to create neighborhood definitions that are unique and consistent across the two census years.[3] If, for example, a 1990 tract split into two tracts in 2000, the two 2000 tracts can be merged into a single neighborhood that is consistent with the original 1990 tract. For less common cases of overlapping tract splits and merges, it is necessary to aggregate over several tracts to obtain one consistent neighborhood.[4] In this paper, the terms neighborhood and census tract refer to these census tract groupings that are linked between 1990 and 2000.

The sample of census tracts for analysis is taken from Metropolitan Statistical Areas (MSAs) and Consolidated Metropolitan Statistical Areas (CMSAs) as defined by the Census Bureau, specifically the 72 MSA/CMSAs in the continental U.S. with populations of at least 500,000 in 1990. Additionally, the sample is limited to the central city tracts, as defined by the Census Bureau. This restriction is made in order to limit the analysis to areas where census tracts most reasonably approximate the geographic area of a "neighborhood." [5] In less dense parts of the metropolitan areas, some of which can be quite rural, tracts can cover areas much larger than what can reasonably be thought of as a neighborhood. Our final sample consists of 12,338 linked tracts from 72 CMSAs. A list of included CMSAs appears in Appendix A.

3.3. Measurement of income and income variance

The household income measure used in this paper sums all forms of income across all members of the householder's family.[6] Income from unmarried partners is included in family income, but we exclude the income from individuals in the household who are otherwise not related to the householder (such as roommates or boarders).

The primary measure of tract-level income dispersion in this paper is the coefficient of variation (CV):

$$CV = \frac{\sigma_x}{\overline{X}},$$

We also conduct sensitivity analysis using three other income dispersion measures: the ratio of the mean to the median (MM), the interquartile range standardized by the median (IQR), and the ratio of the tract standard deviation to the metro-area standard deviation (R).[7] Specifically:

$$MM = \frac{\overline{X}}{X_{med}},$$

[2] Another obvious approach is to compare changes in the median income across successive cohorts. If mixed-income neighborhoods are predominantly transitioning neighborhoods, they should exhibit larger changes in the median income across cohorts. For reasons discussed below, the cross-sectional Census data are less well suited to these sorts of cross-cohort comparisons and we therefore do not pursue the analysis of median income measures in this paper.

[3] The methodology for linking tracts across the two censuses is described in more detail in McKinnish et al. (2010). We thank Randy Walsh for generously allowing us to use the tract-level linking that he developed in that paper.

[4] 82% of the constructed time-consistent neighborhoods contain only one 2000 census tract, and 94% contain no more than two 2000 census tracts.

[5] The census block, an even smaller geographic unit, is also identified. Because, however, CRDC researchers are not currently allowed to link census data over time at the block level, and because the tract more closely relates to our concept of neighborhood, we conduct our analysis at the tract level. Using survey data, Lee and Campbell (1990) find that self reported neighborhoods of residence on average cover 15 square blocks. This finding suggests that census tracts offer a reasonable neighborhood definition for urban areas.

[6] The definition of family used by the Census Bureau is "two or more individuals related by birth, marriage, or adoption who reside together." Our income measure is similar to the family income measure used by the Census Bureau, the largest difference being that householders who do not reside with any relative are still included in our analysis. Unlike the definition of family income used by the Census Bureau, we include the income from individuals designated as the unmarried partner of the householder. Individuals who do not live alone, but are not related to the householder, are not included in our analysis. Their income does not belong in the householder's family's income, but we do not have the migration information to create separate observations for them. The mean fraction of households in a tract with an excluded household member is 6.7% in 1990 and 7.2% in 2000.

[7] An additional benefit of the micro-level data is that we have a large sample of household-level observations of income from which to calculate income dispersion measures. Because the aggregated data used in most other papers only report counts for various intervals of household income, researchers have either had to create dispersion or segregation measures based on various income cut-offs (e.g. Massey and Eggers, 1990; Fischer, 2003; Tach, 2009) or interpolate household-level incomes based on these counts and assumptions about the distribution of income within each interval (e.g. Jargowsky, 1996).

$$IQR = \frac{X_{75pct} - X_{25pct}}{X_{med}},$$

$$R = \frac{\sigma_X}{\sigma_{X,CMSA}}.$$

In order to limit the volume of reported estimates in this paper, we generally discuss qualitatively the results with the additional three measures of income dispersion, but numerical results are available upon request from the authors.[8]

We wish our measures of dispersion to be pure measures of spread, uncorrelated with the median income of the tract. As in Krupka (2008), each measure of dispersion is therefore regressed separately on tract median income. The residuals from these regressions are therefore purged of correlation with tract median income. These residuals are used in all analyses in this paper.

Table 1 regresses tract-level CV on tract demographic characteristics to provide descriptive characteristics of the neighborhoods with higher income dispersion.[9] These regressions also control for CMSA fixed-effects. On average, tracts with higher income dispersion had larger black populations, a larger fraction college graduates, more very young householders as well as more very old householders, and lower median income.[10] The final column adds as a variable the absolute change in the median income between 1990 and 2000 interacted with an indicator for positive change, and an analogous variable interacted with an indicator for negative change. These results indicate that larger values of CV are associated with both larger increases and larger decreases in median income, which is consistent with the idea that at least part of the dispersion is due to neighborhood transition. Both Ellen and O'Regan (2008) and McKinnish et al. (2010) find that there was substantial income growth or gentrification in many previously low-income neighborhoods during the 1990s. It is therefore possible that neighborhood transition was sufficiently prevalent during this period to generate a number of economically heterogeneous neighborhoods.

3.4. Migration cohorts

The PUMS data report, for each household member, whether or not he or she lived in the same housing unit 5 years prior to the survey. The confidential data, fortunately, provide even more detailed information for the householder. For example, in the 2000 data, householders report whether they moved into their current residence from 1999 to 2000, from 1995 to 1998, from 1990 to 1994, or prior. Analogous information is obtained in the 1990 Census. These responses are used to create three cohorts of migrants: those current residents who moved in roughly 5 to 10 years ago (Mig10), those who moved in roughly 1 to 5 years ago (Mig5), and those who moved in roughly during the past year (Mig1).[11] Table 2 reports, for our sample of tracts, the mean proportion of householders who fall in each of the migration cohorts.

The income dispersion measures are calculated for each of these three subsamples of migrants, and additionally for the full sample of households within each tract. One limitation of this research approach is that we do not observe a random sample of households in each migration cohort. We only observe a random sample of, for example, those households that migrated in between 1990 and 1994 and remained through the 2000 Census. To the extent that there is non-random exit from the cohort, our dispersion measure for a particular cohort can be quite different from the dispersion of the cohort when it first arrived in the neighborhood. An additional limitation is that we do not observe household income at the time that they move into their current residence, only their incomes at the time of the Census.[12]

The most recent cohort of migrants is therefore of particular interest. For those households who moved into their current residence within the past year, the neighborhood characteristics in the Census closely approximate the neighborhood characteristics when they chose that location. The incomes of these households reported in the Census should closely match their incomes at the time of their move. Additionally, because of the recent nature of their arrival, there are fewer exits from this cohort by the time of the Census.

In theory we could also use differences in median income across migrant cohorts as a measure of neighborhood transition. The median income of the most recent cohort, however, is only informative when compared to the median income of earlier cohorts. Because these earlier cohorts have experienced non-random exit and changes in income since they first arrived in the neighborhood, there is no way to perform analysis of shifts in median income that is not compromised by these considerable limitations.

Table 1
Tract characteristics associated with higher coefficient of variation in household income.

	1990	2000	2000
%Black	0.413 (0.041)	0.612 (0.048)	0.599 (0.049)
%Hispanic	−0.311 (0.088)	−0.132 (0.102)	−0.109 (0.102)
%HS grad	−1.41 (0.107)	−2.72 (0.148)	−2.56 (0.152)
%College grad	2.21 (0.107)	0.113 (0.142)	−.183 (0.143)
%<30 years old	0.460 (0.236)	2.32 (0.272)	2.25 (0.272)
%30–39 years old	−1.35 (0.294)	0.086 (0.354)	−0.040 (0.356)
%40–49 years old	−0.177 (0.350)	1.60 (0.418)	1.75 (0.419)
%60+ years old	0.199 (0.219)	1.43 (0.262)	1.43 (0.262)
Median income	−0.125 (0.011)	−0.002 (0.012)	−0.016 (0.013)
Income change 1990–2000*positive change			0.098 (0.030)
Income change 1990–2000*negative change			0.048 (0.031)
N	11,879	11,879	11,879

Notes: sample is 11, 879 central city census tracts in 72 most populous CMSA's in 1990. Dependent variable is the tract-level coefficient of variation for household income.

4. Methods

4.1. Comparing income dispersion measures by migrant cohort

The following regression model estimates how the income dispersion for a given migrant cohort compares across tracts with different levels of overall income dispersion:

$$CV_{ctm} = \beta_0 + \beta_1(FCV_t * Mig10_c) + \beta_2(FCV_t * Mig5_c) + \beta_3(FCV_t * Mig1_c) + \beta_4 Mig5_c + \beta_5 Mig1_c + \beta_6 MedInc_t + CMSA_m\delta + \varepsilon_{ctm} \quad (1)$$

[8] The correlations between the CV and MM, IQR and R in the 1990 data are 0.772, 0.685 and 0.369, respectively. Correlations for the 2000 data are very similar.

[9] Our final sample of 11,879 tracts is slightly smaller than the 12,338 reported above due to a subset of tracts with insufficient observations for one or more migrant subsamples to calculate all of the necessary income dispersion statistics.

[10] While the correlation between CV and median income was purged in the simple regression, these two variables can still be correlated once other controls are added to the model.

[11] The Decennial Census records residency for April 1 of the Census year. Mig1 therefore contains, for example, those householders who moved in during 1999 or the first few months of 2000.

[12] One additional unfortunate gap in information in the Decennial Census is that there is no way to identify whether migrant householders previously lived in another housing unit in the same neighborhood or whether they moved in from another census tract. The only information available is whether or not the householder lived in the same county five years prior to the Census. To the extent that those households who have relocated within the same tract have already incurred the migration cost associated with changing residences, they can still be thought of as having chosen their current tract among a set of neighboring census tracts within the same metropolitan area.

Table 2
Mean proportion of households in each migration cohort.

	1990	2000
Mig10: arrived 6–10 years ago	0.139 (0.051)	0.148 (0.043)
Mig5: arrived 1–5 years ago	0.271 (0.073)	0.294 (0.067)
Mig1: arrived in past year	0.222 (0.108)	0.216 (0.099)

Notes: sample is the 11,879 central city census tracts in 72 most populous CMSA's in 1990. Standard deviations in parentheses.

where CV_{ctm} is the logged coefficient of variation for migrant cohort c in tract t in CMSA m. *Mig*10, *Mig*5 and *Mig*1 are indicator variables for the three cohorts of migrants: *Mig*10 equals one for the sample of households who arrived 5 to 10 years ago; *Mig*5 equals one for the sample of households who arrived 1 to 5 years ago; and *Mig*1 equals one for the sample of households who arrived in the past year. *FCV* is the logged coefficient of variation for the full sample of households in the tract.[13] *MedInc* is the median income of the tract and the vector $CMSA_m$ controls for CMSA fixed-effects.[14] Eq. (1) is re-estimated using the three other income dispersion measures: MM, R and IQR. In each case, the dependent variable and the full-sample measures are each replaced accordingly.

If β_3 is positive in Eq. (1), this indicates that tracts with higher overall income dispersion in the full sample also have higher income dispersion in the cohort of households who moved in during the past year. Similar interpretations are given to β_1 and β_2. We focus onβ_3, as we prefer the results using the most recent cohort of in-migrants. Our estimates of β_1 and β_2 indicate how sensitive our results are to the non-random exit and changes in income that more greatly affect the Mig5 and Mig10 cohorts.

One concern about the specification in Eq. (1) could be that the households used to calculate the dependent variable, the income dispersion measures for each migration cohort, are also used to compute an independent variable, the full sample income dispersion measure, therefore inducing a correlation between the two measures. In order to address this concern, we also estimate a version of Eq. (1) using the 2000 Census data, in which we substitute in the full-sample income dispersion measure obtained using the 1990 Census data. This alternative specification therefore estimates the relationship between the tract's income dispersion in 1990 and the income dispersion in 2000 of those cohorts who had moved in between 1990 and 1995, between 1995 and 1999 and between 1999 and 2000.

In order to investigate whether the stability of mixed-income neighborhoods varies by tract racial/ethnic composition, we also add to Eq. (1) interactions of percent black and percent Hispanic in the tract with the variables FCV_t*Mig10, FCV_t*Mig5 and FCV_t*Mig1.

4.2. Comparing income distributions by migrant cohort

Eq. (1) compares the summary measures of income dispersion across neighborhoods. It would be even more satisfying to directly compare the full income distributions themselves. It is easy to compare a single high dispersion neighborhood to a single low dispersion neighborhood, by creating histograms or density estimates for each migrant cohort for each of the two neighborhoods. One could directly compare the income distributions and see how, for each migrant cohort, they differ between the two different neighborhoods. Something very analogous to this exercise can be accomplished by first dividing the households into several income groups. The following categories of household income are based on the metropolitan area's median household income:

I1. Income less than 50% of the metro-area median
I2. Income 50–100% of the metro-area median
I3. Income 100–150% of the metro-area median
I4. Income 150–200% of the metro-area median
I5. Income greater than 200% of the metro-area median

Table 3
Mean tract income distribution statistics.

	1990	2000
I1: %households <50% metro-area median income	0.331 (0.177)	0.348 (0.166)
I2: %households 50–100% metro-area median income	0.267 (0.074)	0.278 (0.070)
I3: %households 100–150% metro-area median income	0.180 (0.064)	0.166 (0.058)
I4: %households 150–200% metro-area median income	0.099 (0.054)	0.089 (0.048)
I5: %households >200% metro-area median income	0.123 (0.120)	0.119 (0.114)
N	11,879	11,879

Notes: sample of 11,879 census tracts described in notes of Table 1.
Table reports the mean fraction of households in a tract that falls in each of the 5 income categories. Standard deviations in parentheses.

Table 3 provides a descriptive breakdown of these categories. For example, in 1990, the average tract in our sample had 33.1% of households in the lowest income category and 12.3% of households in the highest income category.

These income distribution statistics for households in each tract are used in the following regression specification:

$$\begin{aligned} PercentMigGrp_{ictm} = {} & \alpha_1(FCV_t * Mig10_c * I1_i) + \ldots + \alpha_5(FCV_t * Mig10_c * I5_i) \\ & + \beta_1(FCV_t * Mig5_c * I1_i) + \ldots + \beta_5(FCV_t * Mig5_c * I5_i) \\ & + \gamma_1(FCV_t * Mig1_c * I1_i) + \ldots + \gamma_5(FCV_t * Mig1_c * I5_i) \\ & + \phi_1(Mig10_c * I1_i) + \ldots + \phi_5(Mig10_c * I5_i) \\ & + \phi_6(Mig5_c * I1_i) + \ldots + \phi_{10}(Mig5_c * I5_i) \\ & + \phi_{11}(Mig1_c * I1_i) + \ldots + \phi_{15}(Mig1_c * I5_i) \\ & + \phi_{16}MedInc_t + CMSA_m\delta + \varepsilon_{ictm} \end{aligned} \quad (2)$$

Where *PercentMigGrp* is the percent of migrant cohort c in tract t that is in the income category i in CMSA m. *PercentMigGrp* sums to one across the 5 income categories for each migrant group in each tract. *I*1–*I*5 are indicator variables for the 5 income categories. As was the case in Eq. (1), *FCV* is the residual from the regression of the logged full-sample coefficient of variation on tract median income.

The parameters α_1–α_5 effectively trace out the relative income distribution of Mig10 cohort households in high dispersion neighborhoods compared to low dispersion neighborhoods. If, for example, $\alpha_1 > 0$, this indicates that higher dispersion neighborhoods receive disproportionately more of the Mig10 households in the lowest income category compared to the lower dispersion neighborhoods. If, for example, both α_1 and α_5 are positive, this indicates that the income distribution of Mig10 households has thicker tails in higher dispersion neighborhoods than in lower dispersion neighborhoods. Once again, γ_1–γ_5, the estimates for those households who moved into the neighborhood in the past year, are of particular interest.

As was the case with Eq. (1), we estimate a separate version of Eq. (2) using 2000 Census data in which we substitute in the tract's full sample income dispersion measure obtained from the 1990 Census.

[13] Because the distributions of the tract-level income dispersion measures are somewhat skewed, we use the logarithm of these measures in the regression model. The logged measures have been regressed on the tract median income and the residuals, purged of differences in the median income, are used in the regression equations in this paper.

[14] The results are extremely insensitive to the use of MSA fixed-effects or city fixed-effects in place of the CMSA fixed-effects.

Table 4
Income dispersion by migrant cohort.

	Income dispersion measure (IDM)			
	CV	R	MM	IQR
1990 census				
Full sample IDM*Mig10	0.705 (0.008)	0.769 (0.008)	0.899 (0.011)	0.995 (0.014)
Full sample IDM*Mig5	0.762 (0.008)	0.805 (0.008)	0.928 (0.011)	1.073 (0.014)
Full sample IDM*Mig1	0.614 (0.008)	0.669 (0.008)	0.767 (0.011)	0.873 (0.014)
2000 census				
Full sample IDM*Mig10	0.569 (0.007)	0.630 (0.009)	0.853 (0.011)	0.962 (0.013)
Full sample IDM*Mig5	0.627 (0.007)	0.701 (0.009)	0.837 (0.011)	0.994 (0.013)
Full sample IDM*Mig1	0.571 (0.007)	0.636 (0.009)	0.808 (0.011)	0.903 (0.013)
2000 census using full sample IDM calculated from 1990 census				
Full sample IDM*Mig10	0.401 (0.010)	0.400 (0.011)	0.626 (0.013)	0.675 (0.014)
Full sample IDM*Mig5	0.411 (0.010)	0.404 (0.011)	0.589 (0.013)	0.651 (0.014)
Full sample IDM*Mig1	0.394 (0.010)	0.417 (0.011)	0.574 (0.013)	0.580 (0.014)

Notes: sample of 11,789 tracts described in notes of Table 1. Table reports coefficient estimates from the estimation of Eq. (1) using the 1990 Census and the 2000 Census. In the bottom panel, the 2000 regression is re-estimated replacing the full-sample dispersion measure with one calculated for the same tract using the 1990 Census. All regressions control for the tract median income and CMSA fixed-effects.

5. Results

5.1. Income dispersion by migration cohort

Table 4 reports the estimates from the regression specification in Eq. (1) using all four income dispersion measures. Because the income dispersion measures are logged on both sides of Eq. (1), the estimates are interpreted as elasticities. The top panel reports results using the 1990 Census. For our preferred estimates, those for the most recent cohort of migrants, the estimated elasticity using the CV is 0.614, and the elasticities using the other 3 measures range from 0.669 to 0.873. The results in the next panel using the 2000 census are similar. Again for the Mig1 cohort, the estimated elasticity using the CV is 0.571, and the elasticities using the other 3 measures range from 0.636 to 0.903. All of these results indicate a strong positive correspondence between the overall income dispersion and the income dispersion of the cohort of migrants who arrived in the past year.

While, as discussed above, there is the concern that the estimates obtained using the Mig10 and Mig5 cohorts are less reliable, the results using these cohorts are only slightly larger than those obtained for the Mig1 cohort. The estimates obtained for these cohorts range from 0.705 to 1.07 in the 1990 data and from 0.569 to 0.994 in the 2000 data.

The bottom panel of Table 4 uses the 2000 Census measure of the income dispersion for each migrant cohort, but uses the 1990 Census measure of the full-sample income dispersion. Therefore, the samples that are used to compute the income dispersion measures for the migrant cohorts are not used to calculate the full-sample income dispersion. We continue to prefer the estimates obtained using the Mig1 cohort, as this continues to be the sample of migrants that is relatively unaffected by exit and the changes in income since arrival in the neighborhood. In this specification, these coefficients estimate the relationship between total tract dispersion in 1990 and the dispersion of the cohort who arrives 9 to 10 years later. Not surprisingly, therefore, the coefficient estimates obtained from this regression are smaller in magnitude than those in the previous panels. The estimates for the Mig1 cohort range from 0.394 to 0.580.

Overall, the results in Table 4 indicate that the more income disperse neighborhoods do typically attract more economically diverse recent in-migrants. Furthermore, even 10 years out, the neighborhoods with greater dispersion in 1990 are continuing to receive a more diverse set of in-migrants. At the same time, the elasticities are quite a bit below one, indicating that the recent in-migrants are on average less heterogeneous than the tract as a whole.

5.2. Interaction effects with tract racial composition

Table 5 reports the results obtained adding to Eq. (1) interactions with the percent of tract population that is black and percent of the tract population that is Hispanic. We report only the results using the CV measure of income dispersion. The results from the 1990 data in column 1 show that the income disperse tracts that have a high proportion of black or Hispanic residents attract less economically diverse in-migrants than those that have a low proportion of black or Hispanic residents. These results indicate that the elasticities in Table 5 slightly underestimate the elasticities for predominantly white Census tracts, but substantially overestimate the elasticities for the predominantly black or Hispanic tracts.

The results in the final column, those for the 2000 Census using the full sample CV calculating from the 1990 Census, are very similar to those for 1990. The results in the second column, calculating all CV measures from the 2000 data, however, show no evidence of interaction effects with the tract racial/ethnic composition. This finding is unique to the CV measure. Using all three other income dispersion measures, we find sizeable interaction effects in all three specifications in Table 5.[15]

5.3. Income distribution by migration cohort

Table 6 reports estimates from Eq. (2) using the CV as the dispersion measure. For both Census years and for all three migration cohorts, the estimates show that the more income disperse neighborhoods attract a disproportionately higher fraction of households in the lowest and highest income categories, and a correspondingly lower fraction of households in the middle three income categories. The results are just as strong in column 3, when the tract's full sample CV calculated using the 1990 Census is substituted into the analysis for the 2000 Census data. These results show that mixed-income neighborhoods do persist in their ability to attract new residents from the tails of the income distribution. These findings are robust to the use of alternative measures of tract income dispersion.[16]

[15] The empirical estimates obtained using the other income dispersion measures are not reported in the paper to limit the volume of results, but are available from the authors.

[16] Additionally, if the bottom two income classes are further broken into <30%, 30–60%, and 60–100% of the metro median income, the results continue to indicate that tracts with high income dispersion attract migrants disproportionately from the tails of the income distribution, in this case <30% and >200% of the metro-area median income.

Table 5
Income dispersion by migrant cohort, interactions with racial composition.

	1990 census	2000 census	2000 census with full sample CV from 1990 census
Full sample CV*Mig10	0.763 (0.011)	0.566 (0.008)	0.484 (0.014)
Full sample CV*Mig5	0.852 (0.011)	0.639 (0.008)	0.510 (0.014)
Full sample CV*Mig1	0.717 (0.011)	0.557 (0.008)	0.512 (0.014)
Full sample CV*Mig10*% Black	−0.239 (0.024)	−0.007 (0.005)	−0.277 (0.031)
Full sample CV*Mig5*%Black	−0.281 (0.024)	−0.028 (0.005)	−0.276 (0.031)
Full sample CV*Mig1*%Black	−0.318 (0.025)	0.008 (0.005)	−0.325 (0.031)
Full sample CV*Mig10* %Hispanic	−0.030 (0.048)	0.018 (0.007)	−0.174 (0.061)
Full sample CV*Mig5* %Hispanic	−0.257 (0.048)	−0.002 (0.007)	−0.347 (0.061)
Full sample CV*Mig1* %Hispanic	−0.307 (0.048)	0.032 (0.007)	−0.426 (0.061)

Notes: sample of 11,789 tracts described in notes of Table 1. Table 5 reports coefficient estimates from the addition to Eq. (2) of interaction terms with percent of the tract that is black and percent of the tract that is Hispanic. All regressions control for the tract median income and CMSA fixed-effects.

Table 6
Income distribution by migrant cohort.

	1990 census	2000 census	2000 census with full sample CV from 1990 census
Full sample CV*Mig10*I1	0.106 (0.004)	0.096 (0.003)	0.086 (0.004)
Full sample CV*Mig10*I2	−0.055 (0.004)	−0.054 (0.003)	−0.070 (0.004)
Full sample CV*Mig10*I3	−0.096 (0.004)	−0.066 (0.003)	−0.075 (0.004)
Full sample CV*Mig10*I4	−0.051 (0.004)	−0.041 (0.003)	−0.036 (0.004)
Full sample CV*Mig10*I5	0.096 (0.004)	0.066 (0.003)	0.095 (0.001)
Full sample CV*Mig5*I1	0.109 (0.004)	0.092 (0.003)	0.070 (0.004)
Full sample CV*Mig5*I2	−0.075 (0.004)	−0.064 (0.003)	−0.072 (0.004)
Full sample CV*Mig5*I3	−0.091 (0.004)	−0.066 (0.003)	−0.065 (0.004)
Full sample CV*Mig5*I4	−0.037 (0.004)	−0.028 (0.003)	−0.022 (0.004)
Full sample CV*Mig5*I5	0.094 (0.004)	0.065 (0.003)	0.090 (0.004)
Full sample CV*Mig1*I1	0.101 (0.039)	0.085 (0.003)	0.063 (0.004)
Full sample CV*Mig1*I2	−0.079 (0.004)	−0.074 (0.003)	−0.082 (0.004)
Full sample CV*Mig1*I3	−0.067 (0.004)	−0.051 (0.003)	−0.045 (0.004)
Full sample CV*Mig1*I4	−0.023 (0.004)	−0.016 (0.003)	−0.009 (0.004)
Full sample CV*Mig1*I5	0.068 (0.004)	0.056 (0.003)	0.074 (0.004)

Notes: sample of 11,789 tracts described in notes of Table 1. Table 6 reports coefficient estimates from the estimation of Eq. (2) using the 1990 Census and the 2000 Census. All regressions control for the tract median income and CMSA fixed-effects.

5.4. Magnitude of effects

The coefficient estimates in Table 6 can be difficult to interpret in terms of magnitude. Table 7 provides an admittedly highly stylized illustration of the estimated effects. Using the 1990 data, the first column reports means of the I1–I5 income category indicators for the 238 tracts in the 48th–50th percentiles of the CV measure.[17] This provides an income distribution for a "representative" tract of median dispersion. The second column reports the means for the 238 tracts in the 78th–80th percentiles of the CV measure. This column provides an income distribution for a "representative" tract of high dispersion. The first two columns also report the mean of the CV measure for both samples, recalling that the CV measure is the residual from a regression of the logged coefficient of variation on tract median income.

In this illustration, we make a simplifying normalization that the Median CV tract is stable. In other words, we assume that recent migrants into the Median CV tract replicate exactly the distribution reported in the first column. Using the coefficient estimates for the Mig1 cohort from the first column of Table 6, Column 3 of Table 7 reports the predicted income distribution for the Mig1 cohort in the high CV tract.[18]

The assumption in this exercise is that the representative median CV tract, which is 34.42% lowest income (I1) households, receives a Mig1 cohort that is also 34.42% lowest income households. Under this assumption, Table 6 results predict that the representative high CV tract, which is 38.95% lowest income (I1) households, receives a Mig1 cohort that is 37.02% lowest income households. Similarly, at the high end, the median CV tract is 10.4% highest income (I5) households. The representative high CV tract, which is 12.79% highest income households attracts a Mig1 cohort that is 12.15% highest income households.

[17] The primary motivation for taking the means of tracts in the 48th–50th percentiles, rather than just reporting the median, was to avoid the possibility of violating confidentiality requirements of the Census Bureau.

[18] For example, the predicted value of 0.3702 is obtained from 0.3442 + (0.1933–(−0.0659)) *0.1010, where 0.3442 is the proportion I1 households in the median tract, 0.1010 is the coefficient on I1 *Mig1 *CV in the first column of Table 6, and 0.1933–(−0.0659) is the difference in the CV between the representative median income and the high income tracts.

5.5. Demographic characteristics of in-migrants to income disperse neighborhoods

While Eqs. (1) and (2) are estimated with tract-level data, individual data can be used to more fully investigate the demographic characteristics associated with migration into income-disperse neighborhoods. Using the sample of households who moved in the past year (those in the Mig1 cohort), Eq. (3) estimates how the choice to locate in income-disperse tracts varies by income class, age and college education:

$$\begin{aligned} CV_{itm} = {} & \beta_0 + \beta_1 LowInc_i + \beta_2 HighInc_i + \beta_6 Coll_i + \beta_7 LowInc_i * Coll_i \\ & + \beta_8 HighInc_i * Coll_i + \beta_3 Age_i + \beta_4 LowInc_i * Age_i \\ & + \beta_5 HighInc_i * Age_i + \beta_9 Age_i * Coll_i + \beta_{10} Lowinc_i * Age_i * Coll_i \\ & + \beta_{11} HighInc_i * Age_i * Coll_i + X_i\gamma_1 + Medinc_t\gamma_2 \\ & + CMSA_m\gamma_3 + \varepsilon_{itm}. \end{aligned} \tag{3}$$

Using the income categories from Eq. (2), the indicator *LowInc* equals one for households in the lowest income class (I1). The indicator *HighInc* equals one for households in the highest income class (I5). The omitted reference group is therefore the set of households in the middle three income categories (I2–I4). *Coll* is an indicator for a college-educated householder. Eq. (3) also includes controls for race/ethnicity (white non-Hispanic, black non-Hispanic,

Table 7
Magnitude of Table 6 estimates.

	"Representative" median CV tract	"Representative" high CV tract	Predicted Mig1 cohort in high CV tract under assumption of perfect stability in median CV tract
I1	0.3442	0.3895	0.3702
I2	0.2761	0.2473	0.2557
I3	0.1802	0.1502	0.1627
I4	0.0954	0.0851	0.0895
I5	0.1040	0.1279	0.1215
CV	−0.0659	0.1933	

Notes: column 1 reports means for 238 tracts in the 48th–50th percentile of CV measure in the 1990 data. Column 2 reports means for 238 tracts in the 78th–80th percentile of CV measure in the 1990 data. Column 3 reports predicted income distribution of Mig1 cohort in a high CV tract using the difference in CV reported in columns 1 and 2, the coefficient estimates for the Mig1 cohort reported in column (1) of Table 6, and the assumption that the Mig1 cohort in the median tract perfectly replicates the existing distribution.

Table 8
Demographic characteristics of in-migrants to high dispersion neighborhoods.

	Tract CV of households who moved in past year	
	1990	2000
Low-income	0.0924 (0.0055)	0.0707 (0.0048)
High-income	0.0833 (0.0146)	0.0122 (0.0078)
College	0.1292 (0.0099)	0.0829 (0.0063)
Low-income*college	−0.0145 (0.0081)	−0.0249 (0.0068)
High-income*college	0.0518 (0.0189)	0.0247 (0.0107)
Age	0.0004 (0.0001)	−0.0001 (0.0001)
Low-income*age	−0.0012 (0.0001)	−0.0006 (0.0001)
High-income*age	0.0010 (0.0003)	0.0008 (0.0002)
Age*college	−0.0007 (0.0002)	−0.0005 (0.0002)
Low-income*age*college	−0.0004 (0.0002)	0.0000 (0.0002)
High-income*age*college	−0.0002 (0.0004)	0.0005 (0.0002)
N	631,825	690,400

Notes: sample of all householders, in the sample of 11,879 tracts analyzed in Tables 1–6, who moved into their current residence in the past year. Table 8 reports the coefficient estimates from Eq. (3). The dependent variable is the tract coefficient of variation. All regressions include controls for race, presence of children, tract median income and CMSA fixed-effects. Standard errors clustered at the tract level.

and Hispanic), presence of children, tract median income and CMSA fixed-effects.

Eq. (3) is estimated using only the sample of households who moved into their current residence in the past year.[19] The recent migrants who locate in neighborhoods with high income dispersion are therefore selecting into these neighborhoods at the time they are diverse. They are not, for example, households who migrated in a previous period only to find themselves trapped in a transitioning neighborhood due to mobility costs. Eq. (3) therefore characterizes which demographic groups are most likely to move into mixed-income neighborhoods.

Table 8 reports the results from Eq. (3). Consistent with Table 6, the coefficients on LowInc and HighInc indicate that on average low-income and high-income households move into more income-disperse neighborhoods than middle-income households. The results also indicate that in all three income groups, college-educated householders typically move into more income disperse neighborhoods than non-college-educated householders. This effect increases somewhat with household income.

The age effects in Table 8 are quite interesting. Among low-income households, it is the younger householders who move into more income-disperse neighborhoods. Among high-income households, it is the older households who move into more income disperse neighborhoods. Additionally, among college-educated householders, younger households move into more income disperse neighborhoods.[20]

Table 8 suggests that neighborhoods with greater dispersion in annual income may not be nearly as disperse in *lifetime* income. For example, those young householders who expect average annual income across their lifetime to substantially exceed their current annual income may move into higher median income neighborhoods. This may be particularly true for college-educated households, who typically experience greater changes in income over their lifecycle compared to less-educated workers.

[19] Results using the Mig5 and Mig10 cohorts are very similar.

[20] We also estimated a form of Eq. (3) that replaced the interactions with the indicator for college education with interactions with indicators for black and Hispanic householders. Many of the coefficients on the race/ethnicity interactions were insignificant, but the key finding was that the age effects found in Table 7 generally do not exist for black and Hispanic households. We attribute this finding to the fact that black and Hispanic households are much less likely to experience large changes in income over their lifecycle compared to white households.

6. Conclusions

We find that neighborhoods with greater income dispersion do in fact attract a more economically diverse set of in-migrants, particularly from the tails of the income distribution.

While Krupka (2008) and Tach (2009) find that there is a positive correlation in neighborhood income dispersion over time, they only examine aggregate dispersion measures. Therefore, the positive relationship they find could simply reflect mobility costs and slow exit in transitioning neighborhoods. Ours is the first study to analyze the income dispersion of recent migrants to mixed-income neighborhoods.

Our results also indicate that the most recent cohorts are somewhat less heterogeneous than the neighborhood as a whole and that correlations between past levels of income dispersion and income dispersion of future cohorts of in-migrants are considerably less than one. These results confirm that high levels of income dispersion are not fully stable over time. Additionally, we find that mixed-income neighborhoods with a high proportion of black or Hispanic residents attract less economically diverse set of in-migrants.

Finally, our results also suggest that the residents of mixed-income neighborhoods may be less heterogeneous with respect to *lifetime* income. This has important implications in that it suggests that households with permanently low incomes are less likely to inhabit mixed-income neighborhoods than households with temporarily low incomes. Therefore, to the extent that mixed-income neighborhoods buffer the effects of individual-level income inequality, households with chronically low incomes are less likely to receive these benefits.

Appendix A. MSA/CMSAs list

Code	MSA/CMSA name
0160	Albany–Schenectady–Troy, NY
0200	Albuquerque, NM
0240	Allentown–Bethlehem–Easton, PA
0520	Atlanta, GA
0640	Austin–San Marcos, TX
0680	Bakersfield, CA
0760	Baton Rouge, LA
1000	Birmingham, AL
1122	Boston–Worcester–Lawrence, MA–NH–ME–CT
1280	Buffalo–Niagara Falls, NY
1440	Charleston–North Charleston, SC
1520	Charlotte–Gastonia–Rock Hill, NC–SC
1602	Chicago–Gary–Kenosha, IL–IN–WI
1642	Cincinnati–Hamilton, OH–KY–IN
1692	Cleveland–Akron, OH
1840	Columbus, OH
1922	Dallas–Fort Worth, TX
2000	Dayton–Springfield, OH
2082	Denver–Boulder–Greeley, CO
2162	Detroit–Ann Arbor–Flint, MI
2320	El Paso, TX
2840	Fresno, CA
3000	Grand Rapids–Muskegon–Holland, MI
3120	Greensboro–Winston–Salem–High Point, NC
3160	Greenville–Spartanburg–Anderson, SC
3240	Harrisburg–Lebanon–Carlisle, PA
3280	Hartford, CN
3362	Houston–Galveston–Brazoria, TX
3480	Indianapolis, IN
3600	Jacksonville, FL
3760	Kansas City, MO
3840	Knoxville, TN
4120	Las Vegas, NV
4400	Little Rock–North Little Rock, AR
4472	Los Angeles–Riverside–Orange County, CA
4520	Louisville, KY–IN
4920	Memphis, TN–AR–MS
4992	Miami–Ft. Lauderdale, FL

Appendix A (*continued*)

Code	MSA/CMSA name
5082	Milwaukee–Racine, WI
5120	Minneapolis–St. Paul, MN–WI
5360	Nashville, TN
5560	New Orleans, LA
5602	New York–Northern New Jersey–Long Island, NY–NJ–CT–PA
5720	Norfolk–Virginia Beach–Newport News, VA–NC
5880	Oklahoma City, OK
5920	Omaha, NE–IA
5960	Orlando, FL
6162	Philadelphia–Wilmington–Atlantic City, PA–NJ–DE–MD
6200	Phoenix–Mesa, AZ
6280	Pittsburgh, PA
6442	Portland–Salem, OR–WA
6480	Providence–Fall River–Warwick, RI–MA
6640	Raleigh–Durham–Chapel Hill, NC
6760	Richmond–Petersburg, VA
6840	Rochester, NY
6922	Sacramento–Yolo, CA
7040	St. Louis, MO–IL
7160	Salt Lake City–Ogden, UT
7240	San Antonio, TX
7320	San Diego, CA
7362	San Francisco–Oakland–San Jose, CA
7560	Scranton–Wilkes–Barre–Hazelton, PA
7602	Seattle–Tacoma–Bremerton, WA
8000	Springfield, MA
8160	Syracuse, NY
8280	Tampa–St. Petersburg–Clearwater, FL
8400	Toledo, OH
8520	Tucson, AZ
8560	Tulsa, OK
8872	Washington–Baltimore, DC–MD–VA–WV
8960	West Palm Beach–Boca Raton, FL
9320	Youngstown–Warren,OH

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