Neighborhood Economic Change in an Era of Metropolitan Divergence

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ABSTRACT

Urban scholars' dominant focus on neighborhood- and macro-level patterns and predictors of neighborhood economic stratification obscures the metropolitan area's role. This paper applies a metro-level lens to neighborhood economic change by: (1) distinguishing between neighborhood income shifts relative to other neighborhoods within the same metro (local fluidity) and to the national neighborhood distribution (national mobility); (2) estimating variation in each outcome across metros; and (3) decomposing each axis of variation as a function of neighborhood- and metro-level factors. Multilevel analysis of U.S. Census 2000, American Community Survey (ACS) 2011 – 2015, and Equality of Opportunity Project data reveals that 7% of the variation in local fluidity and 14% of the variation in national mobility resides between, rather than within, U.S. metros. Metro-level estimates of the two neighborhood outcomes are weakly correlated, suggesting distinct processes drive each. Upon further examination, the place stratification and ecological context accounts of spatial inequality appear to illuminate metro variation in local fluidity and national mobility, respectively. These insights inform place-based urban policies and lay the groundwork for finer-grained multilevel models that clarify the drivers and consequences of various types of neighborhood economic change.

Patterns of, and explanations for, neighborhood socio-demographic change have dominated urban research since the Chicago school. In recent years, growing academic consensus on the existence of neighborhood effects and amplified public scrutiny of one particularly visible form of neighborhood change – gentrification – have revived this line of inquiry. Despite widespread perceptions of fluidity, most analyses suggest change is the exception, not the rule; American neighborhoods' economic positions are remarkably persistent when evaluated within particular metropolitan areas and on a national scale. Several scholars have inferred that even macro-level shifts – including social change, demographic transitions, economic transformations, and federal policy reforms – are insufficient to disrupt the reproduction of neighborhood inequality (Sampson 2012; Sharkey 2013).

However, urban scholars' dominant focus on neighborhood- and macro-level patterns and predictors of change obscures metropolitan-level processes' role. While a growing body of work has applied a metro-level lens to communities' race-ethnic transitions (Crowder, Pais, and South 2012; Lichter, Parisi, and Taquino 2015), few studies have rigorously applied it to neighborhood economic stratification and change. As a result, clarity on whether neighborhoods remain "stuck in place" (Sharkey 2013) at similar rates across local contexts and on what metro-level processes shape neighborhood income inequality remains elusive. These concerns are particularly salient today, given the "Great Divergence" in U.S. metros' economic and social conditions (Moretti 2012).

Applying a metro-level lens not only clarifies the patterns of and multilevel processes driving neighborhood-level economic conditions; it sharpens our conceptualization of neighborhood inequality and change by highlighting a distinction central to income mobility research but peripheral to spatial inequality literature: relative versus absolute change. In the neighborhood context, local fluidity refers to change in a community's relative income position within an ecological unit such as a metropolitan area, whereas national mobility refers to absolute shifts relative to the entire distribution of U.S. neighborhoods. In this paper, I articulate the theoretical differences between the two phenomena and empirically demonstrate that unlike their income mobility analogues, metro-level estimates of neighborhood local fluidity and national mobility are weakly correlated, suggesting distinct ecological factors drive each. I then construct multilevel models that estimate the variation in each outcome between (versus within) metros and that decompose each axis of variation based on distinct, theoretically salient neighborhood- and metro-level factors.

Using Census 2000, American Community Survey (ACS) 2011 – 2015, and Equality of Opportunity Project data, I find that 7% of the variation in local fluidity and 14% of the variation in national mobility resides between, rather than within, metros. The place stratification and ecological context accounts of spatial inequality provide considerable leverage in accounting for each respective axis of variation. These findings inform place-based urban policies and lay the groundwork for finer-grained, multilevel neighborhood change models that clarify the drivers and consequences of various types of economic shifts.

NEIGHBORHOOD CHANGE IN THE “GREAT DIVERGENCE” ERA

Stratification scholars have long examined unevenness in neighborhoods’ race and class compositions and theorized whether residential segregation calcifies the American social structure (Park et al., 1925). These inquiries attracted renewed interest in the 1980s when researchers observed a strong association between neighborhood socio-demographics and poverty, crime, and joblessness and posited that residential contexts may impede or propel outcomes at the individual level, reproducing race- and class-based inequalities at the population level (Sampson, 2012; Wilson, 1987). This proposition has since been validated by experimental and quasi-experimental studies (Chetty et al., 2016; Sampson et al., 2008; Sharkey and Elwert, 2011). The increasingly substantiated claims that neighborhoods matter and that communities’ conditions and socio-demographic compositions are closely linked have motivated numerous studies on neighborhood socio-demographic *change*.

Tracking neighborhood trajectories illuminates the degree to which residents of communities with particular structural conditions are likely to endure these circumstances in an episodic or chronic manner, a distinction which may have implications for residents' socioeconomic trajectories (Wodtke, Harding, and Elwert 2011; Sampson, Sharkey, and Raudenbush 2008).[1] Change studies also gauge the depth and durability of long-term disparities in neighborhoods' structural conditions, which may undermine the reputations of certain spatial areas and the race/ethnic groups that disproportionately inhabit them (Besbris et al., 2015; Wacquant, 2008).

Despite intense public scrutiny of gentrification, dramatic change in neighborhoods' economic positions appears to be the exception, not the rule (Landis, 2016; Sampson, 2015). Some scholars have inferred that even macro-level shifts – including social change, demographic transitions, economic transformations, and federal policy reforms – are insufficient to meaningfully disrupt the reproduction of neighborhood income inequality (Sampson, 2012; Sharkey, 2013). However, urban scholars' disproportionate focus on neighborhood- and macro-level patterns and predictors of change obscures the potential role of metropolitan-level processes in shaping neighborhoods' trajectories. Although a growing body of work has applied a metro-level lens to neighborhood race-ethnic change (Crowder et al., 2012; Lichter et al., 2015), very few studies have applied it to neighborhood economic change, leaving the degree of, and sources underlying, metro-level variation in neighborhood economic change largely unknown. Drawing our attention to "broader social, economic and ecological structures [that] significantly shape [neighborhood-level] processes" (Crowder et al., 2012:326; see also Fasenfest et al., 2004; Lichter et al., 2015) is particularly important in the contemporary "Great Divergence" era (Moretti, 2012); gaps in metros' economic fortunes, human capital profiles, and housing prices (Ganong and Shoag, 2017; Giannone, 2017; Manduca, 2018), as well as crime rates, divorce rates, political orientations (Moretti, 2012) and depopulation patterns (Small et al., 2018) are widening.

Metro-level Heterogeneity in Neighborhood Local Fluidity and National Mobility

Applying a metro-level lens both sharpens our conceptualization of neighborhood change outcomes and facilitates finer-grained, multilevel explanations of them. In terms of outcomes, the lens highlights a distinction between two types of neighborhood economic change: local fluidity and national mobility. *Local fluidity* refers to change in a neighborhood's relative income position within an ecological unit (analogous to relative income mobility), whereas *national mobility* refers to shifts relative to the entire national distribution of neighborhoods (analogous to absolute income mobility). Concretely, if all neighborhoods within a given metro grew richer at the same rate over a given time period, then no local fluidity would have occurred. However, this change could very well generate national mobility among the metro's neighborhoods if the affluence boost improved their positions relative to the full national distribution. Conversely, large changes in neighborhoods' within-metro income positions could amount to minimal changes in national mobility if the metro's neighborhood income distribution is compressed relative to the national distribution. Neighborhood scholars rarely conceptualize these types of neighborhood change separately and evaluate both simultaneously, reflecting the assumption that they are highly correlated and/or a lack of theorizing regarding how the processes underlying and consequences produced by each type diverge.[2]

Although the relative versus absolute distinction may initially appear methodological rather than theoretical, each variant of change may implicate distinct processes and produce different consequences. In terms of processes, racial animus and rigid class hierarchies are theorized to calcify neighborhood socio-demographic hierarchies within a given local context (Hwang and Sampson, 2014) but are likely less influential vis-a-vis neighborhoods' ascent relative to the national distribution. Conversely, communities' abilities to cultivate skills and economic productivity either by improving incumbent residents' performance or by attracting skilled non-natives likely shapes neighborhoods' trajectories in absolute but not necessarily in relative terms.

As for consequences, each variant of change may produce distinct effects on the spatial distribution of communities' social, institutional, and environmental (dis)advantages within a given context and, in turn, residents' life outcomes. For example, local fluidity may shape a neighborhood's share of local government investment, degree of social cohesion/isolation, and relative attractiveness within a local real estate market and, in turn, generate tangible effects on the community's housing stock quality, crime rates, toxicity exposure, and wealth accumulation. National mobility, on the other hand, may influence a community's quantity and quality of proximate employment opportunities, access to retail (e.g., vendors selling nutritious food), protection from infectious and socially perpetuated diseases, and degree of civic engagement.

Existing empirical analyses tentatively suggest considerable metro-level variation in each neighborhood change variant, but the underlying sources of variation may diverge based on the outcome in question. Starting with local fluidity, Ellen and O'Regan (2008) show that low-income neighborhood upgrading rates, defined in metro-specific terms, ranged widely across metros during the 1990s, from 4% in Albany-Schenectady-Troy, New York to 46% in Shreveport-Bossier City, Louisiana, with a median of 18%. Landis (2016) estimates that the percentage of core urban neighborhoods shifting two metro-defined income deciles between 1990 and 2010 ranged from 1% in New Haven, Connecticut to 28% in Columbia, South Carolina, with a median of 9%. Examining 35 metro areas, Jun (2013) calculates that a third of the variation in neighborhood socioeconomic trajectories during the 1990s resides between, rather than within, metros.

Recent analyses of Chicago and Los Angeles help disentangle local fluidity from national mobility and enable comparisons of metro-level change rates in each outcome. Sampson (2015), evaluating local fluidity rates, finds that neighborhood economic conditions are correlated at similarly high rates in Los Angeles (0.95) and Chicago (0.90) during the 2000s. However, their national mobility rates diverge. 65% of Chicago neighborhoods beginning the 1990s in the bottom or top economic quintile of the national neighborhood distribution remained there by 2005-2009 (Sampson et al., 2015). In L.A., the analogous shares were a staggering 96% and 70% for bottom and top quintile neighborhoods, respectively, during the 1990s and 70% and 90% during the 2000s (Sampson, Schachner, and Mare 2017). Overall, the aforementioned studies suggest both local fluidity and national mobility patterns may exhibit considerable metro variation, and metro-aggregated rates of each may be only modestly correlated.

Theoretical Accounts of Metro-level Variation in Neighborhood Economic Change

The tentative possibility that meaningful metro-level variation in national mobility and local fluidity exists, with each outcome reflecting distinct sets of factors, suggests finer-grained, multilevel neighborhood change models are needed. However, before examining potential metro-level explanations of each outcome, a compositional account must be considered. According to this logic, some metros see higher rates of national mobility and/or local fluidity than others not due to true differences between metros but due to differences in these characteristics of neighborhoods within them. A large body of research suggests neighborhood characteristics that affect one or both types of economic change include: baseline income, race-ethnic composition, educational profile, population size and density, housing stock characteristics, proximity to amenities; and level of government and nonprofit investment (Ellen and O'Regan, 2008; Galster et al., 2003; Hwang and Sampson, 2014; Jun, 2013; Landis, 2016; Owens, 2012). Once between-metro variation in these neighborhood-level factors is accounted for, metro-level variation in national mobility and/or local fluidity may be trivial.

Another strand of the compositional argument highlights metro-level rather than neighborhood-level factors that may mechanically shape neighborhoods' local fluidity and national mobility outcomes. For example, metro-level income segregation could be considered a compositional driver of local fluidity; all else equal, metros containing less income diversity within their neighborhoods are automatically less likely to experience median income shifts given change in resident composition. As for national mobility, the "rising tide" logic suggests metro-level average income growth mechanically determines whether metros' neighborhood median incomes shift relative to the national distribution.

Net of these neighborhood/metro compositional effects, what metro-level features might be salient to each neighborhood change outcome? Drawing on sociological literature, such as Crowder et al. (2012) and Lichter et al. (2015), the *place stratification* and *ecological context* accounts of spatial inequality plausibly illuminate metro-level variation in local fluidity and national mobility, respectively. Beginning with local fluidity, the place stratification model calls attention to racial animus' role in preserving neighborhoods' relative status positions within a given metropolitan area, even in the face of socioeconomic and residential mobility among minority households. Groups' racial preferences and real estate market steering preserve whites' residential advantages and minorities' disadvantages. Moreover, the more unevenly minority residents are distributed across neighborhoods within a metro at baseline the wider actual and perceived gulfs in neighborhood conditions are likely to be across its neighborhood income distribution. These gulfs could impede both incumbent income upgrading/downgrading *within* disadvantaged/advantaged neighborhoods and residential mobility *across* lower-income and higher-income neighborhoods, thereby reducing local fluidity (Charles, 2003; Crowder et al., 2012; Lichter et al., 2015; Logan and Molotch, 1987; Massey and Denton, 1993).

The place stratification perspective suggests it is not just racial segregation that reduces local fluidity but the demographic and institutional processes with which it is associated that exert additional depressive effects. Demographically, high concentrations of minority groups – particularly blacks – may intensify higher-income households' concerns about racial and socioeconomic residential mixing due perhaps to fears about crime, job market competition, and housing prices. These concerns may manifest as stronger symbolic boundaries between neighborhoods of diverging socio-demographic compositions and reduced residential mobility across these perceived divides. Institutionally, the more fragmented a metro is into distinct political/administrative units, the narrower the socioeconomic distribution across which local government resources (e.g., school funding) can be distributed; the more motivated households will be to sort into socio-demographically homogenous communities; and the more likely land use/zoning restrictions will constrict housing availability (i.e., quantity, type, and pricing) for socioeconomically and residentially mobile households (Crowder and South, 2005; Farley and Frey, 1994; Lichter et al., 2015; Logan et al., 2004; Owens, 2016; Rothwell and Massey, 2009).

The ecological context account, on the other hand, calls attention to broader economic and demographic forces that shape the "opportunities and constraints" within a given area, and therefore the conditions of neighborhoods within them (Kim and White, 2010; Lichter et al., 2015). Several scholars perceive these forces to shape racial segregation and local fluidity patterns, but I believe they plausibly operate on neighborhoods' national rather than local positions via their effects on communities' abilities to improve incumbent residents' economic productivity and/or by attracting skilled non-natives. The observation that metropolitan areas' economic and demographic compositions have diverged considerably over the past several decades reinforces the potential salience of this account (Amos Jr., 2014; Ganong and Shoag, 2017; Manduca, 2018).

What particular metro-level demographic and economic factors implicated by the ecological context account might shape neighborhood national mobility? The agglomeration economies thesis holds that populous metropolitan areas with highly-skilled workers generate superior labor market productivity gains through enhanced local infrastructure and facilities, firm specialization, knowledge sharing opportunities, and labor market depth (Duranton and Puga, 2004; Rosenthal and Strange, 2004). Given the productivity-wages link, metro population size and skill levels may interact to increase residents', and therefore neighborhoods', average incomes relative to the national distribution. The concentration of immigrants at the metro level may exert similar effects in light of immigrants' steeper skill and wage trajectories over time, a reflection perhaps of disparities in educational and employment opportunities between the U.S. and some immigrants' native countries.

Beyond generating mechanical "rising tide" effects on neighborhood incomes, the aforementioned factors may drive a broader spatial distribution of neighborhood income gains given the disproportionate propensity among both the highly skilled and immigrants to gentrify historically disinvested communities (Edlund et al., 2015; Hwang, 2016). The degree of overall income inequality is likely also salient; given similar overall levels of wage growth, metros that more equitably distribute incomes across households/neighborhoods may be more likely to boost a greater share of their neighborhoods relative to the national distribution.

RESEARCH DESIGN AND MEASURES

My analyses employ U.S. Census 2000 and American Community Survey (ACS) 2011-2015 data aggregated at two spatial scales: the census tract (i.e., the neighborhood) and the commuting zone (CZ), which is analogous to a metropolitan area, except CZs cover rural areas as well. For CZ-level measures intended to test place stratification and ecological context theories, I also incorporate Equality of Opportunity Project data, which includes CZ-level correlates of intergenerational income mobility measured primarily in the 1990s and early 2000s drawn from several sources, including government tax records, censuses, and research reports.[3]

Census tracts, a frequently employed operationalization of U.S. neighborhoods, cover geographic areas consisting of 2,500 to 8,000 residents, while CZs are geographically contiguous groups of counties containing at least 100,000 residents drawn by (Tolbert and Sizer, 1996) to capture U.S. labor market areas. CZ boundaries generally remain consistent over time, but tract boundaries do not. I use the Backwards Longitudinal Tract Database's interpolation code (Logan, Xu and Stults 2014) to standardize ACS 2011-2015 neighborhood-level data to 2000 boundaries and construct an analytic sample of 57,941 U.S. census tracts (excluding Puerto Rico) containing valid population data and family populations over 50 in 2000 and 2011-15, nested within 325 urban CZs (i.e., those that intersect a metro).

This study centers on two primary outcomes: *change* in an urban neighborhood's income position relative to its (1) CZ-specific distribution (local fluidity) and to (2) the entire U.S. distribution (national mobility) between 2000 and 2011 – 2015. To construct each variable, I rank all 57,941 tracts in ascending order of median family income based on their local CZ distribution and then on the U.S. neighborhood distribution, producing a CZ-specific and national percentile rank, at two points in time: 2000 and 2011 – 2015.[4] I then calculate each tract's CZ-specific and national percentile rank *change* over the timeframe by subtracting the 2011-15 rank from the 2000 rank.

The national mobility measure's range could theoretically span from -99 to 99. When disaggregated by CZ, it is correlated 0.97 with the analogous measure that would be estimated using Chetty et al. (2014)'s absolute income mobility methodology. However, calculating the analogous local fluidity measure – CZ percentile rank change – requires an additional step. If within-CZ shifts spanned -99 to 99 percentiles, the average shift for every CZ would mechanically be 0, precluding analysis of CZ-level variation. In other words, multilevel models of local fluidity would generate a variance in CZ-level intercepts that is automatically 0.

For this reason, I follow Rosenthal (2008) and convert the local fluidity measure into its *absolute value*, indicating the degree to which a neighborhood changes positions within its CZ, whether the direction is up or down.[5] Thus, neighborhoods' within-CZ rank shifts generate an interpretable CZ-aggregated local fluidity rate theoretically ranging from 0 (lowest rate of fluidity) to 99 (highest fluidity). This CZ-aggregated measure of local fluidity is correlated almost perfectly with the analogous measure that would be generated by calculating a rank-rank slope for each CZ; however unlike the rank-rank slope, the operationalization is suitable for a multilevel model.[6]

In terms of predictors, I incorporate several tract-level factors used in prior neighborhood change studies, including baseline (i.e., Census 2000) U.S.- or CZ-based percentile rank, total population (logged), black (%), foreign born (%), unemployment rate (%), bachelor's degree (%), manufacturing employment (%), median year structure built, owner-occupied units (%), median rent ($), and public transportation utilization for work (%). I then include metro-level compositional factors: metro-level income segregation to predict local fluidity, proxied by the *Rank-Order Index* to capture the evenness of a metro's income distribution across census tracts (higher values indicate more segregation), and metro-level *median family income growth from 2000 to 2011-2015* to predict national mobility.

The core independent variables of interest are CZ-level characteristics capturing baseline proxies for the place stratification and ecological context accounts outlined above. Starting with place stratification, I capture CZs' degree of racial segregation with the *Multi-group Theil Index*, a common measure tracking the extent to which tracts' compositions of white, black, Hispanic, and other residents diverge from the metro-wide race-ethnic distribution tracts (higher values indicate more segregation). I also measure overall race-ethnic composition: CZ-level *% minority* (i.e., nonwhite) *residents*, given that minority concentration may intensify white, affluent residents' desire to erect institutional barriers to residential and social mobility. Local governments are perceived to be a key mechanism through which these institutional barriers are constructed, so I include the *Governmental Fragmentation Index*, which calculates the ratio of total independent government units to the total CZ population. Higher values indicate more fragmentation. *Median year of structure built* and *median rent burden* represent housing market conditions. Higher values of the former proxies availability of new housing stock – a factor believed to facilitate residential mobility across neighborhood types. The latter measure*,* which captures the median percentage of households' income spent on rent, indicates how incongruent housing prices are with local incomes. High rent burdens indicate tight CZ housing markets that may constrain residential options available to prospective movers.

To capture the ecological context account, I include two factors related to agglomeration economies: CZ *total population (logged)* and *household income per capita*. The latter measure proxies overall skill levels in the local economy. I then shift from the local economy pie's size to its distribution by including the CZ's *Gini Coefficient*, which is calculated based on IRS tax returns. Higher values indicate higher degrees of inequality. I also incorporate a measure of international migration into the CZ: *% of residents who are foreign born*. Lastly, I incorporate dummy variables indicating the U.S. *state* encompassing the majority of the CZ. These fixed effects reveal whether the existence of, and explanations for, CZ heterogeneity may reflect processes unfolding at even larger geographic scales. Table 1 provides descriptive statistics for key variables. For more detail on each measure, see the Online Supplement Table A1.

Table 1 about here

ANALYTIC STRATEGY

To evaluate CZ-level variation in local fluidity and national mobility I first calculate an unconditional random intercept model of neighborhood-level local fluidity and national mobility:

(**Equation 1)**

Level 1: $Y_{ij} = \beta_{0j} + e_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + r_{0j}$

where the outcome is the absolute value of CZ percentile rank change (local fluidity) or the U.S. percentile rank change (national mobility) between 2000 and 2011-2015 for neighborhood *i* (level-1), nested within CZ *j* (level-2). γ_{00} represents the fixed component of the CZ-level intercept (the estimated percentile rank change for the average CZ), r_{0j} is the random error component of the CZ-level intercept (the deviation of the particular CZ's intercept from the mean CZ intercept), and e_{ij} is the tract-level error term (the difference between a tract's percentile rank change from the average of its CZ). This model and all that follow assume that both the random component of the CZ-level intercept (r_{0j}) and the tract-level residual (e_{ij}) are normally distributed with means of zero and variances of τ_0^2 and σ^2, respectively. For each respective neighborhood outcome, I assess whether the CZ-level intercept's random component has a variance that is significantly different from 0. If τ_0^2 is significantly greater than 0 (i.e., var(r_{0j}) > 0) for both unconditional random intercept models, then I will examine what precise proportion of the total variance in each neighborhood change outcome is accounted for by τ_0^2 (i.e., the CZ-level variance) versus σ^2 (i.e., the neighborhood-level variance) by dividing the CZ-level variance component by the total variance, producing an intraclass correlation (ICC). The ICC ranges from 0 (neighborhood variance accounts for the entirety of the total variance) to 1 (CZ variance accounts for the entirety of the total variance). The higher the ICC, the higher the proportion of the total variance accounted for by CZ-level variance. If discernible between-CZ variation is evident for both outcomes, I further probe this possibility by correlating

CZ-level rates of each. If the two are weakly correlated ($r < 0.3$), I have preliminary evidence that distinct CZ-level factors shape each neighborhood change process.

Probing the CZ-level factors accounting for each respective outcome is the next step, but it is only necessary if neighborhood-level compositional factors do not fully account for the observed between-CZ variation in each outcome. To evaluate this possibility, I return to the unconditional random intercept model and first add in only tract-level (level-1) covariates, producing a random intercept and fixed slope model:

(Equation 2)

Level 1: $Y_{ij} = \beta_{0j} + \beta_1 X_{1ij} + \beta_2 X_{2ij} + \ldots + e_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + r_{0j}$

β_1 and β_2 represent the fixed slopes quantifying the relationships between the neighborhood's U.S. or CZ (absolute value) percentile rank change and a vector of theoretically salient neighborhood-level characteristics (represented by X_{1ij} and X_{2ij}), which are grand mean centered and normalized to have a mean of 0 and a standard deviation of 1. If, after accounting for these neighborhood-level characteristics, the CZ-level variance component (τ_0^2) reduces to 0, then the compositional argument is supported and CZ-level factors are not salient. However, if the variance component remains significantly greater than 0, then CZ-level variance in national mobility and/or local fluidity is evident and not purely the function of neighborhood compositional effects.

The final steps in my analysis consist of explaining any remaining CZ-level variance, net of neighborhood-level characteristics, in each neighborhood outcome. I do this by first using CZ-level compositional factors and then CZ-level covariates pertaining to place stratification when predicting local fluidity and ecological context when predicting national mobility. I preserve the random intercept and fixed slope model with neighborhood-level covariates (Equation 2) and add in the appropriate slate of CZ-level (i.e., level-2) covariates for each neighborhood outcome:

(Equation 3)

Level 1: $Y_{ij} = \beta_{0j} + \beta_1 X_{1ij} + \beta_2 X_{2ij} + \ldots + e_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01} W_{1j} + \gamma_{02} W_{2j} + \ldots + r_{0j}$

γ_{01} and γ_{02} represent relationships between the neighborhood's U.S. or CZ (absolute value) percentile rank change and a vector of CZ-level characteristics (W_{1j} and W_{2j}), whose values vary across CZs but not among neighborhoods within CZs. CZ-level variables are also grand-mean centered and standardized to have a mean of 0 and a standard deviation of 1. In contrast to the prior analyses, I evaluate both the size of CZ-level covariate fixed effects (γ_{01}) on neighborhood change and how much their inclusion reduces the remaining variance in the CZ-level intercept (i.e., var(r_0) or τ_0^2).

RESULTS

Nationally aggregated patterns of both national mobility and local fluidity between 2000 and 2011-15 evince a high degree of persistence. Table 1 reveals that the average U.S. neighborhood shifted 10 percentiles relative to its CZ distribution during the timeframe in question. Moreover, only about 10% of neighborhoods shift 20 percentiles or more relative to their CZ-specific or the national distribution, a finding that mirrors prior analyses of local fluidity (Landis, 2016; Owens, 2012) and national mobility (Sampson et al., 2015). Overall, neighborhoods indeed tend to remain "stuck in place" over time (Sampson, 2012; Sharkey, 2013).

However, this degree of "stickiness" varies considerably across CZs. The bottom panel of Table 1 presents mean neighborhood CZ (absolute value) and U.S. percentile rank change, disaggregated for the twenty most populous CZs as of 2000. The average degree of local fluidity among Atlanta, Georgia neighborhoods (~11.3 CZ percentiles) is just under twice that of Bridgeport, Connecticut: (~6.7). As for national mobility, Detroit's neighborhoods declined by over 12 U.S. percentiles, on average, while Washington, D.C., New York, and San Diego neighborhoods climbed by over 4. Although the national mobility outcome exhibits a clear regional pattern, with coastal CZs achieving the highest levels and Midwestern/southern CZs exhibiting the lowest, the lack of regional patterning in local fluidity suggests current understandings of which local contexts contain economically rigid neighborhood distributions and why requires refinement.

The unconditional random intercept models of both local fluidity and national mobility suggest the observed between-CZ variation in both outcomes is *not* fully accounted for by error variance. Starting with local fluidity, the unconditional random intercept model produces a CZ-level intercept of 12.08 percentiles – the average CZs' overall local fluidity rate – and the random intercept's variance is 8.03, which is significantly different from 0 (LR = 1919.16, $p < 0.01$) and translates to a standard deviation of 2.83. Dividing the random intercept's variance by the total variance in the outcome (the ICC) reveals that 7.14% of the variation in neighborhood local fluidity resides between, rather than within, CZs. A parallel unconditional random intercept model of national mobility produces a random CZ-level intercept of 1.56 percentiles – the average CZs' overall national mobility rate – with a variance of 27.49, which is significantly different from 0 (LR = 6710.18, $p < 0.01$) and translates to a standard deviation of 5.24. The ICC indicates 14.35% of the variation in national mobility resides between, rather than within, CZs.

These analyses indicate that neighborhoods' local fluidity and national mobility outcomes are indeed contingent upon the CZ in which they are located. Importantly, the modest correlation between CZ-level local fluidity and national mobility rates among all 325 U.S. CZs (0.22 unweighted; 0.17 population-weighted), suggests a distinct set of processes may be implicated for each outcome. Recall that the analogous correlations for CZs' absolute and relative intergenerational income mobility rates are much stronger (-0.68, unweighted, -0.61 population-weighted).[7]

Is between-CZ variation merely a compositional artifact? I test this possibility first by incorporating a vector of theoretically salient neighborhood factors. The neighborhood-level model of local fluidity confirms several key findings from extant neighborhood change studies (see Online Supplement Tables A2 & A3 for tract control coefficients), such as the role played by race in keeping neighborhoods stuck in place (Hwang and Sampson, 2014). But these predictors account for variance in the level-1 residual, not in the level-2 random intercept, which remains virtually unchanged (8.24) and significantly exceeds 0 (LR = 1919.83, $p < 0.01$), suggesting between-CZ variation is still evident (Table 2, Model 2A). The story is different for national mobility. A parallel multilevel model containing only neighborhood-level predictors of national mobility also confirms longstanding findings regarding the roles of demographics in shaping communities' absolute trajectories (Galster et al., 2003). These effects account for a considerable portion of the variance in both the level-1 residual and in the level-2 random intercept, the latter of which reduces from 27.49 in the unconditional model to 18.02 in the neighborhood-level compositional model (Table 2, Model 2B). About a third of the total between-CZ variance in national mobility patterns but none of the between-CZ variance in local fluidity is a compositional artifact, reflecting differences in neighborhood characteristics across CZs.

Table 2 about here

What role do metro-level compositional factors play? In predicting local fluidity, including CZ-level income segregation alone reduces the variance in the random CZ-level intercept from about 8 to 3 and accounts for over 60% of total between-CZ variance in neighborhoods' within-metro economic trajectories. As expected, this indicator is significantly and negatively correlated with neighborhoods' local fluidity outcomes ($\beta = -2.11$, $p<0.01$) (Table 2, Model 3A). Because all independent variables are grand-mean centered and standardized to have a mean of 0 and a standard deviation of 1, we can infer that, all else equal, a one standard deviation increase in CZ-level income segregation is associated with a ~2 percentile attenuation in a given neighborhood's local fluidity.

As for national mobility, inclusion of median family income growth drives the variance of the CZ-level random intercept down dramatically – from 18.02 in the previous model to 6.48 – and the proportion of between-CZ variance explained increases more than doubles, to 0.76. As expected, this factor exerts a large positive effect ($\beta = 3.57$, $p < 0.01$) (Table 2, Model 3B). A one standard deviation increase in CZ-level median family income growth is associated with a ~3.6 percentile increase in national mobility. Despite these strong compositional effects, especially at the CZ level, they do not fully account for observed between-CZ variation in local fluidity and national mobility. Other explanations are needed.

Place Stratification and Local Fluidity

The place stratification account of spatial inequality suggests metro-level racial segregation moderates neighborhoods' within-metro trajectories (Crowder et al., 2012; Massey and Denton, 1993). However, in Model 4A (Table 2), CZ-level racial segregation does not approach significance nor does government fragmentation. As for other CZ-level covariates the place stratification literature deems salient, local housing cost burden relative to incomes is significantly and negatively associated with local fluidity ($\beta = -0.27$, $p < 0.01$), and CZ-level new housing stock ($\beta = 0.83$, $p < 0.01$) is positively associated with fluidity, as expected.

Surprisingly, a higher CZ-level concentration of minorities is associated with increased rather than decreased fluidity ($\beta = 0.48$, $p < 0.01$). Although disentangling the precise multilevel dynamics by which race shapes neighborhoods' local fluidity is beyond this study's scope, the positive effect of CZ-level minority composition, combined with the negative effects of neighborhood-level proportion black and foreign-born and the non-significant effect of CZ-level racial segregation, suggest racial dynamics may shape neighborhoods in complex ways. Future analyses will be needed to probe these possibilities, but the key takeaway here is that the full slate of place stratification variables leaves income segregation significant and negative effect intact and reduces the variance of the random CZ-level intercept from 3.17 to 2.17, suggesting they account for a third of the remaining (non-compositional) between-CZ variance. Nearly three-quarters of the between-CZ variance in local fluidity is now explained. Including state fixed effects increases this proportion to over 0.8 but leaves the direction/magnitude, and significance of the aforementioned CZ-level factors largely intact (Table 2, Model 5A).

Ecological Context and National Mobility

As for national mobility, Model 3B (Table 2) supports several strands of the ecological context account. CZ-level household income per capita is significantly and positively associated with neighborhood upward mobility (β =1.49, $p < 0.01$), suggesting affluence/skill levels shape national mobility patterns net of average income growth. Although CZ-level population size is significantly and negatively associated with national mobility (β =-0.61, $p<0.05$), the interaction between household income per capita and population size is significantly and positively associated with national mobility, indicating the agglomeration economies thesis applies not only to a CZ's overall income growth but also to its neighborhoods' absolute trajectories (β =1.29, $p < 0.01$). As predicted, income inequality (β = -0.78, $p<0.01$) is significantly and negatively associated with national mobility, while foreign-born concentration is positively associated with it (β =1.72, $p<0.01$). The latter finding may be considered surprising, especially given the negative effect of the same variable when measured at the neighborhood level. Collectively, these ecological context factors slightly accentuate median family income growth's effect and reduce the CZ-level random intercept variance from 6.48 to 3.17, suggesting they account for half of the remaining, non-compositional between-CZ variance. Now nearly 90% of between-CZ variance in local fluidity is explained. Including state fixed effects increases the proportion to 96% but leaves the direction/magnitude and significance of other CZ-level factors largely intact (Table 2, Model 5B). Figure 1 visualizes the magnitudes of significant CZ-level effects on neighborhoods' income trajectories through marginal effect simulations based on the most complete models (5A & 5B). Distinct sets of metro-level factors appear to meaningfully shape each variant of neighborhood change.

Figure 1 about here

DISCUSSION & CONCLUSION

This study set out to clarify the link between neighborhood economic change and metro-level processes. To this end, I conceptually distinguish between neighborhood income shifts relative to other neighborhoods within the same metro (local fluidity) and to the national neighborhood distribution (national mobility), empirically demonstrate the weak correlation between metro-level measures of the two, and show that 7% of the variation in local fluidity and 14% of the variation in national mobility resides between, rather than within, metros. Although neighborhood- and metro-level compositional factors explain the majority of this variation for each outcome, the place stratification and ecological context accounts of spatial inequality provide considerable leverage in accounting for the variation that remains.

These findings confirm the need for finer-grained, multilevel models of neighborhood economic change. Urban scholars' emerging consensus that neighborhoods, individuals, and families tend to remain "stuck in place" in the contextual hierarchy over time (Sampson, 2012; Sharkey, 2013), while certainly true in the aggregate, needs to be refined. Patterns of change may meaningfully diverge based on: (1) whether the hierarchy is conceptualized in national or metro-specific terms and (2) the particular metropolitan area in which the neighborhoods are embedded. Scholars should further theorize and examine whether distinct processes drive local fluidity and national mobility and identify the particular neighborhood- *and* metro-level mechanisms implicated in each outcome. This study suggests metro-level race and class dynamics shape local fluidity patterns, while metro-level economic opportunity structures influence national mobility outcomes. Further probing the relevant spatial scales at which these processes and others unfold is critical.

Pivoting from neighborhood economic change's causes to its consequences, this study reinforces the contention that neighborhoods may exert stronger effects on residents within some metropolitan contexts than in others (Small et al., 2018), heterogeneity that could reflect divergent economic trajectories among initially similar neighborhoods. These dynamics could contribute to observed differences in intergenerational socioeconomic mobility across metros (Chetty et al., 2014), a possibility that should be explicitly tested. Moreover, as the neighborhood effects literature pivots from measuring impacts to evaluating mechanisms (Sharkey and Faber, 2014), scholars should develop models testing links between various types of neighborhood change to their race-ethnic compositions, lived conditions (e.g., school quality, crime) and to residents' life outcomes.

Several limitations constrain this study's impact. Although the place stratification and ecological context accounts appear to identify salient metro-level factors, the effect estimates presented cannot be interpreted as causal, and other factors must be probed. Future research could leverage exogenous shocks, such as the Great Recession, to address these shortcomings. Moreover, the study's core propositions may be salient only to the most recent era, and to limited time horizons. Future research that spans multiple decades and gauges whether the degree of, and mechanisms underlying, metro-level heterogeneity in neighborhood change vary by time period and across segments of the economic distribution is needed. Lastly, this study's focus on the metropolitan area, rather than on other spatial scales (e.g., municipality, county, state, region, nation), prevents a fuller understanding of how higher-order spatial structures reproduce urban inequality. Clarifying these dynamics is critical to identifying and implementing effective place-based interventions, particularly in the "Great Divergence" era.

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ENDNOTES

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[1] Although this logic may seem more applicable to stationary than to transitory residents, mobile residents exhibit a strong tendency to sort into neighborhoods that are located within the same metro of, and socio-demographically similar to, their origin communities (Sampson and Sharkey, 2008).

[2] For example, Chetty et al., (2014) find that U.S. CZs' absolute and relative intergenerational income mobility rates are correlated -0.68; the same five CZ-level factors predict each.

[3] See http://www.equality-of-opportunity.org for raw data and detailed variable descriptions.

[4] Median family income is a commonly employed metric of neighborhood status. I use this measure to capture income levels across the entire distribution, not solely the bottom/top of it, and because it is easily interpretable.

[5] If my primary objective were to examine *neighborhood*-level drivers of local fluidity then this would not be appropriate, but my focus is on *CZ*-level factors driving neighborhood fluidity.

[6] The two measures can be interpreted in similar ways, just in reverse; higher CZ rank-rank slopes indicate less fluidity; larger absolute values of CZs' percentile rank change indicate more fluidity.

[7] The correlation's sign is negative, not positive, because Chetty et al., (2014) estimate relative mobility as a rank-rank slope; higher values indicate *less* local fluidity. My local fluidity measure, however, employs absolute values; higher values indicate *more* fluidity.

TABLE 1

Descriptive Statistics

All Urban U.S. Commuting Zones (*N* = 325); Census Tracts (*N* = 57,941)

Variable	Mean	SD	Minimum	Maximum
Local Fluidity, Tract level				
CZ income rank change 2000 – 11-15 (abs. value)	10.16	10.45	0	99
National Mobility, Tract level				
U.S. income rank change 2000 – 11-15	0.00	13.68	-91	99
Place Stratification Theory, CZ level				
Racial segregation (Theil Index)	0.18	0.09	0.02	0.47
Minority composition (%)	23.03	16.68	1.95	94.42
Government Fragmentation Index (2002)	0.0004	0.0004	0.0000	0.0035
Median year structure built	1970	7.30	1953	1986
Median rent burden (%)	25.32	2.38	15.33	36.56
Ecological Context Theory, CZ level				
Total population (log)	12.90	1.07	9.01	16.61
Household income per capita (log)	10.46	0.16	9.76	10.93
Gini coefficient (1996 – 2000)	0.44	0.07	0.27	0.68
Foreign born (%)	5.41	5.85	0.51	39.68
Controls, CZ level				
Income segregation (Rank-Order Index)	0.07	0.03	0.01	0.14
Median family income growth (2000 – 2011-15)	-2,711	3,171	-11,526	10,565

Most Populous U.S. Commuting Zones as of 2000 (*N* = 20); Census Tracts (*N* = 22,932)

	Local Fluidity		National Mobility	
CZ Name	Mean	Rank	Mean	Rank
Atlanta, GA	11.33	1	-7.89	19
Sacramento, CA	10.39	2	-1.95	13
Seattle, WA	10.03	3	2.85	5
Houston, TX	9.89	4	-0.86	10
Washington DC	9.86	5	4.39	2
Chicago, IL	9.37	6	-3.52	15
Minneapolis, MN	9.30	7	-2.06	14
Miami, FL	9.16	8	-1.82	12
New York, NY	8.99	9	4.72	1
Phoenix, AZ	8.95	10	-5.42	17
San Francisco, CA	8.91	11	0.29	8
San Diego, CA	8.81	12	4.03	3
Dallas, TX	8.57	13	-6.59	18
Boston, MA	8.52	14	2.98	4
Detroit, MI	8.26	15	-12.27	20
Philadelphia, PA	8.20	16	1.34	7
Cleveland, OH	7.74	17	-5.24	16
Los Angeles, CA	7.71	18	1.49	6
Newark, NJ	7.08	19	-1.10	11
Bridgeport, CT	6.70	20	0.10	9

Notes

[a] All independent variables are measured in 2000, unless otherwise noted.

[b] Only urban census tracts outside of Puerto Rico with family populations > 50 in 2000 are included in analytic sample.

[c] Household income per capita and median family income growth are measured in constant 1999 dollars.

[d] For descriptive statistics of tract-level controls, see Online Supplement Table A1.

TABLE 2

Hierarchical Linear Models of CZ or U.S. Percentile Rank Change (2000 – 2011-15)
Level-1 *N* (Tract) = 57,941; Level-2 *N* (CZ) = 325

Local Fluidity

Outcome: CZ Percentile Rank Change (abs. value)	(Model 2A)	(Model 3A)	(Model 4A)	(Model 5A)
Place Stratification, CZ level				
Racial segregation (Theil Index)			0.18	-0.08
			(0.16)	(0.18)
Minority composition (%)			0.48**	0.81**
			(0.15)	(0.19)
Government Fragmentation Index			-0.14	-0.07
			(0.09)	(0.13)
Median year structure built			0.83***	0.83***
			(0.15)	(0.23)
Median rent burden (%)			-0.27**	-0.21*
			(0.10)	(0.11)
Controls, CZ level				
Income segregation (Rank-Order Index)		-2.11***	-2.14***	-2.04***
		(0.12)	(0.15)	(0.17)
Controls, Tract level	Y	Y	Y	Y
State Fixed Effects	N	N	N	Y
Level 1 Variance	100.40	100.45	100.48	100.47
Level 2 (Intercept) Variance	8.24	3.17	2.17	1.51
S.E. on Level 2 (Intercept) Variance	0.86	0.40	0.32	0.24
Proportion of Level 2 Variance Explained	N/A	.61	.73	.81

National Mobility

Outcome: U.S. Percentile Rank Change	(Model 2B)	(Model 3B)	(Model 4B)	(Model 5B)
Ecological Context, CZ level				
Total population (log)			-0.61*	-0.63**
			(0.28)	(0.24)
Household income per capita (log)			1.49***	1.60***
			(0.18)	(0.16)
Total pop. (log) X Hhld income per capita (log)			1.29**	1.22**
			(0.48)	(0.36)
Gini coefficient			-0.78***	-1.48***
			(0.17)	(0.23)
Foreign born (%)			1.72***	2.11***
			(0.27)	(0.30)
Controls, CZ level				
Median family income growth (2000-2011-15)		3.57***	3.94***	3.92***
		(0.17)	(0.14)	(0.17)
Controls, Tract level	Y	Y	Y	Y
State Fixed Effects	N	N	N	Y
Level 1 Variance	135.67	135.67	135.64	135.58
Level 2 (Intercept) Variance	18.02	6.48	3.17	1.20
S.E. on Level 2 (Intercept) Variance	1.58	0.64	0.36	0.18
Proportion of Level 2 Variance Explained	.34	.76	.88	.96

Notes

[a] Unconditional model (1A & 1B) results and tract-level control coefficients are discussed in the text but not displayed above.

[b] All predictors are grand-mean centered to have a mean of 0 and normalized to have a standard deviation of 1.

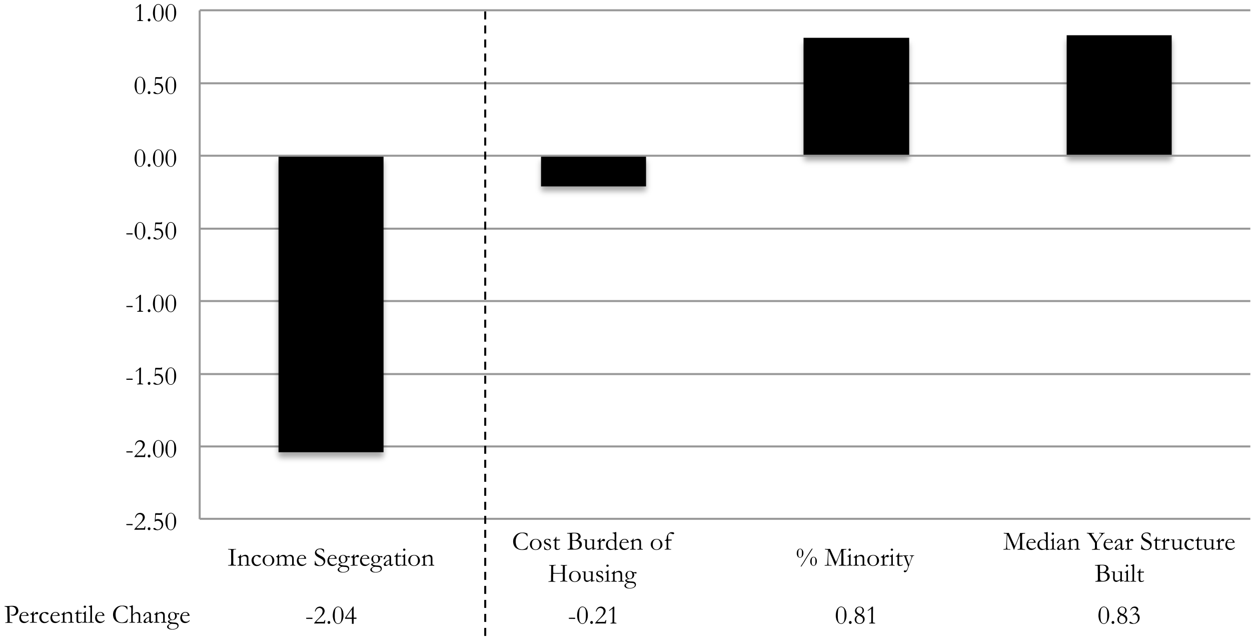
[c] *p < .05, **p < .01, ***p < 0.001 (two-tailed tests).

FIGURE 1

Estimated Metro Effects on Neighborhood Economic Change

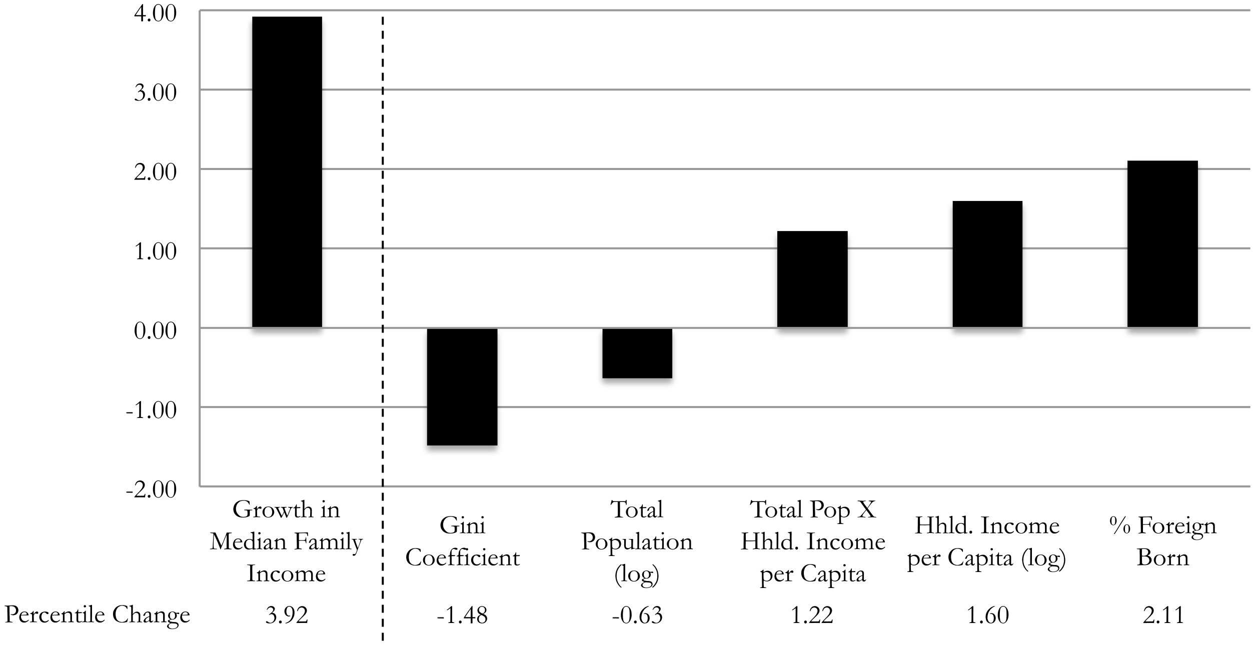
Local Fluidity

Predicted CZ percentile rank change (absolute value) for a tract, given a 1 SD increase in each CZ-level variable, holding all other covariates at their grand means.



National Mobility

Predicted U.S. percentile rank change for a tract, given a 1 SD increase in each CZ-level variable, holding all other covariates at their grand means.



Notes

[a] Simulations are based on most complete models that include state fixed effects (Table 2, Models 5A & 5B).

ONLINE SUPPLEMENT

TABLE A1

Complete Descriptive Statistics & Data Sources

All Urban U.S. Commuting Zones (*N* = 325); Census Tracts (*N* = 57,941)

Variable	Data Source	Mean	SD	Minimum	Maximum
Local Fluidity, Tract level					
CZ income rank change 2000 – 11-15 (abs. value)	U.S. Census 2000 and ACS 2011-15	10.16	10.45	0	99
National Mobility, Tract level					
U.S. income rank change 2000 – 11-15	U.S. Census 2000 and ACS 2011-15	0.00	13.68	-91	99
Place Stratification Theory, CZ level					
Racial segregation (Theil Index)	Equality of Opportunity Project; Census 2000	0.18	0.09	0.02	0.47
Minority composition (%)	U.S. Census 2000	23.03	16.68	1.95	94.42
Government Fragmentation Index (2002)	U.S. Census of Governments 2002	0.0004	0.0004	0.0000	0.0035
Median year structure built	U.S. Census 2000	1970	7.30	1953	1986
Median rent burden (%)	U.S. Census 2000	25.32	2.38	15.33	36.56
Ecological Context Theory, CZ level					
Total population (log)	U.S. Census 2000	12.90	1.07	9.01	16.61
Household income per capita (log)	Equality of Opportunity Project; Census 2000	10.46	0.16	9.76	10.93
Gini coefficient (1996 – 2000)	Equality of Opportunity Project; Tax Records	0.44	0.07	0.27	0.68
Foreign born (%)	U.S. Census 2000	5.41	5.85	0.51	39.68
Controls, CZ level					
Income segregation (Rank-Order Index)	Equality of Opportunity Project; Census 2000	0.07	0.03	0.01	0.14
Median family income growth (2000 – 2011-15)	U.S. Census 2000 and ACS 2011-15	-2,711	3,171	-11,526	10,565
Controls, Tract level					
Baseline CZ income rank	U.S. Census 2000	50.23	28.87	1	100
Baseline U.S. income rank	U.S. Census 2000	50.50	28.87	1	100
Total population (log)	U.S. Census 2000	8.28	0.51	5.22	10.50
Black (%)	U.S. Census 2000	13.98	23.88	0	99.80
Foreign born (%)	U.S. Census 2000	11.08	13.50	0	83.85
Bachelor's degree (%)	U.S. Census 2000	15.20	9.86	0	61.38
Unemployed (%)	U.S. Census 2000	6.36	5.33	0	89.72
Employed in manufacturing (%)	U.S. Census 2000	13.92	8.26	0	67.57
Owner-occupied units (%)	U.S. Census 2000	65.21	23.25	0	99.84
Median year structure built	U.S. Census 2000	1966	15.24	1939	1999
Median rent ($)	U.S. Census 2000	656	271	0	2001
Public transportation to work (%)	U.S. Census 2000	6.12	12.02	0	0.94

TABLE A2

Hierarchical Linear Models of CZ Percentile Rank Change (2000 – 2011-15): Complete Results

Level-1 *N* (Tract) = 57,941; Level-2 *N* (CZ) = 325

	(Model 2A)	(Model 3A)	(Model 4A)	(Model 5A)
Place Stratification, CZ level				
Racial segregation (Theil Index)			0.18	-0.08
			(0.16)	(0.18)
Minority composition (%)			0.48**	0.81**
			(0.15)	(0.19)
Government Fragmentation Index			-0.14	-0.07
			(0.09)	(0.13)
Median year structure built			0.83***	0.83***
			(0.15)	(0.23)
Median rent burden (%)			-0.27**	-0.21*
			(0.10)	(0.11)
Controls, CZ level				
Income segregation (Rank-Order Index)		-2.11***	-2.14***	-2.04***
		(0.12)	(0.15)	(0.17)
Controls, Tract level				
Baseline U.S. income rank	-0.02***	-0.02***	-0.02***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Total population (log)	-1.37***	-1.37***	-1.36***	-1.36***
	(0.05)	(0.05)	(0.05)	(0.05)
Black (%)	-0.58***	-0.50***	-0.55***	-0.57***
	(0.06)	(0.06)	(0.06)	(0.06)
Foreign born (%)	-0.27***	-0.18**	-0.23**	-0.22**
	(0.07)	(0.07)	(0.07)	(0.07)
Bachelor's degree (%)	0.02	0.06	0.08	0.06
	(0.08)	(0.08)	(0.08)	(0.08)
Unemployed (%)	-1.00***	-1.02***	-1.03***	-1.02***
	(0.06)	(0.06)	(0.06)	(0.06)
Employed in manufacturing (%)	-0.68***	-0.74***	-0.68***	-0.70***
	(0.06)	(0.06)	(0.06)	(0.06)
Owner-occupied units (%)	-0.92***	-0.90***	-0.90***	-0.89***
	(0.07)	(0.07)	(0.07)	(0.07)

Median year structure built	-0.92***	-0.90***	-0.90***	-0.89***
	(0.07)	(0.07)	(0.07)	(0.07)
Median rent ($)	0.10	0.15**	0.07	0.08
	(0.06)	(0.06)	(0.06)	(0.06)
Public transportation to work (%)	-0.85***	-0.79***	-0.78***	-0.76***
	(0.07)	(0.07)	(0.07)	(0.07)
Constant	0.26**	0.27**	0.32***	0.32***
	(0.08)	(0.08)	(0.08)	(0.08)
State Fixed Effects	N	N	N	Y
Level 1 Variance	100.40	100.45	100.48	100.47
Level 2 (Intercept) Variance	8.24	3.17	2.17	1.51
S.E. on Level 2 (Intercept) Variance	0.86	0.40	0.32	0.24
Proportion of Level 2 Variance Explained	N/A	.61	.73	.81

TABLE A3

Hierarchical Linear Models of U.S. Percentile Rank Change (2000 – 2011-15): Complete Results
Level-1 *N* (Tract) = 57,941; Level-2 *N* (CZ) = 325

	(Model 2B)	(Model 3B)	(Model 4B)	(Model 5B)
Ecological Context, CZ level				
Total population (log)			-0.61*	-0.63**
			(0.28)	(0.24)
Household income per capita (log)			1.49***	1.60***
			(0.18)	(0.16)
Total pop. (log) X Hhld income per capita (log)			1.29**	1.22**
			(0.48)	(0.36)
Gini coefficient			-0.78***	-1.48***
			(0.17)	(0.23)
Foreign born (%)			1.72***	2.11***
			(0.27)	(0.30)
Controls, CZ level				
Median family income growth (2000-2011-15)		3.57***	3.94***	3.92***
		(0.17)	(0.14)	(0.17)
Controls, Tract level				
Baseline CZ income rank	-0.39***	-0.38***	-0.39***	-0.39***
	(0.00)	(0.00)	(0.00)	(0.00)
Total population (log)	-0.80***	-0.78***	-0.78***	-0.78***
	(0.05)	(0.05)	(0.05)	(0.05)
Black (%)	-3.02***	-2.94***	-2.87***	-2.90***
	(0.07)	(0.07)	(0.07)	(0.07)
Foreign born (%)	-2.30***	-2.25***	-2.35***	-2.34***
	(0.08)	(0.08)	(0.08)	(0.08)
Bachelor's degree (%)	6.10***	5.97***	6.08***	6.12***
	(0.10)	(0.10)	(0.10)	(0.10)
Unemployed (%)	-0.17*	-0.17*	-0.19**	-0.19**
	(0.07)	(0.07)	(0.07)	(0.07)
Employed in manufacturing (%)	-0.90***	-0.74***	-0.64***	-0.71***
	(0.08)	(0.07)	(0.07)	(0.07)
Owner-occupied units (%)	3.66***	3.54***	3.57***	3.61***
	(0.08)	(0.08)	(0.08)	(0.08)
Median year structure built	-0.10	-0.16*	-0.12	-0.11

	(0.07)	(0.07)	(0.07)	(0.07)
Median rent ($)	-0.58***	-0.48***	-0.57***	-0.57***
	(0.08)	(0.08)	(0.08)	(0.08)
Public transportation to work (%)	2.19***	2.24***	2.14***	2.11***
	(0.09)	(0.09)	(0.09)	(0.09)
Constant	-1.33***	-1.60***	0.05	0.70
	(0.26)	(0.17)	(0.21)	(0.65)
State Fixed Effects	N	N	N	Y
Level 1 Variance	135.67	135.67	135.64	135.58
Level 2 (Intercept) Variance	18.02	6.48	3.17	1.20
S.E. on Level 2 (Intercept) Variance	1.58	0.64	0.36	0.18
Proportion of Level 2 Variance Explained	.34	.76	.88	.96