PRELIMINARY DRAFT

Disparate Labor Market Outcomes and Migration Constraints

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Abstract

This paper investigates the role constraints to migration might play in explaining racial disparities in the labor market by using the Delta Index of dissimilarity to compare distributional mismatch between race/education specific workers and jobs. The analysis uses the Current Population Survey between 1992 and 2018 and focuses on 25-54 year old men. The dissimilarity analysis is supplemented with regression analysis and different measures of job opportunity and geography are explored. Preliminary evidence supports the contention that race/ethnic minorities are more constrained in their ability to chase economic opportunities than whites. This does not necessarily mean, however, that equalizing the distribution of jobs and workers for minorities would improve labor market outcomes since doing so may weaken social and cultural networks. The results also don't imply that migration constraints are the most important contributor to labor market disparities.

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1 Introduction and Background

Long-standing disparities in labor market outcomes by race are well documented.[1] At the opening of a conference at the Board of Governors in 2017 highlighting these disparities and their sources, Governor Brainard affirmed that labor market disparities might have negative, "implications for the growth capacity of the economy" (Brainard 2017). Many contributors to these disparities have been documented, including discrimination, educational opportunities, and social networks. An additional contributor could be differences in migration patterns. A greater ability to chase economic opportunity should improve one's labor market outcomes (for example, see El Badaoui, Strobl, and Walsh 2017; Niebuhr et al. 2009). In fact, the "Great Black Migration" has been credited with significantly improving the economic conditions of blacks from the U.S. South during the early 20th century (Boustan 2015).[2] Therefore, racial disparities in the labor market may result, and persist, if a disadvantaged group faces more constraints to migrating.

Constraints to migration can take many forms -- from social/cultural constraints to financial constraints.[3] R. Wilson (2018) demonstrates that access to information can be important for informing migration decisions. Cooke (2011) attributes 20 percent of the overall decline in migration rates between 1999 and 2009 to what he calls "secular rootedness," suggesting a social

[1] For example, see Antecol and Bedard (2004); Biddle and Hamermesh (2013); Bradbury (2000); Cajner et al. (2017); Chetty et al. (2018); Engemann and Wall (2010); Fallick and Krolikowski 2018; Zavodny and Zha (2000); Hotchkiss and Moore (2018).

[2] Although not all outcomes from the Great Migration were positive. Black et al. (2015) provide evidence that migration by African Americans from rural southern states to northern urban locations resulted in increased mortality.

[3] An additional constraint, theorized by Shimer (2007), could include irrational expectations about future local job prospects.

cost to migration. Spilimbergo and Ubeda (2004) also establish family ties as a factor affecting migration in their study for differences in migration rates between Whites and Blacks in the U.S. They find that the reason that Blacks move less than Whites, despite having many factors commonly associated with high migration, is because Blacks have stronger family ties. Additionally, investigating migration patterns in the 1990s, Frey et al. (2005) confirm that cultural constraints to migration are more prevalent among racial minorities. This constraint would be in addition to any other differences across race that have been long known to impact migration decisions, such as access to resources, information, and education (for example, see Greenwood 1975). There may be other indirect contributors to the relationship between migration and labor market outcome gaps. For example, Blair and Chung (2017) provide evidence that occupational licensing reduces racial and gender wage gaps, yet Johnson and Kleiner (2017) find that occupational licensing increases costs of interstate migration. Even though blacks and Hispanics are less likely to be found in occupations that are licensed (Blair and Chung 2017), such institutional constraints may be contributing to labor market disparities in ways that are not obvious.

This paper investigates the role geographic differences in the distribution of jobs requiring a certain education level and workers with that education level might be playing in racial disparities in labor market outcomes. The theory is that if migration was perfectly costless (free of constraints), jobs requiring a certain level of education and workers with that education level would be equally distributed across states (or some other relevant geography). Of course, the degree to which these distributions differ is only suggestive of migration constraints. However, documenting a difference in the distributions is, in a sense, a necessary condition to

make the argument that differences in migration patterns are contributing to observed labor market disparities.

The analysis in this paper is related to, but differs from the long-standing literature on spatial mismatch, which in its most recent incarnation focuses on job decentralization as the dominant force in declining labor market outcomes among urban minorities (see Kain 1968; Wilson 1990 and Ihlanfeldt and Sjoquist 1998 for a comprehensive survey and Miller 2018 for more recent evidence). The analysis here takes a more birds-eye view of the potential constraints to inter-state migration and refrains from making any claims about causation.

2 Delta Index of Concentration

Indices of spatial concentration, within a much broader class of dissimilarity indices, have been used extensively to measure the degree of and changes in residential segregation (see Massey and Denton 1988; Iceland, Weinberg, and Steinmetz 2002). The "Delta" index of concentration was first proposed by Hoover (1941) and it's use, often referred to as the "Duncan Index," became popular among labor economists to measure occupational segregation (Duncan and Duncan 1955; Watts 1998; Karmel and Maclachlan 2007; Silber 1992). Pertaining to the question in this paper, the Delta Index can tell us how workers (of a certain education level and demographic) are distributed across states in the U.S. relative to the distribution of jobs requiring the same education level. If the distribution jobs typically requiring, say, a college degree better matches the distribution of whites with a college degree than the distribution of blacks with a college degree, this suggests that whites, compared to blacks, are geographically less concentrated than the distribution of occupations. Hence, geography could be playing a role in observed labor market disparities. In other words, there is more of a geographic mismatch

between blacks with a college degree and college jobs than between whites with a college degree and college jobs.

The Delta Index (D_e^r) that quantifies the difference between the distribution across states (or some other geography), *s*, of workers of racial group, *r*, and education level, *e*, and the distribution of jobs (or some other measure of labor market opportunity) across states requiring that education level and held by workers of that racial group, is calculated as follows:

$$D_e^r = \frac{1}{2}\sum_{s=1}^{50}\left|\frac{n_{es}^r}{N_e^r} - \frac{j_{es}^r}{J_e^r}\right|, \quad (1)$$

where,

n_{es}^r = number of people of racial group, *r*, in state, *s*, with education, *e*

N_e^r = total number of people in the U.S. of racial group, *r*, with education, *e*

j_{es}^r = number of jobs in state, *s*, requiring education, *e*, held by workers of racial group, *r*

J_e^r = total number of jobs in the U.S. requiring education, *e*, held by workers of racial group, *r*

The Index falls between zero and one. If workers with a certain education were distributed across states identically to the distribution of jobs requiring that education level then the Delta Index would be equal to zero -- the smaller the Index, the lower the mismatch between distributions of jobs and people. The Delta Index tells us what share of the racial group (or jobs) that would need to be moved in order to produce an equal distribution (see Watts 1998); of course, in the context of migration, it's more natural to think about changing the share of workers in the state (through migration), rather than changing the share of jobs in the state, that would be needed to equalize the distributions.

It may seem odd to classify job opportunities by race (adding *r* superscripts to the share of jobs at each education level). However, Hellerstein, Neumark, and McInerney (2008) find that an absence of the availability of jobs, generally, is not enough to explain lower employment rates

of blacks, but the absence of jobs *available to blacks* that matters -- accounting for the distribution of jobs only by education level would ignore this point. Additionally, since total jobs in an area may not capture important dynamics, different measures of labor market opportunity will be explored, such as the distribution of transitions from unemployment to employment within the state.[4] Further, in addition to evaluating distribution dissimilarities across states, we will also explore dissimilarities across the more narrowly defined locations of Core-based Statistical Areas (CBSA) and commuting zones (CZ).[5]

3 Data and Measurement Issues

The monthly Current Population Survey (CPS) is used to construct the statistics needed for the Delta Index for each year between 1992 and 2018. The analysis here only includes 25-54 year old men. Across several dimensions, labor market racial disparities are often found to be worse among men than among women (for example, see Cajner et al. 2017). The analysis was also performed for 25-54 year-old women, as well, but the patterns across race for women mirror the patterns found among men. For each year, a separate index is constructed for three racial groups (White, non-Hispanic; Black, non-Hispanic; and Hispanic) and for four education levels (less than high school, high school degree, some college, and bachelor degree and above).[6]

[4] Job vacancies in each state by occupation are not available. The Bureau of Labor Statistics makes available measures of job openings (vacancies) in their Job Openings and Labor Turnover Survey (JOLTS). But these data are available only by industry or broad Census region, not both. In addition, occupation is more reflective of educational requirements than industry, which will employ workers of a much broader range of educational attainment.

[5] Detailed information on CBSAs can be found at https://www.census.gov/topics/housing/housing-patterns/about/core-based-statistical-areas.html and information on CZs can be found at https://usa.ipums.org/usa-action/variables/COMZONE#description_section.

[6] "Other, non-Hispanic" is excluded from the analysis due to small number of observations.

3.1 Education "Required" for Each Occupation

For each year, among those employed (both men and women and all races), excluding the armed forces, the median education level is determined for each detailed occupation.[7] Table 1 reports the distribution of occupations across median education. The CPS has a different set of detailed occupation codes for 1992-2002, 2003-2010, and 2011 to the present. Not being able to match codes across years is not a concern since the median education for each occupation is constructed within these year groups, and the Delta Index is calculated for each year separately.[8] Table 1 shows that across all years, most occupations have a median education level of a high school degree only, followed by some college, then college and above. Less than one percent of all occupation codes have a median education level of less than a high school degree.

[Table 1 about here]

3.2 Demand for Educational Skills--Labor Market Opportunities by Education and Race

Only three occupations prior to 2011 have a median education level of less than high school -- farm workers, launderers and ironers, and graders and sorters. Farm workers and launderers only exist as separate occupations in the earliest time period of this analysis. Examples of occupations that have a median education of some college are drafters, police and sheriff patrol officers, physical therapist assistants, logistician, paralegal, and private detective.

The number of jobs (held by workers of any gender, within race groups) in each state requiring a certain education level (j_{es}^{r}) is simply the sum of people of that race group employed in that state in occupations requiring that education level, using the median education for

[7] Using the mode education level proved problematic since several occupations had multiple "modes," or, rather, multiple education levels that tied for mode status. CPS person weights are used when obtaining the median.

[8] Occupation codes for each year can be found at https://cps.ipums.org/cps-action/variables/OCC#codes_section.

occupations. Summing across states yields the total number of jobs in the U.S. held by workers in that race group requiring that education level (J_e^r). We will also explore transitions from unemployment to employment as an alternative measure of job opportunities.

3.2 Supply of Workers by Race and Education

The supply of potential workers in each state for each race and education group is calculated simply as the sum of workers in the state of that race with that education level (n_{es}^r). The total number of workers (25-54 year old men) in the U.S. of that race with that education level, then, is just the sum across states (N_e^r). Table 2 reports the distribution of 25-54 year old men across race/ethnicity for each educational group. This is the for the full sample 1992-2018. White, non-Hispanics make up the largest share in all education groups, except those with less than a high school degree. The shares of black, non-Hispanics and Hispanics declines in educational attainment, whereas the share of white, non-Hispanics increases in education.

[Table 2 about here]

3.3 Using Monthly CPS Data

Monthly CPS data are used to construct the total number of workers and jobs in each state and across the U.S. for each year. First the number of workers and jobs are summed within each month for each year, using the CPS person weight. Then, this monthly total is averaged across months to get an annual average total. The entire analysis is repeated using only March as the annual proxy, and the results are essentially the same; using monthly data also smooths the series due to using more observations.

4 Results - The Delta Index

4.1 Distributions in the Data

For illustration, Figure 1 compares the distributions of jobs across the U.S. in 2018 for which the median education is a high school degree and the distribution of workers with that level of education. Panel (a) makes this comparison for black, non-Hispanics and Panel (b) makes the comparison for white, non-Hispanics.

[Figure 1 about here]

The distributions will reflect the largest states (California, Texas, and New York, for example) having among the greatest shares of jobs and people of each race at each education level. However, the Delta Index is able to quantify the subtleties in relative distributional differences. For example, the share of jobs requiring a high school degree held by blacks in Ohio is less than the share of blacks living in Ohio (highlighted with red circles). Similarly, the share of jobs requiring a high school degree held by whites in Oregon is greater than the share of whites living in Oregon (highlighted with green circles).

Figure 2 makes a similar comparison between jobs and people across CBSAs rather than across whole states. The red circles in panel (a), again, highlight the location (Seattle) where the share of black, NHs with a high school exceeds the share of jobs held by black, NHs. And, the green circles in panel (b) illustrate one CBSA where the share of whites with a high school degree is less than the share of jobs held by whites with a college degree. Again, the Delta Index will be able to quantify thisese differences across CBSAs.

[Figure 2 about here]

4.2 The Delta Index and Migration

We claim that the Delta Index will tell us something about migration. Specifically, in the presence of migration constraints, we should see a greater mismatch between workers and job opportunities. A greater mismatch in the distributions of workers and jobs will produce a higher Delta Index. Therefore, we interpret a higher Delta Index as evidence consistent with lower migration. In this section, we investigate whether this relationship between the Delta Index and migration is consistent with some stylized migration facts from the literature.

4.2.a The Delta Index and the Relationship Between Migration and Education

A positive relationship between education and migration is well established in the literature (for example, see Molloy, Smith, and Wozniak 2011; Greenwood 1975). The theory behind this observation is that education reduces the informational cost of migrating and moving yields a greater return on general human capital afforded to those with higher education levels. Figure 2 shows that this stylized fact holds for white, non-Hispanics but not for the other racial groups.

[Figure 3 about here]

For all groups, those will less than a high school degree are more dissimilarly distributed across the states relative to the jobs requiring that education level. But, unexpectedly, there is greater mismatch between blacks and Hispanics with a college degree and jobs requiring a college degree, compared with those with high school or some college. This suggests that differences in migration constraints by education level vary by race, as well. Specifically, black and Hispanic workers at higher education levels face more constraints than those workers at lower education levels. This may be reflecting the importance of considering racial specificity of job opportunities (see Hellerstein, Neumark, and McInerney 2008).

4.2.b The Delta Index and Migration Patterns over Time

Since at least the 1980s, overall declines in inter-state migration are well-documented, and many varied explanations have been offered to explain it (for example, see Costa and Kahn 2000; Cooke 2013; Molloy, Smith, and Wozniak 2011; Kaplan and Schulhofer-Wohl 2017) . The declining trends in migration have been documented among all racial and education groups. If there is a link between lower migration and greater dissimilarity between the distribution of jobs and workers, we would expect the downward trend in migration rates to manifest itself in rising Delta Indices.

We find the Delta Index to be unambiguously rising over the time period only for white high school graduates. This is seen in Panel (a) of Figure 2. This suggests that even if the Delta Index is found to reflect a greater mismatch between people and job opportunities among racial/ethnic minorities than among whites, linking this result to lower migration rates (i.e., migration constraints) may be more tenuous than we thought.[9] However, if falling migration rates are more related to the aging population or declines in geographic specificity of occupations (Kaplan and Schulhofer-Wohl 2017), then rising migration may not result in greater mismatch between job opportunities and the working age population.

4.3 The Delta Index Across Race/Ethnicity

In this section we investigate whether differences in the Delta Index across race and education are suggestive of greater migration constraints among racial/ethnic minorities. The analysis will explore different measures of job opportunities and different levels of geography across which distributions are compared.

[9] Also see Hall and Schulhofer-Wohl (2018) who document a reduction in job matching efficiency between 2001 and 2013.

4.3.a Total Jobs across U.S. States

As described in equation (1), the total number of race/education specific jobs is used as the first measure of job opportunities, and the distribution of these jobs is compared with the distribution of race/education population across U.S. states. Figure 4 presents the Delta Indices within education level across race/ethnicity. All racial groups with either a high school or less than high school education level appear to be similarly distributed across U.S. states as job requiring those education levels (see panels a and b). Additionally, Hispanics and whites with some college education are equally similarly distributed across U.S. states as jobs requiring that education level -- and more similarly distributed than blacks with some college (see panel c).

[Figure 4 about here]

It is among those with at least a college degree that white, non-Hispanics appear to have the distributional advantage over both blacks and Hispanics. Panel (d) reflects, through a lower Delta Index over the whole time period, that whites with a college degree are significantly more similarly distributed across U.S. states as jobs requiring at least a college degree, than are blacks and Hispanics, both exhibiting greater dissimilarity through a higher Delta Index. Therefore, if differences in the Delta Index across race/ethnicity are reflecting differences in migration constraints, then Figure 4 suggests that these differences are concentrated among those with at least a college degree. The robustness of this conclusion to different measures of labor market opportunity and to different geographies is explored next.

4.3.b Labor Market Transitions across U.S. States

It might be argued that the total number of race/education specific jobs in an area does not appropriately account for job opportunities -- that what is needed is a more dynamic measure. While a measure of job vacancies by occupation (for any geography level) is not available from

typical data sources, using individually matched CPS observations from one year to the next, we can create a measure of transitions from unemployment to employment (U-to-E).[10] While total jobs reflects a point-in-time employment opportunity for an area, U-to-E transitions could be argued to reflect greater labor market dynamism, thus changing opportunity.

The Delta Index is re-calculated to compare the distribution of people of a particular race and education level with the distribution of year-to-year transitions by workers of the same race and education level (a similar analysis using monthly transitions produces similar results):

$$D_e^r = \frac{1}{2}\sum_{s=1}^{50}\left|\frac{n_{es}^r}{N_e^r} - \frac{t_{es}^r}{T_e^r}\right|, \quad (2)$$

where,

n_{es}^r and N_e^r are defined as above in equation (1);

t_{es}^r = number of U-to-E transitions from one year to the next made by workers of racial group, *r*, with education level, *e*, in state, *s*; and

T_e^r = total number of U-to-E transitions in the U.S. from one year to the next made by workers of racial group, *r*, with education level, *e*.

The Delta Indices presented in Figure 5 offer more wide-spread evidence than seen in Figure 4 of an advantage for whites across education groups regarding mismatch between people and job opportunities. Except for those with less than a high school education, the Delta Index over time and across education levels for white, non-Hispanics is lower than for other racial groups. Additionally, at most education levels, Hispanics are more mismatched than black, non-Hispanics.

[Figure 5 about here]

[10] A review of some research using online vacancy data, such as Glassdoor or Vault can be found in Kureková, Beblavý, and Thum-Thysen (2015).

Panel (a) of Figure 5 presents a unique observation -- Hispanics are no more mismatched with job opportunities requiring less than a high school degree than are white, non-Hispanics, suggesting a comparable degree of mobility between the two racial groups. Recall that there are no occupations starting in 2011 for which "less-than-high-school" is the median education level for workers, and prior to 2011, there are only three occupations in that group, so we may want to take Panel (a) results with a grain of salt. However, we do know that at least over this time period Hispanics constitute the majority of farm workers and 39 percent of farm workers are (internal) migrants (Fan et al. 2015). The implication is that the frequent migration of Hispanic farm workers produces a relatively low Delta Index for Hispanics with less than a high school education.

4.3.c Labor Market Transitions across CBSAs and CZs

Figures 4 and 5 reflect the comparison of the distributions of people and job opportunities across U.S. states. It could be argued that the share of race/education specific jobs in a state is much too large a geography to capture the labor market opportunities for any one person or group. In order to see whether the patterns of Figure 5 hold for more narrow geographies, Figure 6 plots the Delta Index comparing the distributions of job opportunities with that of the corresponding race/education specific population across Core-based Statistical Areas (CBSAs) and across Commuting Zones (CZs).[11] CBSAs are restricted to more urban locations, while CZs are defined for both rural and urban areas.[12] Job market opportunities are measured by the distribution of race/education specific year-to-year U-to-E transitions (the same measure used in Figure 5).

[11] For these analyses, the time frame is from 1996-2018 due to lack of consistent CZ and CBSA identifiers in the CPS prior to 1996.
[12] See footnote 3 for more on CBSAs and CZs.

[Figure 6 about here]

The first observation to be made when looking at the Delta Indices in Figure 7 is that across both CBSAs and CZs, there is greater mismatch between the distributions of black, non-Hispanics and Hispanics and their race/education specific job opportunities (measured as U-to-E transitions) than there is for white, non-Hispanics. Like the distribution comparison across states (Figure 5), the only exception is those with less than a high-school degree, where Hispanics experience the same degree of mismatch with jobs across CBSAs as whites do, and *less* mismatch than whites across CZs (black, non-Hispanics are excluded from this education group due to too-few observations in many locations).

The second observation is that, although the patterns of mismatch across race are the same regardless of level of geography (comparing Figures 6 and 5), the overall degree of mismatch differs. Across all education levels, the Delta Index is higher, and, thus, reflects a greater degree of mismatch for all racial groups when the distribution across a more narrow geography is considered (Figure 6). This makes sense, for example, since there may be exactly the same share of black college graduates in the state of California as the share of black college graduates transitioning from U-to-E. However, the transitions may be concentrated in Los Angeles, whereas the non-transitioning or out-of-the labor force populations may be concentrated in San Francisco. The state level Delta Index would not pick up this mismatch, but the CBSA and CZ measures would.

5 Results - Multivariate Regression

So far, this analysis has interpreted a higher Delta Index (i.e., greater mismatch between people and job opportunities) for a particular racial group as evidence for the presence of greater

constraints on migration. This has not been a causal analysis, but merely the presentation of evidence consistent with that conclusion. All else equal, fewer migration constraints implies a greater migration response to growing job opportunities. In order to try and get at a more causal conclusion to the question of whether white, non-Hispanics are more responsive to job opportunities, we estimate a linear regression model where the change in local labor market opportunities (U-to-E transitions) enters as a determinant for the change in the share of people in that location:

$$\Delta\left(\frac{n_e^r}{N_e^r}\right)_{g,t} = \alpha + \sum_{j=1}^{2}\left\{\beta_j^1 RACE_{g,t}^j + \beta_j^2 RACE_{g,t}^j * \Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t}\right\}$$

$$+ \sum_{k=1}^{2}\left\{\varphi_k^1 EDUC_{g,t}^k + \varphi_k^2 EDUC_{g,t}^k * \Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t}\right\}$$

$$+ \sum_{j=1}^{2}\sum_{k=1}^{2}\left\{\lambda_{jk}^1 RACE_{g,t}^j EDUC_{g,t}^k + \lambda_{jk}^2 RACE_{g,t}^j EDUC_{g,t}^k * \Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t}\right\}$$

$$+\rho\Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t} + \theta' X_{g,t-1} + \delta d_{eg,t-1}^r + \gamma_g + \tau_t + \varepsilon_{erg,t}, . \quad (3)$$

where,

$\Delta\left(\frac{n_e^r}{N_e^r}\right)_{g,t}$ = change in the share of all people of racial group, *r*, with education, *e*, in geography, *g*, from *t-1* to *t*;

$\Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t}$ = change in the share of all U-to-E transitions from one year to the next made by workers of racial group, *r*, with education level, *e*, in geography, *g*, from *t-1* to *t*;

$RACE_{g,t}$ = set of 0,1 regressors indicating black, non-Hispanic or Hispanic race/ethnicity;

$EDUC_{g,t}$ = set of 0,1 regressors indicating some college or college plus education groups;

$X_{g,t-1}$ = geography specific additional regressors at time *t-1* , including the unemployment rate and industry shares, which are expected to capture both baseline job opportunities and unemployment risk in the geographic location (e.g., see Devaraj et al. 2017);

$d^r_{eg,t-1} = \left|\frac{n^r_e}{N^r_e} - \frac{t^r_e}{T^r_e}\right|$ = race and education specific component of the Delta Index for geographic location, *g*, at time *t-1*, reflecting the initial mismatch between race/education specific job opportunities and people;

λ_g and τ_t are geography and year fixed effects, respectively, and $\varepsilon_{erg,t}$ are robust standard errors, clustered at the geography level (each CBSA and CZ are observed multiple times across years).[13] The geography fixed effect is expected to control for time-invariant geographic features, such as amenities. The unit of observation is race/education/geography/year and the analysis is performed for both CBSA and CZ geography levels. The analysis excludes less than high school and is restricted to white and black non-Hispanics. Note that the definition of commuting zones depends on knowing a person's county, which is often missing; so there will be more observations in the CBSA analysis than in the CZ analysis. Since U-to-E transitions (or, more generally, employment opportunity) may be endogenous to population changes, we will investigate instrumenting $\Delta\left(\frac{t^r_{es}}{T^r_e}\right)_{g,t}$ with a Bartik shift-share (Bartik 1991) in future analyses.

This analysis is not unlike that undertaken by Amior and Manning (2018), who find evidence of significant migratory response to labor market opportunity, but that push-migration (from declining economic opportunity) is much weaker than pull-migration. This means that population never fully adjusts to changing employment opportunities and labor market

[13] Clustering is not done at the state level since CZs and CBSAs cross state boundaries. And, using Census regions or divisions would provide too few clusters (see Cameron, Gelbach, and Miller 2008).

disequilibrium persists across commuting zones. Their analysis, however, does not separate migration responses by education or race.

Full estimation results are contained in Appendix A (Tables A1 and A2). Table 3 reports the marginal effect of the change in area transitions on change in population shares. A positive marginal effect indicates that in an area with a higher education/race U-to-E transition share over the previous year, the share of people in that education/race group also increased in that area -- suggestive of a positive migration response to improved job opportunities in the area. The question is whether blacks exhibit any different level of response than whites.

[Table 3 about here]

Table 3 indicates that there is at least a significant positive correlation between transition share changes and population changes at the CBSA level of geography among both blacks and whites (see columns 1 and 2). The marginal effect for whites, for example, suggests that a one percentage point increase in the change in U-to-E transition shares (which is about one standard deviation in transition share changes) is associated with a 0.0153 percentage point change in the population share of whites. This marginal effect is also about a standard deviation in population share changes

The level of significance of the marginal effect is reduced for both blacks and whites when looking at the CZ level of geography. However, the main result is that the marginal effect of education/race specific transition share changes on education/race specific population shares is significantly smaller for blacks than for whites, and, in fact, not significantly different from zero in all but the CBSA analysis without controls.

In the full estimation results reported in Appendix A, we also note that the initial economic conditions of a location perform as expected. The coefficients on both the location-

specific unemployment rate and the education/race/location specific Delta Index component are negative. This means that locations with worse economic conditions (higher unemployment rate or greater mismatch between jobs and people) are associated with smaller increases in population shares (less gross migration to the location). Both of these effects are statistically significant for the CBSA regression (Table A1), but only the Delta component coefficient is significant in the CZ regression (Table A2).

6 Importance of Social Costs

The appropriate policy aimed at correcting the mismatch between jobs and workers depends on the reason why disadvantaged workers are less responsive to changes in labor market opportunities. If social costs are keeping racial and ethnic minorities from migrating to better opportunities, then a policy aimed at moving people to jobs is likely to be less effective than a policy of moving jobs to people. A recent graphical analysis of Facebook connections published by the New York Times (Badger and Bui 2018) illustrates how powerful connections from historical events, like the Great Migration in the early 20th century, can dictate geographic connectedness today. This section presents two analyses designed to explore the role that social costs might be playing in the observed lack of responsiveness of minority workers to changes in job opportunities.

The first analysis repeats the estimation of equation (3), but limits the sample to CBSAs on the receiving end of migrants during the "Great Migration." Between 1910 and 1970, an estimated 6 million blacks migrated from Southern states to other parts of the country in search of improved economic and social conditions. One could argue that these historic connections would reduce the social costs, all else equal, faced by blacks in their decision today to migrate to

take advantage of job opportunities elsewhere. The U.S. Census Bureau identifies cities that were most impacted by the Great Migration (U.S. Census Bureau 2012) and we link those cities to CBSAs (details available upon request). CBSAs included in the analysis are those that experienced at least a five percentage point increase in black population during the Great Migration.

Table 4 reports the marginal effects relating the change in the share of each race/ethnic group, by education, in a Great Migration CBSA and the change in the share of U-to-E transitions (among the same race/education group) in that CBSA. The marginal effects including all CBSAs from Table 3 are also reported in Table 4 for easy comparison.

[Table 4 about here]

Even among Great Migration CBSAs, the response of black, NHs to changes in job market opportunities are still not significantly different from zero. This doesn't mean that social costs are unimportant to migration decisions, but this specification doesn't capture it. Additionally, the responses of white, NHs and college educated Hispanics are stronger among the Great Migration restricted sample. Since these regressions include measures of labor market strength and location specific fixed effects, it's not clear what the implication of these stronger effects is.

The second analysis to explore the role that social costs might play in the ability/willingness of racial and ethnic minorities to migrate in order to take advantage of job market opportunities is a regression specification that modifies equation (3) by including the share of the population in the CBSA that is black, non-Hispanic or Hispanic by itself, interacted with education, and also interacted with changing job opportunities in the CBSA. Responsiveness to job market opportunities in CBSAs that increases with the share of same

ethnic/racial population would suggest that social costs might be a constraint in migration of minorities. Marginal effects by ethnic/racial percentiles are presented in Table 5. The full set of parameter estimates and the estimating equation are found in Appendix B.

[Table 5]

Except for the marginal effects for Hispanics with some college education, each of the point estimates progresses in the way that we would expect if job market opportunities in CBSAs with higher shares of ethnic/racial minorities was more influential in motivating minorities to migrate to take advantage of those opportunities. This would suggest that removing those social costs would increase migration responsiveness of minorities to job market opportunities elsewhere. However, rarely are the parameter estimate statistically different from zero.

7 Conclusions and Discussion

The analysis in this paper finds that black and Hispanic workers, at each education level, are more geographically concentrated than whites, relative to race/education specific job opportunities. This result holds for different measures of job opportunities and across different levels of geography, including states, Core-based Statistical Areas (CBSA), and Commuting Zones (CZ). The differences in concentration are most dramatic when job opportunity is measured by the distribution of transitions from unemployment to employment (U-to-E) across different geographies.

A regression analysis supports the interpretation of these results as differences in migration responses by education and race to changing job opportunities. At both the CBSA and CZ geographic level, the relationship between the change in education/race specific job opportunity in a location and the change in education/race specific population is significantly

larger and more statistically significant among white, non-Hispanics than it is for black, non-Hispanics. Additional analysis falls short of providing evidence that social costs play a significant role in constraining ethnic/minority response to changing labor market opportunities elsewhere. However, this should not be interpreted as rejecting an important role of social costs in constraining migration.

Finding evidence of greater job opportunity/population mismatch among racial/ethnic minorities and potentially weaker response of black, non-Hispanics to changing job opportunities is not sufficient to conclude that blacks and Hispanics would be better off if they were spread more thinly across the U.S. states to better match the distribution of jobs matching their education. Some have found that racial and ethnic minorities experience significant gains from social and cultural networks that are accessible when living in close proximity with one another (e.g., Montgomery 1991; Edin, Fredriksson, and Åslund 2003; Elliott 2005). This would suggest that efforts directed toward decreasing disparate labor market outcomes should focus on adjusting the human capital of minorities (e.g., by improving educational opportunities) to better match the occupational demands of the area, or by improving economic opportunities that better match the educational attainment of the population, rather than necessarily promoting migration.

On the other hand, Xie and Gough (2011) don't find any evidence of benefits to immigrants working in "ethnic enclaves" relative to immigrants working outside of the enclave. In addition, Dickerson (2007) finds that employment outcomes are worse for blacks in segregated cities, suggesting that geographic concentration may indeed be harmful for economic outcomes of minorities, and that easing migration might prove useful for improving labor market disparities.

Picard and Zenou (2018) provide a theoretical model showing how minority workers,

faced with a mismatch of location and jobs, could benefit from a variety of policy approaches. Place-based policies, such as neighborhood regeneration (which provides incentives for majority workers to move there providing improved networking contacts) and establishment of enterprise zones (attracting firms providing additional employment opportunities) are ways in which specific geographic locales can attract both residents and firms. Contrastingly, people-based policies, such as the Moving to Opportunity programs, provide housing subsidies in order to improve outcomes by moving people closer to jobs. Both of these first two types of policies would improve the measured locational mismatch between minorities and jobs. However, incentivizing people to move is a tall order (for example see Harrison and Raice 2018). Indirect policies, such as improving public transportation or access to information (see Waldrip et al. 2015; R. Wilson 2018) will also improve employment outcomes among minorities, but may not change the locational mismatch between minorities and jobs. This potential conflict in policies focused on *either* people *or* place is long-standing in the urban literature, described in a phrase coined by Winnick (1966)-- 'Place Prosperity vs. People Prosperity' (also see Bolton 1992; Partridge and Rickman 2007).

Hellerstein, Neumark, and McInerney (2008) find that an absence of the availability of jobs, generally, is not enough to explain lower employment rates of blacks, but it's the absence of jobs *available to blacks* that matters. This suggests that while Marinescu and Rathelot (2018) find that aggregate geographical mismatch between jobs and people may not be very important in the overall unemployment rate, education/race specific mismatch may play a greater role in determining labor market outcome. In other words, combating discrimination and negative neighborhood effects (Cain and Finnie 1990) may be even more important than solving the distribution problem.

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Table 1 Distribution of occupations across median education of those employed in the occupation.

Median Education in Occupation	Percent of Occupation codes across years
Less than high school	0.46%
High school degree only	42.02%
Some college	32.31%
College degree and above	25.21%

Notes: Authors calculations using the CPS; includes all workers 25-54 employed in each occupation between January 1992 and March 2018.

Table 2 Distribution of 25-54 year old men across race/ethnicity by educational attainment, 1992-2018.

	Percent of Education Category		
	White, NH	Black, NH	Hispanic
Less than HS	40	12	48
HS degree	69	15	17
Some Coll	74	13	12
College degree or more	84	8	7

Notes: Authors calculations using the CPS person weight. Row totals may not sum to 100 due to rounding.

Table 3 Marginal effect of a change in the U-to-E transition share on share of population in the geography, by race/ethnicity and educational attainment.

Geographic area:	Excluding Controls		Including Controls	
	CBSA (1)	CZone (2)	CBSA (3)	CZone (4)
White, NH	0.0156***	0.0100*	0.0107***	0.0111**
	[0.0042]	[0.0057]	[0.0038]	[0.0046]
High School	0.0197***	0.0150**	0.0140**	0.0174***
	[0.0062]	[0.0070]	[0.0057]	[0.0065]
Some College	0.0135***	0.0054	0.0093**	0.0075
	[0.0049]	[0.0097]	[0.0047]	[0.0078]
College and Above	0.0132***	0.0093***	0.0086**	0.0080**
	[0.0039]	[0.0033]	[0.0038]	[0.0033]
Black, NH	0.0051*	0.0003	0.0013	-0.0037
	[0.0028]	[0.0044]	[0.0027]	[0.0050]
High School	0.0057	-0.0011	0.002	-0.0036
	[0.0059]	[0.0079]	[0.0059]	[0.0083]
Some College	0.0028	0.0015	-0.0009	-0.0017
	[0.0046]	[0.0062]	[0.0046]	[0.0066]
College and Above	0.0069**	0.0005	0.0028	-0.0059
	[0.0032]	[0.0039]	[0.0029]	[0.0047]
Hispanic	0.0088**	0.0076***	0.0045	0.0058
	[0.0040]	[0.0024]	[0.0043]	[0.0035]
High School	0.0215**	0.0218***	0.0174	0.0238*
	[0.0108]	[0.0083]	[0.0108]	[0.0122]
Some College	-0.0036	-0.0014	-0.0076	-0.0045
	[0.0060]	[0.0063]	[0.0063]	[0.0058]
College and Above	0.0076***	0.0012	0.0028	-0.0036
	[0.0027]	[0.0050]	[0.0029]	[0.0046]
Observations	41,650	21,470	41,650	21,470

Note: Robust standard errors are clustered at the level of geography. There are 346 CBSAs and 188 CZs observed across time. *, **, *** => statistical significance at the 90, 95, and 99 percent level. Additional controls included in columns (3) and (4) are education indicators, the area unemployment rate, the area's industry shares, the race/education specific component of the Delta Index for that area, and geography and year fixed effects. Sample includes 25-54 year-old men with at least a high school degree and 1996-2018 years of data. Full estimation results are included in Appendix A.

Table 4: Marginal effect of a change in the U-to-E transition share on share of population in the in CBSAs most impacted by the "Great Migration", by race/ethnicity and educational attainment.

	Full Sample of CBSAs (copied from Table 3)	"Great Migration" CBSAs only
White, NH	0.0107***	0.0129**
	[0.0038]	[0.0062]
High School	0.0140**	0.0168*
	[0.0057]	[0.0101]
Some College	0.0093**	0.0106
	[0.0047]	[0.0073]
College and Above	0.0086**	0.0111**
	[0.0038]	[0.0054]
Black, NH	0.0013	0.0014
	[0.0027]	[0.0034]
High School	0.002	0.0037
	[0.0059]	[0.0081]
Some College	-0.0009	-0.0004
	[0.0046]	[0.0054]
College and Above	0.0028	0.0009
	[0.0029]	[0.0029]
Hispanic	0.0045	0.0087
	[0.0043]	[0.0064]
High School	0.0174	0.0272
	[0.0108]	[0.0173]
Some College	-0.0076	-0.0082
	[0.0063]	[0.0088]
College and Above	0.0028	0.0061**
	[0.0029]	[0.0030]
Observations	41,650	25,366

Note: Robust standard errors are clustered at the level of geography. There are 346 CBSAs in the full sample analysis and 163 CBSAs in the "Great Migration" estimation. *, **, *** => statistical significance at the 90, 95, and 99 percent level. Regression includes CBSA specific unemployment rate, industry shares, the race/education specific component of the Delta Index, and CBSA and year fixed effects. Sample includes 25-54 year-old men with at least a high school degree and 1996-2018 years of data. Full estimation results are included in Appendix A.

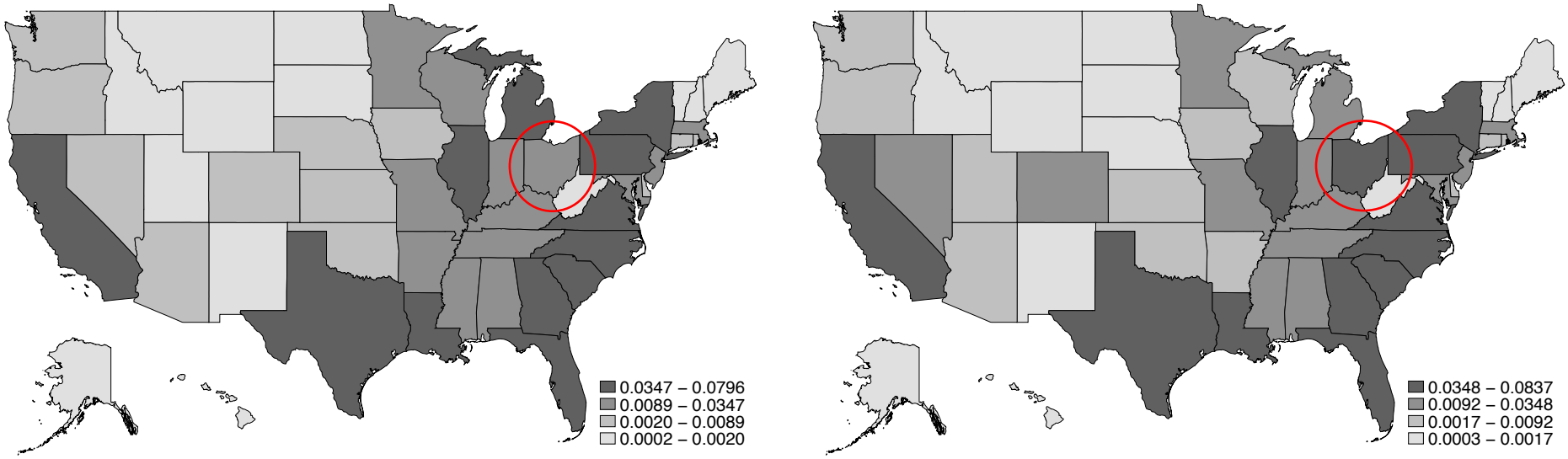
Table 5 Marginal effect of a change in the transition share among black, NH and Hispanics on share of population in CBSA, by own race/ethnicity, at different points in the distribution of CBSA race/ethnicity population share.

	Own Race/ethnicity population share in CBSA by percentile		
	25th Percentile	50th Percentile	75th Percentile
M.E. for Blacks, NH			
High School	0	0.0008	0.0021
	[0.0093]	[0.0074]	[0.0057]
Some College	-0.0102**	-0.0062	0.0002
	[0.0045]	[0.0041]	[0.0046]
College or Above	0.0004	0.0011	0.0023
	[0.0047]	[0.0036]	[0.0028]
M.E. for Hispanics			
High School	0.0171	0.0172	0.0172*
	[0.0116]	[0.0109]	[0.0102]
Some College	-0.0165**	-0.0145**	-0.0102
	[0.0074]	[0.0070]	[0.0064]
College or Above	0.0025	0.0026	0.0028
	[0.0037]	[0.0034]	[0.0029]

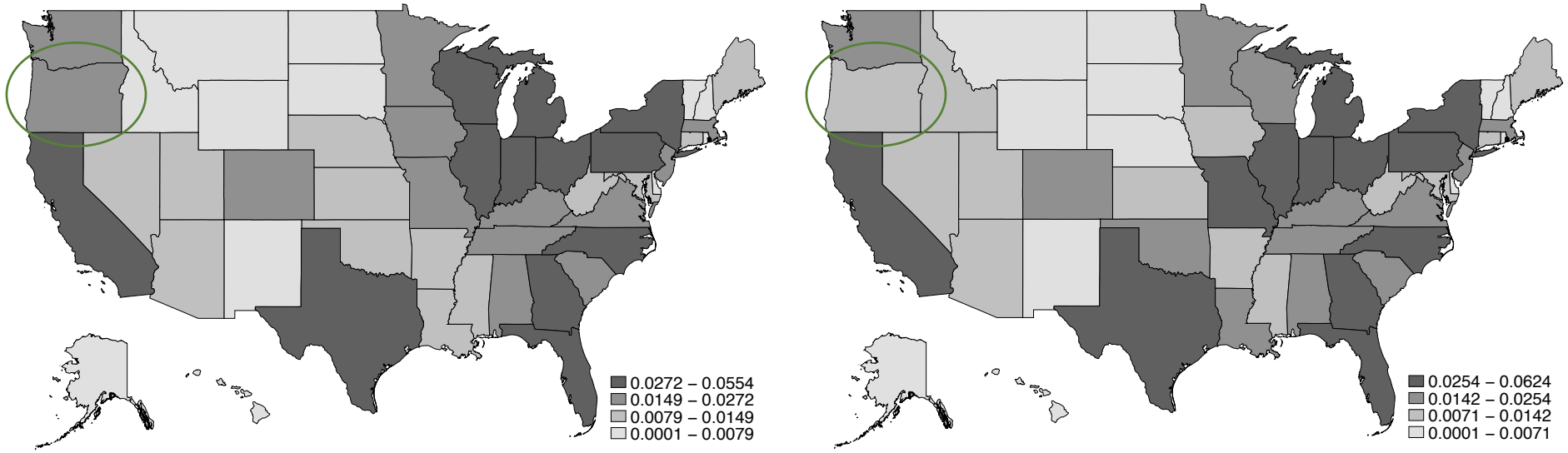
Note: Robust standard errors are clustered at the CBSA level. There are 346 CBSAs. *, **, *** => statistical significance at the 90, 95, and 99 percent level. Regression includes CBSA specific unemployment rate, industry shares, the race/education specific component of the Delta Index, and CBSA and year fixed effects. Sample includes 25-54 year-old men with at least a high school degree and 1996-2018 years of data. Full estimation results are found in Appendix B.

Figure 1 Maps of the distribution of high-school-only jobs by race across states.

Panel (a): Distribution of high school jobs held by black, non-Hispanics vs. the distribution of black, non-Hispanics with a high school degree.



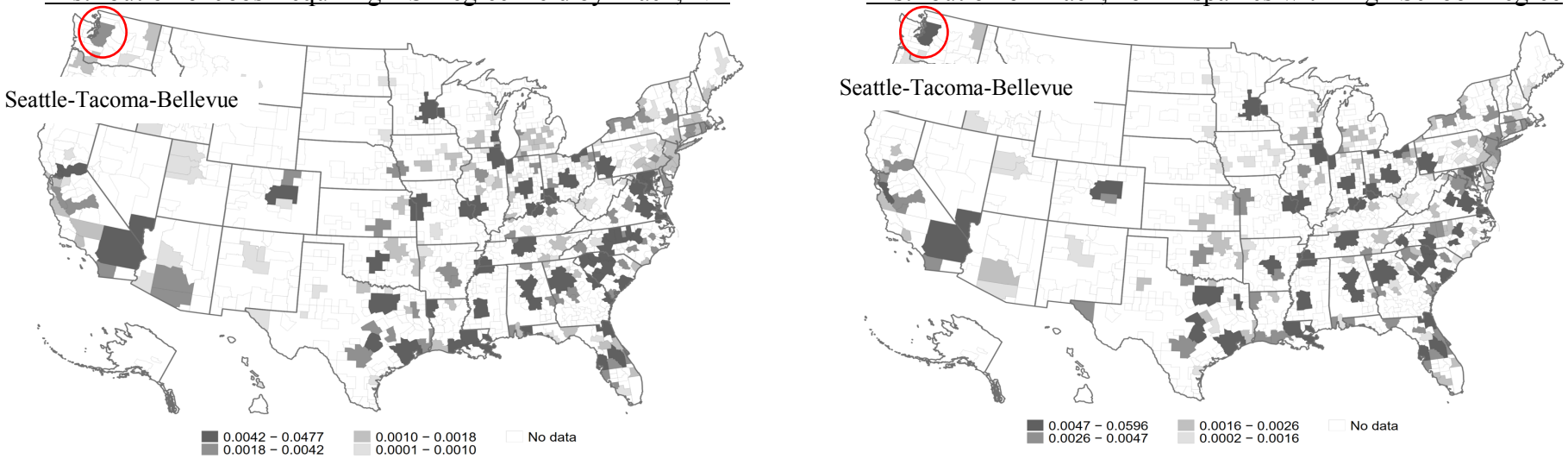
Panel (b): Distribution of high school jobs held by white, non-Hispanics vs. the distribution of white, non-Hispanics with a high school degree.



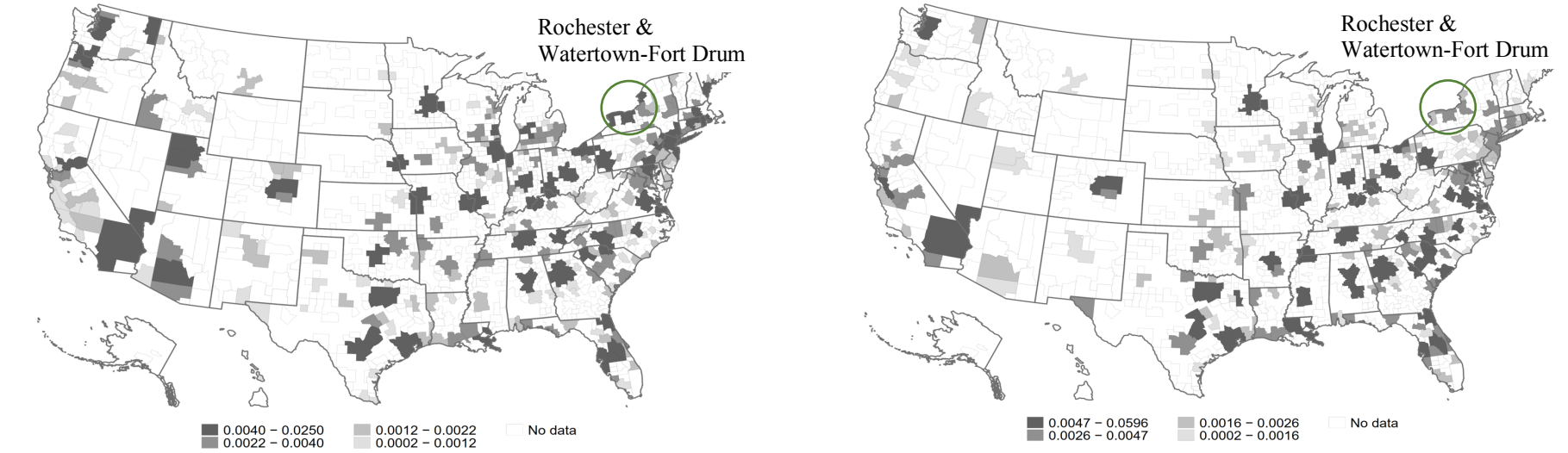
Notes: The "required" education for a job is determined by the median education of people employed in that occupation. Data reflects the distribution of jobs in 2018. Maps created using the Stata program _maptile_.

Figure 2 Maps of the distribution of high-school-only jobs by race across Core-based statistical areas (CBSAs).

Panel (a): Distribution of high school jobs held by black, non-Hispanics vs. the distribution of black, non-Hispanics with a high school degree.



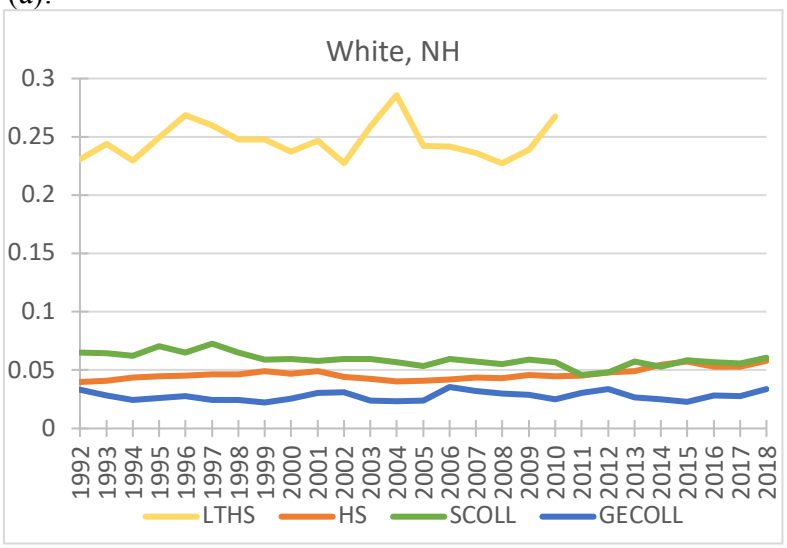
Panel (b): Distribution of high school jobs held by white, non-Hispanics vs. the distribution of white, non-Hispanics with a high school degree.



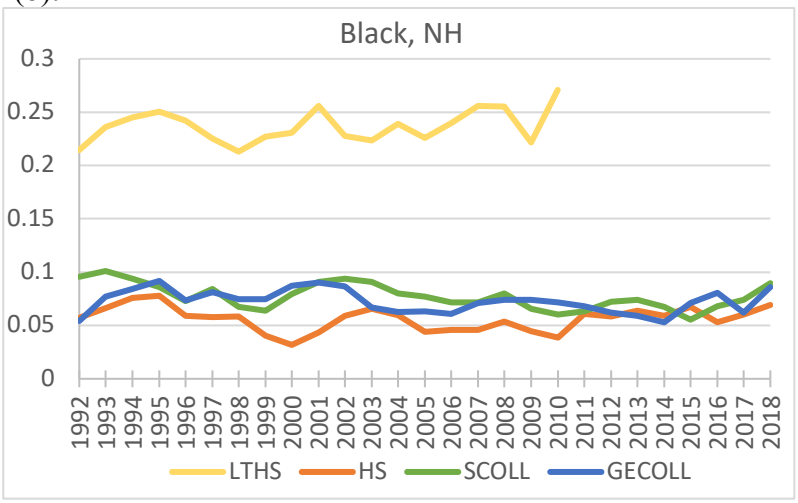
Notes: The "required" education for a job is determined by the median education of people employed in that occupation. Data reflects the distribution of jobs in 2018. Maps created using the Stata program _maptile_.

Figure 3 Delta Index across education by race across time, total number of jobs across U.S. states.

Panel (a):



Panel (b):



Panel (c):

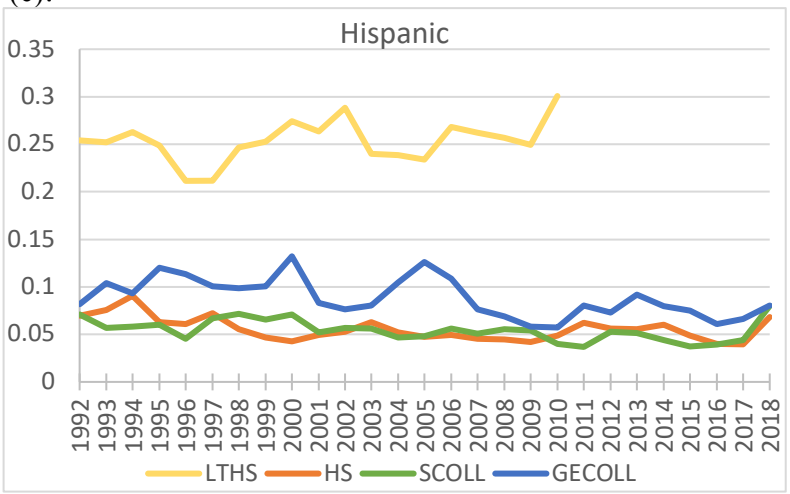
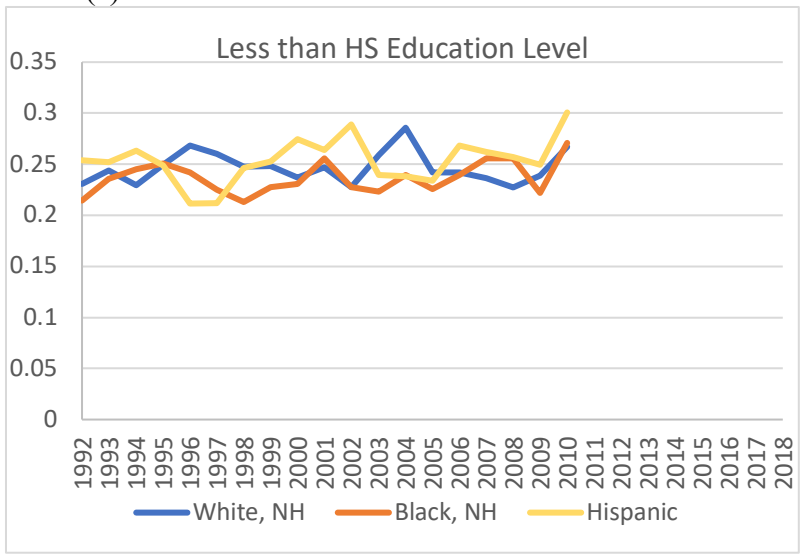
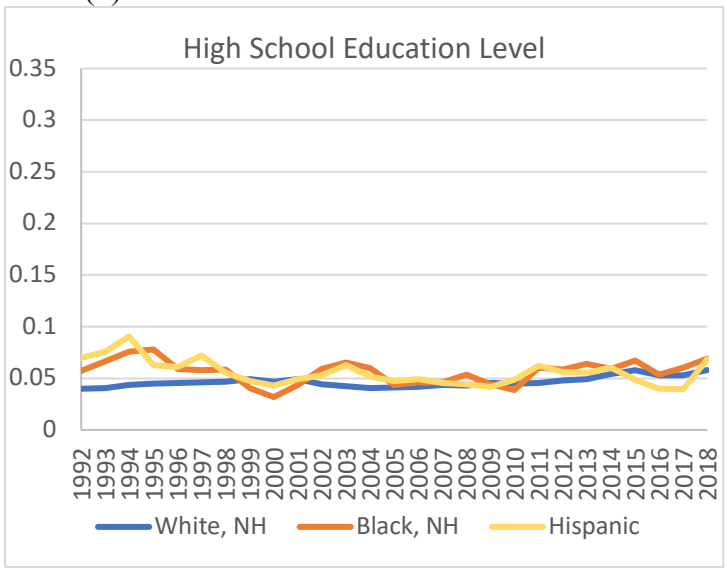


Figure 4 Delta Index across racial groups by education across time, total number of jobs across U.S. states.

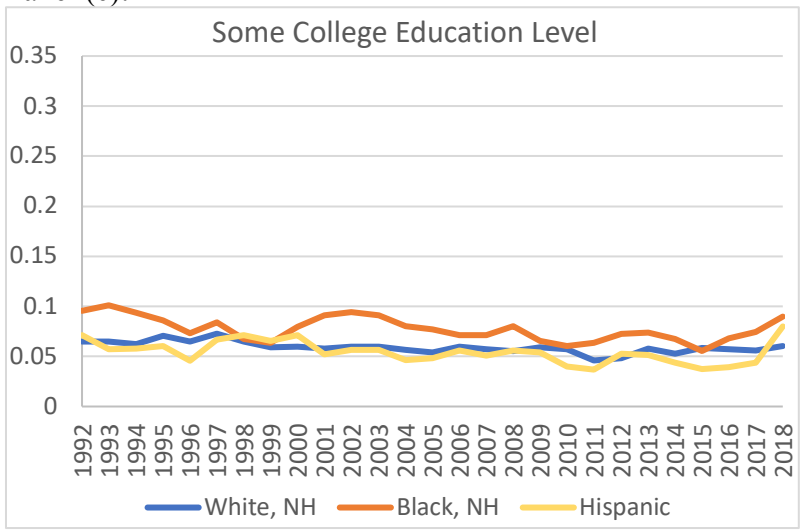
Panel (a):



Panel (b):



Panel (c):



Panel (d):

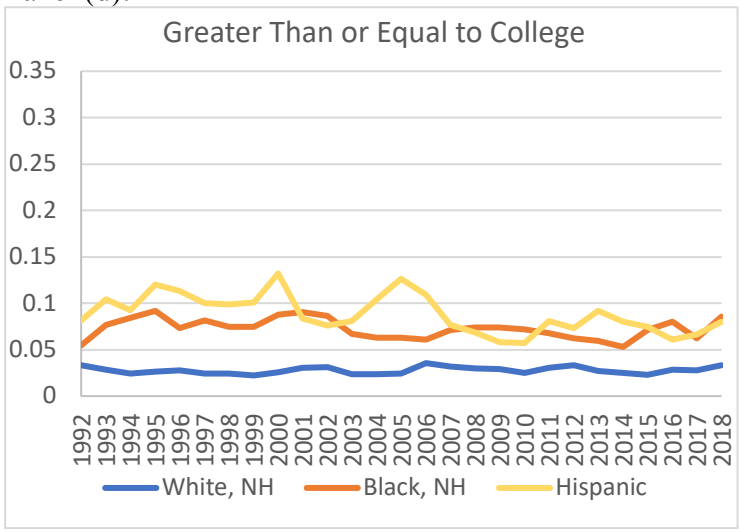
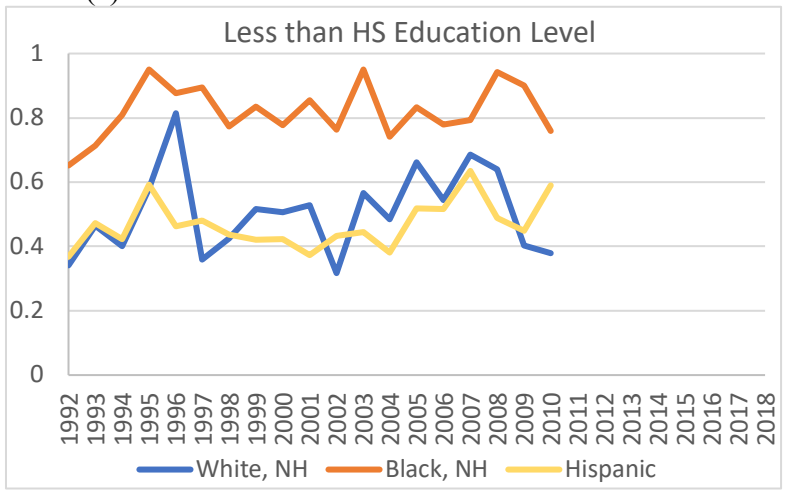
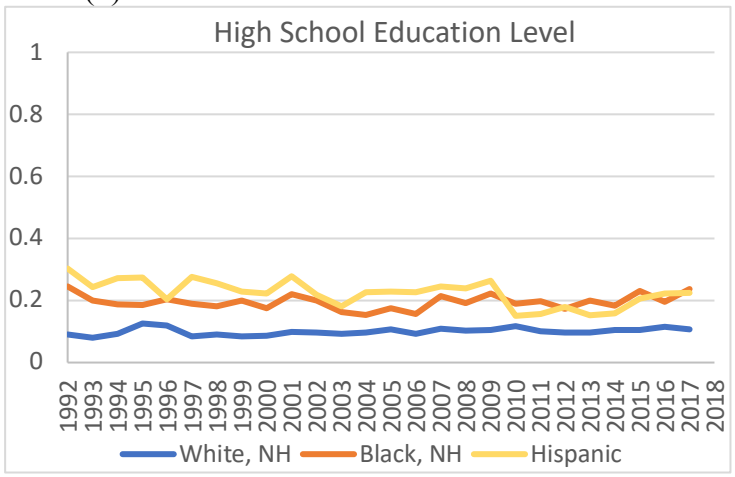


Figure 5 Delta Index across racial groups by education across time, year-to-year transitions from unemployment to employment across U.S. states.

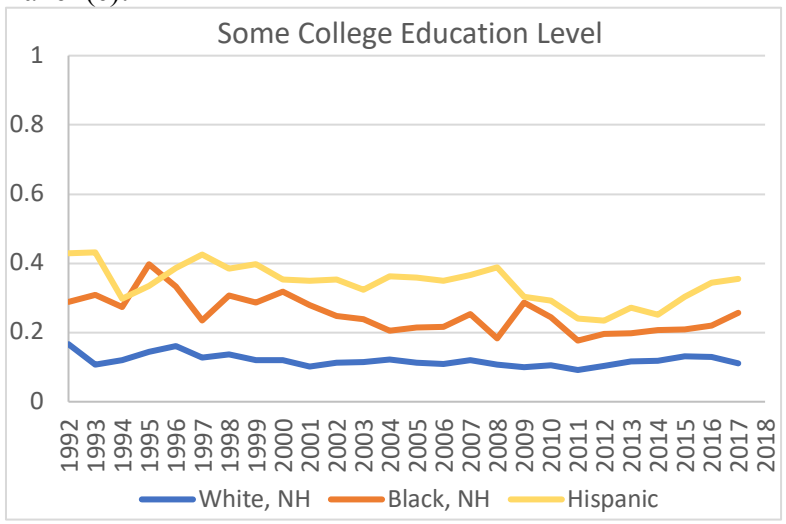
Panel (a):



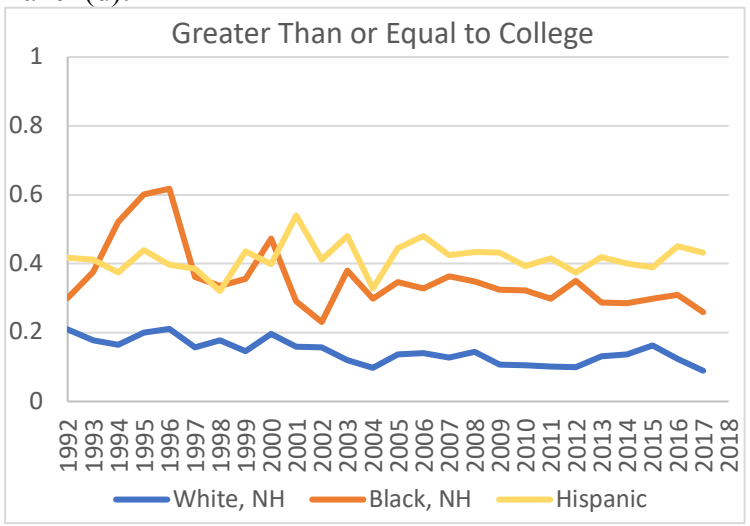
Panel (b):



Panel (c):

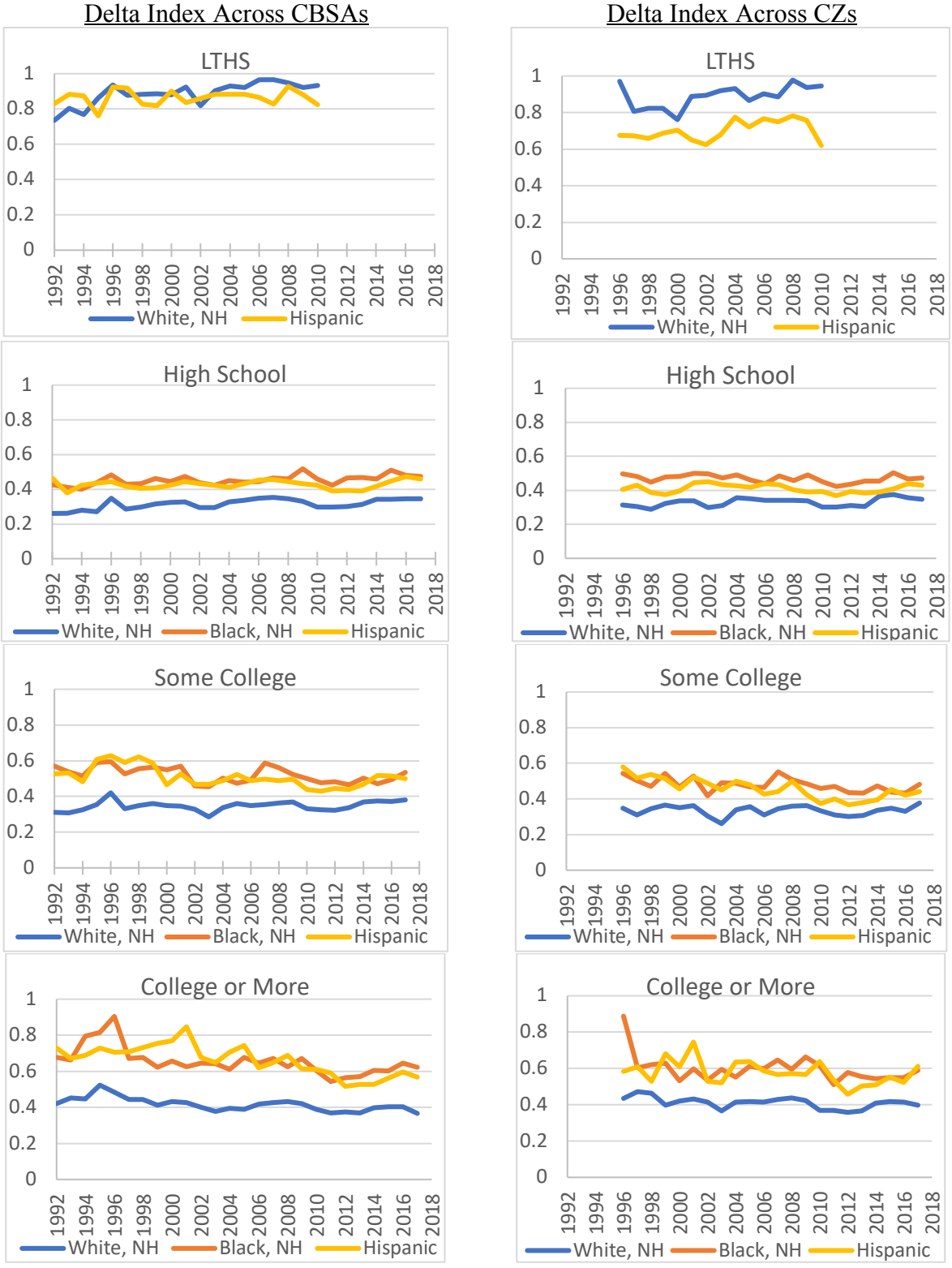


Panel (d):



Note: Delta Indexes are plotted through 2017 only, since only partial data were available for 2018.

Figure 6 Delta Index across racial groups by education across time, year-to-year transitions from unemployment to employment across CBSAs and CZs.



Note: Delta Indexes are plotted through 2017 only, since only partial data were available for 2018. CZ data only available starting in 1996. Black, NHs are excluded from the LTHS graphs due to too few observations.

Appendix A: Complete Set of OLS Parameter Coefficient Estimates and Sample Means

Table A1 Core-based statistical area (CBSA) results; the dependent variable is the year-to-year change in share of population $\Delta\left(\frac{n}{N}\right)$

VARIABLES	Excluding Controls	Including Controls
Change in Transition share	0.0197315***	0.0139651**
	(0.0062302)	(0.0057447)
Black, NH	0.0000053	0.0000247*
	(0.0000120)	(0.0000136)
Hispanic	-0.0000068	0.0000200
	(0.0000201)	(0.0000165)
Black, NH* Change in Transition share	-0.0140388*	-0.0119570*
	(0.0072460)	(0.0072297)
Hispanic* Change in Transition share	0.0017809	0.0034025
	(0.0103847)	(0.0105325)
Some College	0.0000050	0.0000082
	(0.0000065)	(0.0000066)
College and Above	0.0000001	0.0000096
	(0.0000067)	(0.0000080)
Some College * Change in Transition share	-0.0062629	-0.0047023
	(0.0057348)	(0.0055252)
College and Above * Change in Transition share	-0.0065601	-0.0053667
	(0.0055665)	(0.0053777)
Black, NH * Some College	-0.0000113	-0.0000037
	(0.0000150)	(0.0000150)
Black, NH* College and Above	-0.0000062	0.0000281
	(0.0000173)	(0.0000206)
Hispanic * Some College	-0.0000208	-0.0000010
	(0.0000185)	(0.0000190)
Hispanic * College and Above	-0.0000195	0.0000206
	(0.0000200)	(0.0000235)
Black* Some Coll * Change in Transition share	0.0033390	0.0018333
	(0.0095038)	(0.0094767)
Black* Coll and Above * Change in Transition share	0.0077981	0.0061170
	(0.0086420)	(0.0086610)
Hispanic* Some Coll * Change in Transition share	-0.0188279	-0.0202429
	(0.0138305)	(0.0137429)
Hisp* Coll and Above * Change in Transition share	-0.0073192	-0.0092282
	(0.0120098)	(0.0120384)
Lag Duncan Component	--	-0.0125798***
		(0.0035475)
Lag CBSA Unemployment Rate	--	-0.0000086**
		(0.0000042)
Constant	-0.0000371***	0.0010304**
	(0.0000102)	(0.0004511)

VARIABLES	Excluding Controls	Including Controls
Lagged Industry Shares	N	Y
CBSA fixed-effect	N	Y
Year fixed-effect	N	Y
Observations	41,650	41,650
Adjusted R-squared	0.0025581	0.0254312

Note: Robust standard errors are clustered at the CBSA level. There are 346 CBSAs. *, **, *** => statistical significance at the 90, 95, and 99 percent level. Sample includes 25-54 year-old men with at least a high school degree and 1996-2018 years of data.

Table A2 Commuting zone (CZ) results; the dependent variable is the year-to-year change in share of population $\Delta\left(\frac{n}{N}\right)$

VARIABLES	Excluding Controls	Including Controls
Change in Transition share	0.0150439**	0.0173639***
	(0.0070282)	(0.0064673)
Black, NH	-0.0000090	0.0000695*
	(0.0000420)	(0.0000412)
Hispanic	-0.0000177	0.0000378
	(0.0000430)	(0.0000368)
Black, NH* Change in Transition share	-0.0161062	-0.0210010**
	(0.0101157)	(0.0103169)
Hispanic* Change in Transition share	0.0067298	0.0064141
	(0.0130475)	(0.0149868)
Some College	0.0000128	0.0000153
	(0.0000178)	(0.0000160)
College and Above	0.0000100	0.0000367*
	(0.0000192)	(0.0000210)
Some College * Change in Transition share	-0.0096013	-0.0098548
	(0.0083920)	(0.0080669)
College and Above * Change in Transition share	-0.0057276	-0.0094018*
	(0.0057457)	(0.0056858)
Black, NH * Some College	-0.0000485	-0.0000407
	(0.0000388)	(0.0000410)
Black, NH* College and Above	-0.0000456	0.0000269
	(0.0000499)	(0.0000609)
Hispanic * Some College	-0.0000245	0.0000213
	(0.0000386)	(0.0000476)
Hispanic * College and Above	-0.0000897**	0.0000008
	(0.0000433)	(0.0000570)
Black* Some Coll * Change in Transition share	0.0121144	0.0117494
	(0.0127738)	(0.0123128)
Black* Coll and Above * Change in Transition share	0.0073053	0.0071596
	(0.0097441)	(0.0103747)
Hispanic* Some Coll * Change in Transition share	-0.0135609	-0.0184380

VARIABLES	Excluding Controls	Including Controls
	(0.0106622)	(0.0129532)
Hisp* Coll and Above * Change in Transition share	-0.0148134	-0.0179704
	(0.0132054)	(0.0160274)
Lag Duncan Component		-0.0209407***
		(0.0052613)
Lag CBSA Unemployment Rate		-0.0000038
		(0.0000122)
Constant	-0.0000284	0.0013400
	(0.0000225)	(0.0008627)
Lagged Industry Shares	N	Y
CZ fixed-effect	N	Y
Year fixed-effect	N	Y
Observations	21,470	21,470
Adjusted R-squared	0.0005379	0.0136905

Note: Robust standard errors are clustered at the CZ level. There are 188 CZs. *, **, *** => statistical significance at the 90, 95, and 99 percent level. Sample includes 25-54 year-old men with at least a high school degree and 1996-2018 years of data.

Table A4: Core-based statistical area (CBSA) full set of results for the "Great Migration" geographic area restrictions; the dependent variable is the change in share of population $\Delta\left(\frac{n}{N}\right)$

VARIABLES	Great Migration CBSA
Change in Transition share	0.0168445*
	(0.0101046)
Black, NH	0.0000104
	(0.0000188)
Hispanic	0.0000187
	(0.0000249)
Black, NH* Change in Transition share	-0.0131532
	(0.0112088)
Hispanic* Change in Transition share	0.0103097
	(0.0169336)
Some College	0.0000057
	(0.0000098)
College and Above	0.0000172
	(0.0000126)
Some College * Change in Transition share	-0.0062272
	(0.0093500)
College and Above * Change in Transition share	-0.0057554
	(0.0091817)
Black, NH * Some College	0.0000141
	(0.0000208)

Black, NH* College and Above	0.0000395
	(0.0000275)
Hispanic * Some College	0.0000068
	(0.0000271)
Hispanic * College and Above	0.0000402
	(0.0000336)
Black* Some Coll * Change in Transition share	0.0020899
	(0.0136041)
Black* Coll and Above * Change in Transition share	0.0029711
	(0.0124277)
Hispanic* Some Coll * Change in Transition share	-0.0291033
	(0.0213908)
Hisp* Coll and Above * Change in Transition share	-0.0152855
	(0.0189468)
Lag Duncan Component	-0.0130879***
	(0.0042624)
Lag CBSA Unemployment Rate	-0.0000123*
	(0.0000074)
Constant	0.0010452
	(0.0011486)
Lagged Industry Shares	Y
CBSA fixed-effect	Y
Year fixed-effect	Y
Observations	25,366
Adjusted R-squared	0.0320865

Note: Robust standard errors are clustered at the CBSA level. There are 163 CBSAs in the "Great Migration" estimation. *, **, *** => statistical significance at the 90, 95, and 99 percent level. Each regression includes geography and year fixed effects and indicators for industry mix for each location and year. Sample includes 25-54 year-old men with at least a high school degree and 1996-2018 years of data.

Table A5 Means of Geographic Specific Regressors

Variable	Commuting Zone	CBSA
Change in number in the Share of People	-0.000025	-.0000344
	(.0028)	(.0015)
Change in Transition Shares	.0004	.0000103
	(.0151)	(.0084)
Share of Mining Industry	.0068	.0069
	(.0162)	(.0152)
Share of Construction Industry	.073	.0718
	(.0225)	(.0218)
Share of Manufacturing Industry	.1036	.1107
	(.0522)	(.0537)

Share of Trade Industry	.1464	.1445
	(.0272)	(.0278)
Share of Warehouse/Utilities Industry	.0511	.0511
	(.0166)	(.0175)
Share of Information Industry	.0267	.0264
	(.0122)	(.0118)
Share of Finance Industry	.0665	.0652
	(.0258)	(.0241)
Share of Business Services Industry	.1036	.102
	(.0333)	(.0337)
Share of Education/Health Industry	.2063	.2093
	(.0448)	(.0445)
Share of Leisure/Hospitality Industry	.0979	.0938
	(.033)	(.0308)
Share of Other Services Industry	.0499	.0498
	(.0137)	(.0137)
Share of Public Administration Industry	.0479	.0486
	(.0236)	(.0262)
Share of Agriculture Industry	.02	.0199
	(.0283)	(.0273)
Unemployment Rate	6.4173	6.3987
	(2.8049)	(2.8072)
Observations	13,852	26,770

Note: Sample includes 25-54 year-old men and 1996-2018 years of data. Standard deviations are in parentheses.

Appendix B: Regression specification including interactions with CBSA share of population that is black/Hispanic.

This appendix describes an estimation specification that modifies equation (3) to take into account the share of the minority population in the location where growing job opportunities are observed. If social costs are important to the migration decision, we should observe that blacks and Hispanics are more willing to respond to growing labor market opportunities, all else equal, in locations with larger population shares of racial minorities. Equation (3) is modified as follows:

$$\Delta\left(\frac{n_e^r}{N_e^r}\right)_{g,t} = \alpha + \sum_{j=1}^{2}\left\{\beta_j^1 RACE_{g,t}^j + \beta_j^2 RACE_{g,t}^j * \Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t}\right\}$$

$$+ \sum_{k=1}^{2}\left\{\varphi_k^1 EDUC_{g,t}^k + \varphi_k^2 EDUC_{g,t}^k * \Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t}\right\}$$

$$+ \sum_{j=1}^{2}\sum_{k=1}^{2}\left\{\lambda_{jk}^1 RACE_{g,t}^j EDUC_{g,t}^k + \lambda_{jk}^2 RACE_{g,t}^j EDUC_{g,t}^k * \Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t}\right\}$$

$$+ \sum_{l=1}^{2}\left\{\omega_l^1 SHARErace_{g,t}^l + \omega_l^2 SHARErace_{g,t}^l * \Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t}\right\}$$

$$+ \sum_{l=1}^{2}\sum_{k=1}^{2}\left\{\eta_{lk}^1 SHARErace_{g,t}^l EDUC_{g,t}^k + \eta_{lk}^2 SHARErace_{g,t}^l EDUC_{g,t}^k * \Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t}\right\}$$

$$+\rho\Delta\left(\frac{t_e^r}{T_e^r}\right)_{g,t} + \theta' X_{g,t-1} + \delta d_{eg,t-1}^r + \gamma_g + \tau_t + \varepsilon_{erg,t}, . \quad \text{(B1)}$$

In this specification, the share of the population in location *g* that is black, non-Hispanic or Hispanic enters the regression by itself, interacted with education, and also interacted with changing job opportunities in location *g*. Increasing responsiveness to job market opportunities in CBSAs with higher shares of same ethnic/racial population would suggest that social costs

could be constraining migration of ethnic/racial minorities. Marginal effects of changing transition shares on changes in population shares at different points in the population race/ethnicity share distribution are reported in Table B1. Full estimation results are reported in Table B2.

Table B2 Estimation results including interactions with CBSA share of population that is black/Hispanic; dependent variable is the change in share of population $\Delta\left(\frac{n}{N}\right)$.

VARIABLES	Coef (st err)
Change in Transition share	0.0121174
	(0.0137288)
Black, NH	0.0000244*
	(0.0000134)
Hispanic	0.0000221
	(0.0000162)
Hispanic # Change in Transition share	-0.0128096*
	(0.0072429)
Black, NH # Change in Transition share	0.0031380
	(0.0095926)
Some College	0.0000165
	(0.0000157)
College and Above	-0.0000101
	(0.0000157)
Some College# Change in Transition share	-0.0184642
	(0.0131559)
College and Above# Change in Transition share	-0.0056266
	(0.0123347)
Black, NH# Some College	-0.0000021
	(0.0000152)
Black, NH# College and Above	0.0000289
	(0.0000202)
Hispanic# Some College	-0.0000013
	(0.0000183)
Hispanic# College and Above	0.0000176
	(0.0000219)
Black, NH# Some College # Change in Transition share	-0.0004292
	(0.0096689)
Black, NH# College and Above # Change in Transition share	0.0058596
	(0.0087211)
Hispanic# Some College # Change in Transition share	-0.0240226*
	(0.0138824)
Hispanic# College and Above# Change in Transition share	-0.0089261
	(0.0111110)
Share of Black	0.0003649
	(0.0004170)
Share of Hispanic	0.0008646**
	(0.0003563)
Some College # Share of Black	-0.0000743
	(0.0000909)
College and Above # Share of Black	0.0000515
	(0.0001060)

VARIABLES	Coef (st err)
Some College # Share of Hispanic	0.0000025
	(0.0000573)
College and Above # Share of Hispanic	0.0001227
	(0.0000804)
Share of Black # Change in Transition share	0.0161476
	(0.0550041)
Share of Hispanic # Change in Transition share	0.0002494
	(0.0406631)
Some College # Share of Black # Change in Transition share	0.0638279
	(0.0634351)
College and Above # Share of Black # Change in Transition share	-0.0010494
	(0.0616198)
Some College # Share of Hispanic # Change in Transition share	0.0480442
	(0.0430359)
College and Above # Share of Hispanic # Change in Transition share	0.0016060
	(0.0423205)
Duncan Component	-0.0132816***
	(0.0036095)
Lag CBSA Unemployment Rate	-0.0000100**
	(0.0000041)
Constant	0.0008507*
	(0.0004520)
Observations	41,650
Adjusted R-squared	0.0261908

Note: Robust standard errors are clustered at the CBSA level. There are 346 CBSAs. *, **, *** => statistical significance at the 90, 95, and 99 percent level. Each regression includes geography and year fixed effects and indicators for industry mix for each location and year. Sample includes 25-54 year-old men with at least a high school degree and 1996-2018 years of data.