A Divergent View on Black-White Earnings Convergence

by

Dan Black
University of Chicago
danblack@uchicago.edu

Natalia Kolesnikova
Federal ReserveBank of St. Louis
natalia.a.kolesnikova@stls.frb.org

Seth Sanders
Duke University
seth.sanders@duke.edu

Lowell Taylor
Carnegie Mellon University
lt20@andrew.cmu.edu

Mark Wessel
Carnegie Mellon University
mw4f@andrew.cmu.edu

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Abstract

We pursue two primary tasks in this paper. Our first task is to provide empirical evidence that controlling for location matters significantly in assessing the degree of convergence in earnings over the period from 1940-2000. We use data from the Integrated Public Use Micro Samples for the 1940 to 2000 Censuses to explore this question. We find little evidence of black-white earnings convergence since 1950 in many cites. For instance, we find that once we condition on education, age, and location, black males earned 35 and 37 percent of what comparable white males made in 1950 in Chicago and New York. By 2000, however, the earnings gap had increased to 45 and 41 percent in Chicago and New York. Our second task is to develop a theoretical model that can help us interpret the evidence we present and provide insights into important issues of policy with respect to earnings disparities. Not the least of these is the conclusion that in an environment of significant migration a careful view of the social welfare implications of the apparent "convergence" must go beyond any simple analysis of changes in the earnings gap.

I. Introduction

The second half of the 20th Century is rightly known as a period in which the difference between the average earnings of White Americans and African Americans grew significantly closer. (cite). The purpose of this paper is to provide evidence that the degree of "convergence" in earnings is driven by substantial migration of African Americans from areas in which the so-called "wage gap" is relatively wide to those in which it is relatively narrow. In particular, it is our finding that once one controls for location, a significant portion of the apparent convergence disappears and even reverses itself to some degree after 1970.

Why is controlling for location important? One of the most important sociological phenomena of the mid-20th century for African Americans is what has come to be known as "the Great Migration" – the migration of massive numbers of African Americans from the rural south to cities, predominantly in the northern United States. If, as it appears, there is substantial regional variation in the "wage gap" this migration can yield a decline in the observed average national gap while the actual gap in any location does not change. Since the narrowing of this gap has been seen in many quarters as evidence of either broad declines in labor market discrimination or of the effectiveness of changes in the legal and policy environment, sorting out the relative magnitude of the forces driving convergence is important.

We pursue two primary tasks in this paper. Our first task is to provide empirical evidence that controlling for location matters significantly in assessing the degree of convergence in earnings over the period from 1940-2000. We use data from the Integrated Public Use Micro Samples for the 1940 to 2000 Censuses to explore this question. Our second task is to develop a theoretical model that can help us interpret the evidence we present and provide insights into important issues of policy with respect to earnings disparities. Not the least

of these is the conclusion that in an environment of significant migration a careful view of the social welfare implications of the apparent "convergence" must go beyond any simple analysis of changes in the earnings gap.

II. Data and Methodology

A. Data description

All the Census data for this paper are taken from IPUMS for the 1940 to 2000 Censuses; see Ruggles, Sobek, Alexander, Fitch, Goeken, Hall, King, and Ronnander (2008) for details. The IPUMS represents an integrated data set of the Public Use Micro Samples (PUMS) that were released in each of these Censuses. Respondents were asked about their earnings in the previous year, the number of weeks worked that year, and, at least for the 1980 to 2000 Censuses, the usual hours worked that year. Baum-Snow and Neal (2006), however, document systematic biases that differ by race and sex in responses to hours worked. Given these limitations, we focus our analysis on annual earnings.

The Censuses also provide challenges for researchers because of item nonresponse. Respondents will occasionally choose not to answer questions about their age, race, ethnicity, or education level. Much more frequently respondents will omit answers to questions about their hours worked or about their earnings. Our approach is to drop respondents who do not answer questions about their age, race, Hispanic status, education, or earnings. We do, however, increase the weights on other respondents with identical ages, race, and education levels to reflect the missing data by using inverse probability weighting. To be precise, we estimate the probably of a nonresponse, or

$$\Pr(NR = 1 \mid X = x^0) = F(x^0) \tag{1}$$

where x indexes the age-race-education-location cell, and then we construct weights, w_1,

$$w_1(x^0) \equiv \frac{w_0}{1-F(x^0)} \tag{2}$$

where w_0 are the initial Census weights. Thus, if half the people in the age-race-education-location cell do not respond to their earnings or hours worked questions, the responders within the cell have their weights doubled (see Wooldridge (2007)). This procedure implicitly assumes that data are, conditional on the age-race-education-location cell, missing at random. Because we condition on age, race, education, and location, this procedure also replicates the Census joint distribution of the age-race-education-location variables.

We also must face three additional important issues about the data: the problem of nonparticipation, the measurement of education, and the measurement of location. Nonparticipation is particularly troublesome issue. While one could in principle use the weighting procedure outlined above, nonparticipation is likely not to be random. While we focus on men for most of this paper and men have much higher participation rates than women, at least three features of the data should concern us. First, nonparticipation rates of African Americans are higher than the corresponding nonparticipation rates of whites. Second, nonparticipation rates are inversely correlated with education, and presumably nonparticipation also varies with unobservable skills as well. Third, nonparticipation rates have been growing over time. Much evidence (e.g., Black, Daniel, and Sanders, 2002, and Autor and Duggan, 2003) suggests this is quite sensitive to prevailing economic opportunities, particularly for the low skilled.

The measurement of education in the Censuses presents problems for at least three reasons. First, in 1990, the Census Bureau reworked the education question to account for highest degree for those with a college education and some categorical data for lower levels of education. For instance, in 1990 the Census asked:

How much school has this person COMPLETED? Fill ONE circle for the highest level COMPLETED or degree RECEIVED. If currently enrolled, mark the level of previous grade attended or highest degree received.

O No school completed
O Nursery school
O Kindergarten
O 1st, 2nd, 3rd, or 4th grade
O 5th, 6th, 7th, or 8th grade
O 9th grade
O 10th grade
O 11th grade
O 12th grade, NO DIPLOMA
O HIGH SCHOOL GRADUATE - high school DIPLOMA or the equivalent (For example: GED)
O Some college but no degree
O Associate degree in college - Occupational program
O Associate degree in college - Academic program
O Bachelor's degree (For example: BA, AB, BS)
O Master's degree (For example: MA, MS, MEng, MEd, MSW, MBA)
O Professional school degree (For example: MD, DDS, DVM, LLB, JD)
O Doctorate degree (For example: PhD, EdD)

Prior to 1990, the Census asked the standard years of schooling question. For instance, in 1980 the Census asked:

What is the highest grade (or year) of regular school this person has ever attended? *Fill one circle. If now attending school, mark grade person is in. If high school was finished by equivalency test (GED), mark "12."*

Highest grade attended:
O Nursery school O Kindergarten
Elementary through high school *(grade or year)*
1 2 3 4 5 6 7 8 9 10 11 12
O O O O O O O O O O O O
College *(academic year)*
1 2 3 4 5 6 7 8 or more
O O O O O O O O
O Never attended school

Making these consistent is in principle quite easy if the two types of questions have a similar structure of measurement error. Unfortunately, for the 1990 census, Black, Sanders, and Taylor

(2003) document that the education questions exhibit significant measurement error and that the degree of measurement error is correlated with race. Finally, there was a dramatic improvement in the education of Americans over the period. For instance, in 1940 88 percent of blacks and 64 percent of whites between the ages of 25 and 60 did not have a high school education, and only 2 percent of blacks and 8 percent of whites had a bachelor's degree or better. By 2000, only 9 percent of blacks and 5 percent of whites did not have a high school degree while fully 33 percent of whites and over 19 percent of blacks had a bachelor's degree or better.

Given these problems, we use the following ten education categories: no formal education or kindergarten only, 1 to 4 years, 5 to 8 years, individual years for 9 through 12 years, some college but no bachelor's degree, bachelor's degree, and more than a bachelor's degree.

Finally, there is the issue of the measurement of location. Because of the growth in cities and changes in disclosure policy, the identification of MSAs varies over time. In 1960 (the first public use micro sample that the Census Bureau released), the only geography identified was State of residence. As a result, we cannot conduct the same location analysis of interest to us with the 1960 data and only use an urban indicator interacted with an indicator for state of residence. In 1940, 1950, and 1970 to 2000, we use MSA of residence for those respondents living in a MSA. For those respondents not living in an identified MSA, we use an indicator for state of residence. Hence, we exploit the geographical variation that is generally available to us. There are, however, a few noteworthy limitations.

First, residents of some current MSA's are not separately identified in the early censuses, but are so identified subsequently. For example, in the 1940, Orlando residents are mixed in with residents living in "rural" Florida, but later are broken out as part of an Orlando MSA. Similarly, Las Vegas is identified only starting in 1970. There are a host of smaller towns that

are only identified in later years. Moreover, MSAs can be created from regions that were previously a part of different MSAs. This is a particular problem in the densely populated areas of the east and west coasts. Finally, for areas that are only identified as "rural" we may be mixing residents from very different areas of a given state. For example, this designation mixes residents of the desert areas of Southern California with residents of rural Northern California who may face very different labor markets and price levels.

For the 1940 through 1970 Censuses, we use a one-percent sample of respondents, and from 1980 to 2000, we use the five-percent sample, which, along with population growth, provides much larger sample sizes and much more precise estimates. Prior to 1980, the Census did not release the five-percent sample so we do not have access the extremely large sample sizes that the five-percent sample affords. Finally, we note one important data limitation with the 1950 Census. In 1950, only the "sample line" respondents were asked about education and earnings by the Census Bureau. Hence, only about 3.3 percent of the population were given these questions. This means that the effective sample size of the 1 percent PUMS is less than 2 in one thousand. Thus, estimates from the 1950 Census are considerably less precise than estimates from even the 1940 Census.

B. Method of estimation

While there are clear limitations to census data, there are also significant benefits. First, it provides us with an opportunity to examine the economic progress of African Americans relative to whites over a period of 60 years using data from instruments that are similar both in terms of content and mode of administration. Second, the data provide extremely large samples that provide extremely precise estimates. For instance, the number of respondents in the 2000

PUMS living in the New York MSA exceeds the number of respondents in the entire 1979 and 1997 Panels of the National Longitudinal Survey of Youth *independent* of location.

These sample sizes come at a cost. There are only a limited number of variables available in the Census data. For our analysis, we divide respondents on the basis of race (using black and non-Hispanic whites) and then condition on individual years of age, our 10 education categories, and location. Given the limited number of covariates and the large sample sizes, it seems imprudent for us to rely on parametric estimation so we model the earnings of blacks and whites as:

$$\begin{aligned} y_{B,i} &= g_B(X_i, U_i) \\ y_{W,i} &= g_W(X_i, U_i) \end{aligned} \tag{3}$$

where B indexes blacks, W indexes whites, X_i is a vector of covariates, U_i is a vector of unobservables, $g_k(\cdot)$ are unknown functions, and $y_{k,i}$ are the earnings measures. Because the data are discrete, we may calculate the mean conditional on the realization of the covariates, or

$$\begin{aligned} E(y_{W,i} \mid X = x^0) &= \int g_W(x^0, U)\, dF_W(U \mid X = x^0) \\ E(y_{B,i} \mid X = x^0) &= \int g_B(x^0, U)\, dF_B(U \mid X = x^0) \end{aligned} \tag{4}$$

where $F_k(U_i \mid X = x^0)$ denotes the conditional distribution of the unobservables. If we wish to know how African Americans fare relative to whites with the same distribution of observables we need only to calculate

$$\Delta = \int \Big(E(y_{B,i} \mid X) - E(y_{W,i} \mid X) \Big)\, dF_B(X) \tag{5}$$

where $F_B(X)$ is the distribution of observables for blacks. The parameter Δ answers the question: How do the earnings of blacks in the data compare to the earnings of whites with the same distribution of observables? It is important to keep in mind that the estimate contains not

only the impact of the observables but also the impact of unobservables as equation (4) indicates. Given the paucity of covariates, it seems inconceivable that distribution of the unobservables would be the same across blacks and whites. Black, Haviland, Sanders, and Taylor (2006) document that black men choose college majors that are systematically less lucrative than those chosen by white men. Because the Census does not contain information on college major, we are unable to condition on this variable. The impact of college major therefore becomes an unobservable. Similarly, Neal (2006) documents large differences in the cognitive test scores of African Americans relative to whites. He also shows that the test score gap has narrowed considerably over time. Again, the lack of, say, test scores in the Census means that the impacts of such scores are imbedded in the unobservables and their correlation with observable measures.

In principle, one could directly estimate equation (5) by calculating the conditional means at each point in the distribution of covariates. We implement a somewhat easier estimator. Consider the conditional probability of being black given by

$$p(x^0) = \Pr(Black \mid X = x^0) \tag{6}$$

This probability can be calculated for each point in the data, and then we may define the weights

$$\begin{aligned} w_2(x^0) &\equiv w_1(x^0) \equiv \frac{w_0}{1-F(x^0)} \quad \text{if worker is black} \\ w_2(x^0) &= w_1(x^0)\frac{p(x^0)}{1-p(x^0)} = \frac{w_0}{1-F(x^0)}\frac{p(x^0)}{1-p(x^0)} \quad \text{if worker is white} \end{aligned} \tag{7}$$

Thus, whites who have characteristics more like the blacks in the sample are weighted more highly, and whites who, based on their observed characteristics, are less similar to blacks are weighted less.

Given the weighting scheme in equation (7), we may now simply run weighted ordinary least squares on the equation

$$y_{k,i} = \alpha + \Delta Black_i + \varepsilon_i \quad (8)$$

and the estimated Δ will be identical to the direct estimation of Δ from estimating the difference of means at each point in the X and aggregating over the distribution $F_B(x)$ as in equation (5). The intuition for why this procedure provides an estimate of Δ is that the reweighting scheme given in equation (7) makes the distribution of covariates in the sample of whites identical to the distribution of covariates in the sample of blacks. In the matching context, this is often referred to as "inverse probability weighting" or the Horvitz-Thompson (1952) estimator; see Hirano, Imbens, and Ridder (2003) and DiNardo, Fortin, and Lemieux (1996) for extended discussions of inverse probability weighting with continuous variables. See Black, Haviland, Sanders, and Taylor (2006, 2008) for applications to discrete data.

III. Some Important Trends

In this section, we chronicle three dramatic changes in the economic situation of African Americans: the migration from the rural South to urban areas, the progress toward convergence between blacks and whites in the educational attainment as measured in the Census, and the progress toward convergence in cognitive test scores.

The basic facts of internal migration are striking. Table 1 documents the shifts in the regional concentration of African American men and white men by census region of birth. In 1940, over 90 percent of African American men were born in the South, but this declined to just 62 percent in 2000. For whites, there was a modest decline in the number of men born in the East and Midwest and a dramatic increase in the number born in the West.

Of course, the state of birth tends to lag migration rates. Table 2 shows region of residence. Again, blacks become less concentrated in the South. In 1940, nearly 67 percent of

black men resided in the South, but this proportion declined to about 56 percent in 2000. The residency table shows, however, that the concentration in the South fell until 1980, but began to increase in 1990. For whites, the decline in the concentration in the East and Midwest is corresponds to population share gains in the West and South.

Panel B of Table 2 shows the fraction of black and white men that reside in their state of birth. Of course, this is an extremely crude proxy for migration. In New England states tend to be physically smaller than in the South and West. Hence, changes of state for New Englanders (who are disproportionately white) may represent very modest moves relative to, say, Southern blacks. Similarly, a person whose parents moved when he was an infant but has resided in the same state since that move would be counted as having migrated, whereas the person born in California who moved to New York for 25 years and then returned to California is treated as a non-migrant. Despite these limitations, the measure does show the large impact of migration within the black community, especially for the 1950 and 1960 Census.

Of course, we are far from the first to document the migration of blacks out of the South. To name just a couple, Smith and Welch (1989) and Lemann (1992) have explored this large movement in considerable depth. The connection between migration and changes in earnings for blacks relative to whites, however, is still underexplored. As we will see, there is substantial geographic variation in wages and in the black-white earnings gap across the United States. The tables described above demonstrate that the migration patterns of blacks and whites differ in important ways. This opens the very real possibility that a significant portion of what has been seen as convergence in black-white earnings is the result of this migration rather than a result of structural changes in the labor market conditions faced by blacks relative to whites in any given

location. To fully explore this question, however, we must also examine changes in other relevant factors – most notably education and skill development.

Table 3 documents the large rise in educational attainment of both blacks and whites. It is readily apparent, that the increase for black men is even larger than the impressive growth in educational attainment of white men. There are several factors that affect the measurement of this convergence. First, for much of this period blacks in the South were educated in segregated southern schools. While separate from whites, these schools were anything but equal as required by the infamous *Plessey versus Ferguson*. See Card and Krueger (1992) for an excellent discussion. Second, the end of *de jure* segregation (officially with *Brown versus the Board of Education*) was not the end of *de facto* segregation. For instance, in the Chicago Public School System 45.6 percent of students are African American but only 8.0 percent are percent are white (see Chicago Public Schools, Basic Facts). In contrast, if one considers the Chicago suburb of Naperville, only 4.1 percent of the students are black and fully 76.6 percent are white (see Illinois District Report Card). While the Chicago schools have considerable resources, they also face the considerable problems of any urban school district. Thus, the difference in per pupil expenditures ($10,555 in Chicago versus $9,881 in Naperville) does not reflect the difference in the quality of schools or at least the quality differences of the performance of their respective students. For instance, 59.0 percent of Chicago Public School students met or exceeded the state's minimum standard for reading, but 90.8 percent of Naperville students met or exceeded the standard. Third, as noted above, Black, Sanders, and Taylor (2003) document large racial difference in measurement error in the census education measure. This fact suggests we may be overstating the degree of economic progress of African Americans. Finally, the recent work of Heckman and LaFontaine (2007) document the large racial differences in the use of the GED to

obtain a high school diploma.. For instance, using the 2000 PUMS they estimate that counting GED recipients as high school graduates causes us to over count the number of black male high school graduates by 10.5 percentage points and the number of white high school graduates by 8.7 percentage points. Moreover, the importance of the GED has grown dramatically over the years. In 1960, GED recipients accounted for about two percent of high school graduates; by 2001, they accounted for nearly 20 percent. To the extent that the GED and the completion of high school represent different levels of skill attainment, this misestimation of "high school graduates" will bias our estimates of the impact of education on earnings.

Given the problems with the measurement of education, we would ideally like an independent measure of human capital that confirms the hypothesis of converging human capital levels across races. Neal (2006) documents a considerable convergence of test scores between black and white students from the 1970s to 1990s. Black, Charles, Ryan, and Sanders (2009) document that the convergence, while sizeable for black men, is much larger for black women than black men. These studies show a sizeable improvement in the relative performance of African Americans. They do so, however, by relying on relatively recent cohorts of Americans.

To get a better feel for the long-term trend in black-white test scores, we examine the General Social Survey's (GSS) vocabulary test. The test is a ten-word test taken from the twenty-item Gallup-Thorndike verbal intelligence Form A test, which was developed by Thorndike and Lorge for use in surveys. The reliability coefficients ranged from 0.80 to 0.85 in Gallup surveys in the 1940s; see Davis, Smith, and Marsden (2007). The score is simply the number of correct items on a vocabulary test where the respondents are asked for the definitions of 10 words and given five choices for each word. Because the GSS has been given for many years and because the sample frame is the adult population in households residing in the US, we

have large number of respondents from a wide-range of years. To the extent that African Americans have higher mortality rates than whites and to the extent that early mortality is concentrated among the less able, differential mortality may result in a biased downward our estimates of the black-white test score gaps among the older cohorts and lead us to understate the degree of convergence.

To examine the rate of convergence, we estimate a regression of the form

$$y_{ijt} = \sum_k \beta_k \, cohort_k \times black_{ijt} + \alpha_{jt} + \varepsilon_{ijt} \tag{9}$$

where y_{ijt} is the test score for individual i born in year j taking the test at time t, $black_{ijt}$ is an indicator for whether the respondent is black, α_{jt} is an indicator for year of birth j and taking the survey in year t, and ε_{ijt} is the regression error. Thus, identification is obtained by comparing black and white respondents who were born in the same year and who took the vocabulary test in the same year. To capture the trends in the black-white test scores we divide respondents up into four cohorts: those born before 1923, those born 1923 to 1942, those born 1943 to 1962, and those born after 1962.

We present the results in Table 4. There is a clear decline in the black-white test score gap with modest evidence of acceleration in the post-1962 birth cohort. By 1962, the test score gap is only 47 percent the test score gap of the cohort born before 1923. In the second column, we repeat the exercise using only a birth-year fixed effect instead of a birth-year-survey-year fixed effect. The results are essentially identical. There seems to be a prolonged convergence in the human capital obtained by black and white Americans.

The migration from the South on the part of African Americans must be viewed against the backdrop of the decline in the importance of agriculture as an employer of Americans. In

Table 5, we document the fraction of black and white youth aged 8 to 12 living on a farm from 1900 to 2000. For whites, the decline is dramatic: from 43.5 percent in 1900 to 1.4 percent by the 2000 Census. For blacks, the decline is even more dramatic: from 58.4 percent in 1900 to 0.3 percent. Thus, while the movement out of the South is a important in understanding the location of African Americans, it should be viewed as a part of the realignment of the American workforce out of agricultural production.

Hence, there is ample evidence of substantial migration of both blacks and whites over the period we are exploring, that the migration patterns of blacks and whites differ in systematic ways, and that the rate at which human capital is being acquired by these two racial groups is also different. It is not difficult to believe that these forces have an impact on the degree of convergence in the earnings of blacks and whites over the period – indeed, it would be surprising if they did not. But how significant was this effect? This is the question to which we turn in the next section.

IV. Earnings Outcomes

A. Results Conditioning only on Age

In Table 6, we begin our story by considering the earning gap between blacks and whites for the census years from 1940 to 2000. We use two measures of earnings: total earnings from wages and salary and total earnings from wages and salary, business income, and farm income. In this table, we only condition on the age of workers, and we replicate the finding of remarkable progress observed previously by others. For the first measure, we assume anyone without employment would have been a wage and salary worker, but drop all the respondents who are self-employed. For the second measure, we keep all men and report zeros (and even negative numbers for the self-employed). Unfortunately, we cannot produce this second measure for 1940 as the business and farm earnings were not asked. We report, in Table 6, the ratio of the mean difference between black and white earnings divided by the mean white earnings, or, in terms of coefficients in equation (8), we report Δ / α.

In the first column, we report results for the first measure when we only condition on age. The results indicate extremely large wage gaps. For instance, the annual earnings of black men 56.6 percent lower than the earnings of similar aged white men in 1940. This improved to 40.7 percent gap in 1950. Thus, the ten year gap between 1940 and 1950 generates massive economic progress for African Americans. This undoubtedly reflects the drastic changes in the US economy resulting from the end of the Great Depression and World War II. In contrast, wage gaps for men actually increased in the 1950s. In the 1960s and 1970s, however, there was a substantial decline in earning gaps to about 38.4 percent by 1980. From 1980 to 2000, however, the gap again grew. In column (5), we repeat the exercise for the broader measure of earnings. While the trends are broadly the same, the differential in the early years is magnified.

In columns (2) and (6) we condition on education and age. Not surprisingly given the educational differences reported in Table 3, we find that conditioning on education substantially reduces the gap. In contrast, in columns (3) and (7) when we condition on age and location, the gap is initially reduced and subsequently increased. In recent years, blacks have congregated in relatively high wage areas relative to whites.

Finally, in columns (4) and (8) we provide measures of the wage gap conditioning on age, education, and location. These estimates have the virtue of comparing men of the same age and observed educational level who are participating in the same labor market. Regardless of earning measures used, however, the results indicate scant relative economic progress for blacks since 1950.

When examining the results in Table 6, the reader should recall that white and black men had very large differences in educational attainment in the middle of the 20th century and lived in different locations. African Americans were concentrated in former slave states, while whites were disproportionately in the Northeast and Midwest. Because of years of education in Southern segregated schools, African Americans had much different quantities and qualities of schooling than did white Americans. Both location and education are, of course, the result of choices made by workers and hence may reflect the selection bias associated with those choices. Yet, if one wishes to understand how labor markets treat blacks relative to whites, conditioning on education would seem to be required. Indeed, given the work of Neal and Johnson (1996), one would prefer to have a measure of skills based on the AFQT or another skill based test to understand true human capital acquisition. Not surprisingly, literally hundreds of studies condition on education when reporting on black-white earnings gaps; see Altonji and Blank (1999) for a detailed review of the literature.

In contrast, the literature on location is less extensive. Important contributions include the work of Smith and Welch (1989), Bound and Freeman (1992), Cunningham and Zalokar (1992), and King (1995). Most of this work relied on controlling for region and, in some cases, urban location. Results from this literature generally show that the migration out of the South increased the relative earning of blacks. To the extent that the distribution of the locations of blacks and whites differ within region or rural/urban area, these estimates will be confounded by differences in local labor market conditions.

B. Some Detail on Urban Labor Market Changes

Given our emphasis on local labor markets, one may wonder if the aggregate numbers that we presented in Table 6 hide some interesting variation in the economic progress of blacks by location. Table 7 explores the earnings gap for black and white men in the seven cities that had the largest African American populations in 1940: Baltimore, Chicago, Detroit, New York, Philadelphia, St. Louis, and Washington. Each city had at least 300 African American men between the ages of 25 and 55 with non-imputed data in 1940 Census one-percent sample. For this analysis, we match black men to white men of exactly the same age and education category. Focusing on the northern cities of Chicago, Detroit, New York, and Philadelphia, we see that using the wage and salary measure of earnings there was substantial convergence between 1940 and 1950. Between 1950 and 2000, there was no substantial convergence except in Philadelphia between 1950 and 1970, and by 2000, the earnings gap was larger in each of these cities than in 1950. The use of the broader measure does not alter this conclusion: the earnings gap was larger 2000 than in 1950.

For the southern cities of Baltimore and St. Louis, the pattern is different. For Baltimore, the wage gap grew between 1940 and 1950, and there was substantial progress between 1950 and 1970, regardless of the earnings measure used. In St. Louis, there was substantial convergence between 1940 and 1950, although not as large as in the northern cities, but there was also some convergence at least for the broader measure of earnings between 1950 and 2000.

The results for Washington are also quite interesting. Between 1940 and 1950 Washington experienced the largest convergence: blacks made up over 22 percentage points on whites in that decade. There was some evidence of a deterioration of the relative performance of blacks between 1950 and 1970 and some modest improvement between 1970 and 2000.

What could account for this remarkable improvement in the economic conditions of African Americans between 1940 and 1950? On July 26th of 1948, President Truman signed Executive Orders 9980 that desegregated federal employment and 9981 that desegregated the armed forces. Prior to this, Truman had established the President's Committee on Civil Rights in December of 1946. President Roosevelt in June of 1941 had signed Executive Order 8802 that established the Fair Employment Practices Committee and banned discrimination on the basis of race, creed, color, or national origins in the defense industry and federal government.

An additional feature of these data strikes us as noteworthy. The lack of data from the 1960 is extremely unfortunate. The aggregate earnings gap between black and white men increased from 1950 to 1960 suggesting that the dynamics by location between 1950 and 1960 would be quite interesting.

In Table 8, we repeat this exercise for eight Sunbelt cities (Atlanta, Charlotte, Dallas, Denver, Houston, Los Angeles, Phoenix, and Tampa) and five older cities (Boston, Cleveland, Kansas City, Pittsburgh, and San Francisco). Because of limited number of African Americans in

many of these cities and the relatively small sample sizes in the 1950 Census, we limit our analysis to 1970-2000 period. All of the Sunbelt cities experienced remarkable growth in the three decades between the 1970 and 2000 Censuses. During this period, in every city except Phoenix there was a substantial increase in the economic performance of African Americans relative to whites between 1970 and 1980. (In Phoenix, the black population was so small in 1970 that there were only 65 black males between 25 and 55 with non-imputed data in the one-percent sample of the 1970 PUMS.)

Finally, in each of the older cities, there was no progress in reducing the earnings gap from 1970 to 2000. Thus, the reduction of the earnings gap viewed in the aggregate data between 1970 and 2000 seems to be largely concentrated in Sunbelt cities and other older Southern cities. More broadly, while it is far from conclusive, these data suggest that to the extent that there has been improvement in the wage gap over the period since 1940 it is substantially the result of blacks moving from high wage gap areas to those with low wage gaps and that once they arrived in those new cities further progress was decidedly scarce.

V. Some Theory and Interpretation

A. Prices, Location, and the Measurement of Economic Welfare

In the last section, we provided a number of results that suggested a good portion of the black-white convergence could be traced to difference in the migration patterns of black and white Americans. The results, however, raise an important question: When can we use the black-white earnings gaps, either nationally or locally, to infer anything about welfare difference between blacks and whites?

The answer to that question, we rely on our recent in Black, Kolesnikova, and Taylor (2009). Suppose that blacks and whites have the same preferences that are summarized in our static model by the expenditure function, $e(p, r_j, A_j, u_i)$, where p are prices of nationally traded goods, r_j are the prices of local or non-traded goods such as housing, A_j is a vector of amenities that residents have from living in the jth city, and u_i is the utility of the ith group with i equal to either white or black. Define the compensation function, $K(p, r_j, A_j, u_b, u_w)$

$$K(p, r_j, A_j, u_b, u_w) = \frac{e(p, r_j, A_j, u_w)}{e(p, r_j, A_j, u_b)}. \tag{10}$$

The compensation function asks: By what fraction must we adjust the earnings of blacks to leave them equally well off as whites? Because African Americans have lower levels of wealth (and presumably utility) we expect that $K(p, r_j, A_j, u_b, u_w) > 1$.

In general, this question depends on prices (both national and local), local amenities, and the level of utilities of the two groups in the location. National estimates of the earnings gap reflect differences in utility levels that are independent of price and location if and only if the expenditure function is of the form

$$e(p, r_j, A_j, u) = g(u_i) f(p, r_j, A_j, u). \tag{11}$$

Local wage gaps will be independent of prices if and only if the expenditure function is of the form

$$e(p, r_j, A_j, u_i) = g(u_i, A_j) f(p, r_j). \tag{12}$$

While equation (12) is modestly less restrictive than equation (11), both are quite restrictive. Indeed, the form of the expenditure functions given in either equation (11) or (12) requires the consumer to have homothetic preferences. Homothetic preferences require that all goods have

unitary income elasticities, which almost every consumption study rejects. See Black, Kolesnikova, and Taylor (2009) for an extended discussion.

Thus, without making strong assumptions, one cannot rely on even the estimates that compare blacks and whites in the same market to make welfare judgments. Theory can, however, provide a few insights. Consider how a change in the price of the local good affects the compensation index

$$\begin{aligned} K_{r_j}(p, r_j, A_j, u_b, u_w) &= \frac{e_{r_j}(p, r_j, A_j, u_w)}{e(p, r_j, A_j, u_b)} - K(p, r_j, A_j, u_b, u_w)\frac{e_{r_j}(p, r_j, A_j, u_b)}{e(p, r_j, A_j, u_b)} \\ &= \frac{K(p, r_j, A_j, u_b, u_w)}{r_j}(s_w - s_b) \end{aligned} \tag{13}$$

where $s_i \equiv r_j e_{r_j}(p, r_j, A_j, u_i) \big/ e(p, r_j, A_j, u_i)$ is the budget share of the local good for the *ith* group. The sign of the derivative, therefore, depends on whether the budget shares are increasing or decreasing in utility. Thus, if the income elasticity of the local good is less than one, the compensation function is a decreasing function of the price of the location good.

Of course, at least since the work of Haruin (1980) and Roback (1982), economists have understood that differences in amenities across cities affect the levels of prices for the local good. Toward that end, consider the impact of a change in amenity level, which also increases price of the local good, or

$$\begin{aligned} K_{A_j}(p, r_j, A_j, u_b, u_w) = &\left(\frac{e_{r_j}(p, r_j, A_j, u_w)}{e(p, r_j, A_j, u_b)} - K(p, r_j, A_j, u_b, u_w)\frac{e_{r_j}(p, r_j, A_j, u_b)}{e(p, r_j, A_j, u_b)} \right)\frac{dr_j}{dA_j} + \\ &\left(\frac{e_{A_j}(p, r_j, A_j, u_w)}{e(p, r_j, A_j, u_b)} - K(p, r_j, A_j, u_b, u_w)\frac{e_{A_j}(p, r_j, A_j, u_b)}{e(p, r_j, A_j, u_b)} \right) \\ = &\frac{K(p, r_j, A_j, u_b, u_w)}{A_j}\left[(s_w - s_b)\eta_{r_j} + \left(\eta^w_{A_j} - \eta^b_{A_j} \right) \right] \end{aligned} \tag{14}$$

where η_{r_j} is the elasticity of the price of the local good with respect to the amenity (which should be positive) and η_{A_j} is the elasticity of the expenditure function with respect to the amenity level. Thus, if local good is income inelastic so $s_b > s_w$ and the amenity is a luxury so $\eta^w_{A_j} < \eta^b_{A_j}$ (recalling that $\eta_{A_j} < 0$, people must pay for amenities to remain at the same level of utility), then the compensation is a decreasing the level of the local amenities.

B. Location Equilibrium

The discussion in the last section is somewhat incomplete because we have not specified how people allocate themselves among the various locations where they can choose to live. In this subsection, we briefly discuss two possible assumptions about the nature of the equilibrium. In the first model, we consider a model where workers have identical preferences for the location and no mobility costs. In the second, we introduce a friction that makes mobility costly between locations.

In the first model, we consider a model in which labor is initially distributed between two sites: Chicago and Mississippi. Initially, we will consider a model in which there is only one type of worker, which we will call a white worker. We assume that workers first decide in which city to reside then production and consumption occurs. Each worker has identical preferences for both locations, and to focus our discussion on migration, we assume that if no worker moved, the allocation of workers would provide a utility premium for workers residing in Chicago. Of course, in the absence of any restriction on mobility, this disequilibrium cannot survive and workers will flow out of Mississippi into Chicago until the utilities of residing in the two locations are equalized. In this model, the workers that move to Chicago and the workers that remain in Mississippi benefit from the migration. Indeed, in the equilibrium, all workers are

indifferent between both locations, although workers initially residing in Chicago may regret the influx of the cheap labor that drove down wages and increased the prices of locally traded good.

Now we want to consider the possibility of there being two types of workers with differing utility levels that can reside in the two locations. A couple of issues arise. First, why does the utility level differ? Second, how does the willingness to pay for residing in, say, Chicago differ by these utility levels?

To our knowledge, Black (1995) provides the only model of location choice in the context of a discrimination model. He constructs a search model that focuses on the heterogeneous talents of entrepreneurs to sustain an equilibrium model of discrimination based on employer discrimination. But his model would not predict migration from the South because in his model, minority workers residing in areas with high concentrations of minority workers are paid more and have higher utility than minority workers in areas where there are fewer minority workers. In his model, workers would want to segregate to areas of the highest concentration of minority workers where they can become, in essence, the majority group.

Thus, the massive exodus of blacks from the South would appear to be the result of a decrease in the demand for black labor in the South, perhaps because of technological advances in Southern agriculture, or an increase in the labor demand in other parts of the country. The latter is obviously plausible because of the rapid expansion of American industry following the Great Depression. Alternatively, there may have been increased overt discrimination against blacks in the South that made living in the North more attractive.

VI. Some More Results

{To be provided}

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Table 1: Black and White Men's Region of Birth, 1940 to 2000

Blacks	**1940**	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**
East	3.7%	4.9%	6.8%	10.0%	10.4%	12.2%	14.3%
Midwest	5.0	5.9	6.7	9.7	12.1	15.3	18.4
South	91.0	88.8	85.9	78.9	74.6	68.1	61.6
West	0.2	0.4	0.6	1.4	2.8	4.4	5.7
Whites							
East	30.9%	28.5%	28.6%	29.1%	26.8%	25.4%	24.7%
Midwest	36.4	35.3	33.8	32.3	32.6	33.0	32.9
South	27.3	29..2	30.2	29.9	30.0	28.6	27.9
West	5.5	7.0	7.4	8.6	10.7	13.0	14.5

Source: Authors' calculations, 1940 to 2000 PUMS. Sample is men aged 25 to 55 inclusive. The sample of whites is non-Hispanic whites.

Table 2: Black and White Men's Residence Patterns, 1940 to 2000

Pane A: Region of Residence

Blacks	**1940**	**1950**	**1960**	**1970***	**1980**	**1990**	**2000**
East	15.2%	16.5%	17.7%	---	18.6%	16.8%	15.7%
Midwest	16.0	19.7	19.6	---	20.7	18.5	18.6
South	66.9	58.2	55.9	---	50.8	54.0	56.0
West	2.0	5.7	6.8	---	9.9	10.8	9.7
Whites							
East	33.3%	27.8%	26.7%	---	22.7%	20.9%	19.9
Midwest	32.9	30.9	30.4	---	28.1	27.0	27.3
South	22.2	25.8	27.1	---	31.1	32.6	33.4
West	11.6	15.6	15.8	---	18.1	19.4	19.4

Source: Authors' calculations, 1940 to 2000 PUMS. Sample is men aged 25 to 55 inclusive. The sample of whites is non-Hispanic whites.

Panel B: Reside in State of Birth

	1940	**1950**	**1960**	**1970***	**1980**	**1990**	**2000**
Blacks	55.7%	48.9%	51.9%	---	53.7%	57.4%	59.0%
Whites	58.0	51.1	62.1	---	59.6	58.1	57.5

Source: Authors' calculations, 1940 to 2000 PUMS. Sample is men aged 25 to 55 inclusive. The sample of whites is non-Hispanic whites.

Table 3: Black and White Men's Education, 1940 to 2000

Blacks	**1940**	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**
No schooling	7.2%	5.1%	3.5%	2.1%	1.0%	1.2%	1.1%
1 to 4 years	31.2	24.2	17.0	8.0	3.0	0.8	0.3
5 to 8 years	44.8	40.8	36.6	24.9	12.4	4.2	2.3
9 years	4.1	6.1	6.8	8.0	5.7	3.2	2.3
10 years	3.2	5.6	7.9	10.3	7.9	5.5	4.1
11 years	1.9	3.6	6.3	9.4	8.2	6.7	5.7
High school or GED	4.3	8.9	13.9	25.1	34.2	39.0	40.7
Some college	1.9	3.5	4.8	7.2	17.5	27.0	29.6
Bachelor's degree	1.2	1.4	2.9	4.5	9.0	8.6	9.8
Post graduate	0.4	0.8	0.4	0.6	1.1	3.9	4.2
Whites	**1940**	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**
No schooling	2.0%	1.2%	0.6%	0.6%	0.4%	0.5%	0.4%
1 to 4 years	6.3	4.7	2.8	1.5	0.8	0.2	0.1
5 to 8 years	43.8	32.9	24.7	14.0	7.0	2.5	1.5
9 years	6.4	6.3	6.8	5.5	3.4	1.8	1.3
10 years	7.8	8.0	8.2	7.1	4.2	2.8	2.1
11 years	4.1	5.6	6.1	5.9	3.8	2.5	2.1
High school or GED	15.8	22.6	27.7	34.3	35.1	31.7	30.8
Some college	6.2	9.2	10.6	13.1	19.4	29.0	30.4
Bachelor's degree	4.5	5.8	10.9	15.7	22.9	18.3	20.4
Post graduate	2.0	3.8	1.6	2.3	3.2	10.6	10.9

Source: Authors' calculations, 1940 to 2000 PUMS. Sample is men aged 25 to 55 inclusive. The sample of whites is non-Hispanic whites.

Table 4: Vocabulary Test Scores by Race and Cohort, GSS Data

	(1)	(2)
Birth year-survey year fixed effects	Yes	No
Birth year fixed effects	No	Yes
Black-white gap for respondents born before 1923	-1.95	-1.94
	(0.1197)	(0.1144)
Black-white gap for respondents born from 1923 to 1942	-1.65	-1.67
	(0.0856)	(0.0829)
Black-white gap for respondents born from 1943 to 1962	-1.38	-1.37
	(0.0596)	(0.0583)
Black-white gap for respondents born after 1963	-0.92	-0.92
	(0.0875)	(0.0858)
N	22,083	22,083

Source: Authors' calculations, GSS data. Each coefficient is statistically significantly different than each the other coefficients at the five-percent confidence interval (two-tailed).

Table 5: Fraction of 8 to 12 year olds living on a Farm, 1900 to 2000

	Blacks			Whites		
Year	**US**	**South**	**Midwest**	**US**	**South**	**Midwest**
1900	58.4%	61.6%	20.8%	43.5%	66.3%	47.6%
1910	58.0	61.3	20.8	37.8	58.6	41.5
1920	62.5	67.5	6.0	35.0	57.1	36.8
1930	50.7	58.4	7.1	28.6	47.6	30.5
1940	44.6	53.8	5.6	27.5	44.8	28.6
1950	31.5	41.4	3.2	20.6	31.5	23.5
1960	11.6	17.6	0.6	10.3	13.2	15.5
1980	0.4	0.7	0.0	2.9	2.4	6.0
2000	0.3	0.6	0.0	1.4	1.1	2.6

Source: One-percent samples of the I-PUMS. The 1970 and 1990 Censuses are not used because the farm status variable contains a substantial number of missing observations.

Table 6: Economic Progress of African Americans

	Annual wage earnings				Annual earnings including earnings from self-employment and farming			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education	No	Yes	No	Yes	No	Yes	No	Yes
Location	No	No	Yes*	Yes*	No	No	Yes*	Yes*
1940	-0.566	-0.436	-0.548	-0.423	---	---	---	---
1950	-0.407	-0.294	-0.409	-0.330	-0.478	-0.368	-0.466	-0.380
1960	-0.438	-0.313	-0.433	-0.335	-0.504	-0.379	-0.495	-0.389
1970	-0.421	-0.315	-0.426	-0.330	-0.440	-0.330	-0.447	-0.346
1980	-0.384	-0.303	-0.406	-0.324	-0.403	-0.321	-0.425	-0.340
1990	-0.416	-0.320	-0.451	-0.351	-0.431	-0.336	-0.467	-0.368
2000	-0.439	-0.329	-0.480	-0.361	-0.428	-0.318	-0.470	-0.353

Source: Authors' calculations, 1940 to 2000 I-PUMS. Dependent variable is the annual earnings and figure reported is the difference of means divided by the white mean. Where possible, we dropped observations with imputed variables for earnings (which is not possible in the 1960 data), but we adjust the weights for these nonreports using inverse probability weighting. We also drop data with imputed race, education, sex, and age (where possible) and reweight using inverse probability weighting. The education variable is categorical reflecting no years of schooling, one to four years of schooling, four to eight years of schooling, 9 years of schooling, 10 years of schooling, 11 years of schooling, high school degree or GED, some college, bachelor's degree, and graduate education. Age control reflects single years of age. In all regressions, the white sample is reweighted so that the distribution of age, education (where appropriate), and location (when appropriate) are the same for whites as for blacks. Because of data limitations, 1960 "location" is combines people across a state into urban areas.

Table 7: Economic Progress of African Americans in Cities with Historically Large Black Populations

Annual earnings	**1940**	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**
Baltimore	-0.347	-0.427	---	-0.334	-0.334	-0.354	-0.340
Chicago	-0.470	-0.312	---	-0.310	-0.379	-0.432	-0.456
Detroit	-0.433	-0.248	---	-0.289	-0.327	-0.388	-0.377
New York	-0.450	-0.307	---	-0.314	-0.359	-0.388	-0.429
Philadelphia	-0.482	-0.326	---	-0.282	-0.360	-0.380	-0.419
St. Louis	-0.475	-0.387	---	-0.337	-0.343	-0.412	-0.381
Washington	-0.491	-0.279	---	-0.327	-0.265	-0.291	-0.289
Annual earnings including earnings from self-employment and farming							
Baltimore	---	-0.441	---	-0.347	-0.346	-0.372	-0.328
Chicago	---	-0.348	---	-0.321	-0.393	-0.447	-0.453
Detroit	---	-0.299	---	-0.300	-0.344	-0.407	-0.367
New York	---	-0.370	---	-0.330	-0.376	-0.409	-0.421
Philadelphia	---	-0.343	---	-0.298	-0.375	-0.393	0.394
St. Louis	---	-0.434	---	-0.346	-0.354	-0.418	-0.367
Washington	---	-0.316	---	-0.353	-0.289	-0.312	-0.303

Source: Authors' calculations, 1940 to 2000 I-PUMS. Dependent variable is the annual earnings and figures reported are the differences of means divided by the white mean. Where possible, we dropped observations with imputed variables for earnings, but we adjust the weights for these nonreports using inverse probability weighting. The education variable is categorical reflecting no years of schooling, one to four years of schooling, four to eight years of schooling, 9 years of schooling, 10 years of schooling, 11 years of schooling, high school degree or GED, some college, bachelor's degree, and graduate education. Age control reflects single years of age. In all regressions, the white sample is reweighted so that the distribution of age and education for each location are the same for whites as for blacks.

Table 8: Economic Progress of African Americans in Sunbelt and Older Cities

Sunbelt Cities:					**Older Cities:**				
	1970	1980	1990	2000		1970	1980	1990	2000
Atlanta	-0.387	-0.340	-0.350	-0.353	Boston	-0.290	-0.292	-0.317	-0.358
Charlotte	-0.382	-0.290	-0.328	-0.328	Cleveland	-0.321	-0.312	-0.386	-0.364
Dallas	-0.426	-0.344	-0.399	-0.399	Kansas City	-0.316	-0.296	-0.346	-0.333
Denver	-0.395	-0.286	-0.283	-0.320	LA	-0.337	-0.344	-0.362	-0.383
Houston	-0.405	-0.337	-0.421	-0.421	Pittsburgh	-0.283	-0.311	-0.411	-0.286
Phoenix	-0.319	-0.320	-0.323	-0.325	San Francisco	-0.341	-0.363	-0.418	-0.375
Tampa	-0.363	-0.295	-0.325	-0.269					

Source: Authors' calculations, 1940 to 2000 I-PUMS. Dependent variable is the annual earnings (including earnings from self-employment and farming) and figures reported are the differences of means divided by the white mean. Where possible, we dropped observations with imputed variables for earnings, but we adjust the weights for these nonreports using inverse probability weighting. The education variable is categorical reflecting no years of schooling, one to four years of schooling, four to eight years of schooling, 9 years of schooling, 10 years of schooling, 11 years of schooling, high school degree or GED, some college, bachelor's degree, and graduate education. Age control reflects single years of age. In all regressions, the white sample is reweighted so that the distribution of age and education for each location are the same for whites as for blacks.