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OBAMA, KATRINA, AND THE PERSISTENCE OF RACIAL INEQUALITY

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ABSTRACT

This paper is my presidential address to the Economic History Association. In it, I review and extend the economic history of racial differences in per capita income from 1870 to the present. Specifically, I revise pre-World War Two benchmark estimates of Black/White income ratios originally prepared by Robert Higgs. The Higgs benchmarks suggest that the Black/White income ratio increased from 1870 to 1900, but the trend was flat from 1900 to 1940. Compared with the Higgs benchmarks, mine show less convergence before 1900 but more between 1900 and 1940. When my new benchmarks are combined with standard post-World War Two census data they suggest that the underlying pace of Black/White income convergence has been absolutely slow, with the notable exceptions of the 1940s and the period of the modern Civil Rights Movement. I explore the interpretation of these long-run features with a model of intergenerational transmission of racial inequality in which racial differences in causal factors that determine income are initially enormous after the Civil War and which erode slowly across generations.

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1. Introduction

--"The problem of the twentieth century is the problem of the color line."

W. E. B. Du Bois, *The Souls of Black Folk*

The subject of this paper is the evolution of racial inequality in the United States from the end of the Civil War to the present. This is a massive topic that needs to be circumscribed to be manageable. I focus on per capita income and various causal factors, such as education and race *per se*.

The subject can be motivated in different ways. Mine is visual. I ask readers to recall two sets of images. The first is from early September 2005. These are images from Hurricane Katrina, the massively destructive storm that took the lives of over 1,800 people and obliterated more than 100 billion (2005) dollars of property. The specific images are of poor African-Americans from the Lower 12th Ward of New Orleans – in harm's way and desperate to be rescued by boat or helicopter -- and from around the Superdome – hungry, despondent, and dead-tired. Millions of Americans and untold numbers around the world saw these images on television. I could summon other depressing images of contemporary Black poverty from Detroit, Baltimore, Chicago, Cleveland, or Ferguson, Missouri.

The second set is from early November 2008. The setting is Grant Park, Chicago, on the evening of Barack Obama's election to his first term as President. To call this "historic" is an understatement. We are a little more than a half-century after the March on Washington. Would any of the leaders of the Civil Rights Movement at the time – Martin Luther King, John Lewis, or others – have predicted an African-American president just fifty years later? I doubt it.

At any juncture in modern American history other than Obama presidency we could readily find photographs of poor Whites and contrast these with the smiling face in the White House. But that contrast would not bring immediately to mind the subtext of race and its lengthy historical baggage. I have chosen the Obama inauguration because the visual image is so arresting, but it would be easy to summon many other examples, mundane and otherwise, of highly successful African-Americans, in virtually any walk of economic life.

I have two goals. The first is to review and revise the economic history of racial differences in per capita income from 1870 to the present. Specifically, I shall be revising pre-World War Two benchmark estimates of Black/White income ratios originally prepared by Robert Higgs. The Higgs benchmarks suggest that the Black/White income ratio increased from 1870 to 1900, but the trend was flat from 1900 to 1940. Compared with the Higgs benchmarks, mine show less convergence before 1900 but more between 1900 and 1940. While I believe my benchmarks are an improvement, there is more work to be done. I welcome scrutiny and further research.

When my new benchmarks are combined with standard post-World War Two census data they suggest that the underlying pace of Black/White income convergence has been slow, with the notable exceptions of the 1940s and the period of the modern Civil Rights Movement. I explore the interpretation of these long-run features with a model of intergenerational transmission of inequality. Income convergence is slow because racial differences in causal factors that determine income eroded slowly across generations and because initial racial inequality after the Civil War itself was so glaring.

My findings rationalize the imagery that I opened with. Because there has been long-run convergence we can find numerous examples today of economic success in the Black community. Because convergence has been far from complete we can, unfortunately, find even more examples of Black poverty. Post-Civil Rights, there is relatively more Black economic success than pre-Civil Rights but this reflects, in part, the cumulated accomplishments of prior generations.

2. Black-White Per Capita Incomes, 1870 to the Present: A Revision

--"To be a poor man is hard, but to be a poor race in a land of dollars is the very bottom of hardships."

W. E. B. Du Bois, *The Souls of Black Folk*

Labor economists studying the historical evolution of racial economic differences often focus on earnings, typically those of males (Smith and Welch 1989; Donohue and Heckman 1991, Bound and Freeman 1992). I focus instead on the broader measure of per capita income, which includes non-labor income and also the labor earnings of women.[1]

Before proceeding I wish to emphasize several caveats. There are severe gaps in the historical record and strong assumptions must be made to make quantitative progress. There is nothing special about this as long as the analysis is transparent, as I hope mine is. I am after the big picture, not minute brush strokes.

In focusing on racial differences in per capita income I am effectively assuming that all income generated by Blacks (Whites) is consumed within the Black (White) community. While not literally true, historically the bias here is small because there has been so little racial

[1] Historically, labor force participation rates of Black women exceeded those of Whites; see Goldin (1977) and Boustan and Collins (2014).

intermarriage, a point I return to later in the paper. Moving forward, one could imagine a not-so-distant future United States with far more racial mixing, in which case race-specific per capita income figures would not make much economic sense.

Focusing on per capita income necessarily obscures changes within group populations. While it is quite plausible that income inequality within the Black population has changed in the long run it is impossible to document this accurately. Because my interest is mainly in the long run I stick with per capita income.

My analysis pertains to the civilian, non-institutionalized population. The institutionalized population includes those in prison and, in recent decades, Black incarceration has increased absolutely and relative to White incarceration (Neal and Rick 2014; Bayer and Charles 2015). It is far from obvious how to compute the "income" of prisoners but excluding them likely biases the post-1980 trend in the Black/White income ratio, possibly upward.[2]

[Figure 1 about here]

With these caveats in mind I begin with Figure 1, which displays four time series. The one labeled "Census" is derived from post-World War Two data. From 1967 to the present (2014), this series is the ratio of the Census Bureau's annual estimates of Black and White per capita income. For 1948 to 1966 the ratio is estimated by multiplying the Black-White ratio of

[2]In terms of Figure 1, the bias in the post-1980 trend in the Black/White income ratio would be upward if the income of prisoners were less than the income generated by the same people were they not incarcerated and said income were measured in the civilian economy (as opposed to the underground economy). On the other hand, Figure 1 makes no adjustment for imputed income from equity in owner-occupied housing. If imputed income were incorporated into my estimates, the extent of long-run racial convergence would increase because Black/White differences in home ownership have narrowed considerably since the end of the Civil War (Collins and Margo 2001, 2007, 2011). There has been significant racial convergence in expectation of life at birth since the early twentieth century (Boustan and Margo 2015). Consequently racial differences in the present discounted value of lifetime earnings narrowed more in the long run than in current per capita income. I note this point, but do not explore it quantitatively.

adult earnings by a scaling factor.[3] Prior to 1948 there are no annual data to construct a counterpart to the Census Bureau series. Instead, I show the three benchmark estimates for ca. 1870, 1900, and 1940 made by Robert Higgs (1977, 1989); my revisions to the Higgs benchmarks; and a series pertaining to adult men prepared by James Smith (1984) for the census years 1890 to 1980.[4]

I begin by focusing on the Higgs benchmarks and the post-World War Two census data treating the two as if they were joined at the hip – the Higgs-*cum*-census series. In the immediate aftermath of the Civil War, Black income per capita was far lower than White – according to the Higgs benchmark, just shy of a quarter (0.24) ca. 1870.[5] That is, for every dollar of income received by Whites in the immediate aftermath of the Civil War, Blacks received 24 cents.

My focus in this paper is on what happened next but it is also natural to compare the ca. 1870 benchmark with an ante-bellum counterpart. On the one hand, per capita income declined sharply in the South after the Civil War, absolutely and relative to income elsewhere in the nation (Engerman 1966; Goldin 1979). If the decline where shared proportionately by race, Blacks would have borne the greater brunt, because relatively more were Southern, compared with Whites. On the other hand, the vast majority of Blacks before the Civil War were enslaved, and slaves were exploited in the neoclassical (economic) sense – they received "income" (primarily food, clothing, and shelter) less than the value of their marginal product at any point in time and over the life-cycle. Appendix A briefly discusses a range of (highly)

[3]The scaling factor is s = (Black/White ratio of per capita incomes)/(Black/White ratio of adult earnings). The scaling factor is the average over the period for which race-specific series on per capita income and adult earnings are both available.

[4] The Higgs benchmark is ca. 1870 in that most of the data used in constructing it pertains to ca. 1867-68. My benchmark pertains to 1870 proper.

[5] Smith's text (1984) is clear that his series was based on occupation status, not income but when he presented his results in tabular form, the title read "Black-White Male Income Ratios".

provisional estimates of Black/White ratios for 1860; these are constructed in the same general manner as the 1870 and 1900 benchmarks (Higgs and mine). [6] The range of Black/White ratios falls between 0.22 and 0.31, with 0.26 as a plausible point estimate. This range encompasses both the Higgs ca. 1870 benchmark and my revision to it for 1870. The Civil War ended American slavery as it was known, but it does not seem to have led to an immediate increase in the relative per capita income of African-Americans.

Returning to the narrative moving forward, between 1870 and 1900 Blacks managed to increase their average income relative to Whites by 11 percentage points, or from 0.24 to 0.35, according to the Higgs benchmarks. The relative progress was short-lived, however. From 1900 to 1940 convergence in per capita income stalled completely – the Higgs benchmark for 1940 is 0.34, slightly lower than in 1900 (0.35).

After 1940 the series takes a decidedly upward turn. Between 1940 and 1960 the ratio grows at a steady pace, which then accelerates in the 1960s. But in the late 1970s the upward trend loses steam, and the pace of convergence after 1980 was much slower than during the proceeding four decades. In 2010, the most recent Census year, the ratio is 0.64 – for every dollar of income accruing to a White person the average Black received 64 cents.[7]

Over the 140 years between 1870 and 1910, therefore, the Black-White income ratio increased by 40 percentage points according to the Higgs-*cum*-census series. The increase is not uniformly continuous but occurs in a step-function or "episodic" manner in which periods of relatively strong, steady convergence are followed by periods of stasis (1900-40) or slower convergence (1980-present). Although the post-World War Two annual data display many ups

[6] That is, I start with estimates of Black and national per capita income and the Black population share, back out White per capita income from the national identity, and form the Black/White ratio.

[7] It is noteworthy that the average ratio over the period 1999-2014 is also 0.64 (see Figure 1); that is, there has been no upward movement in the Black/White income ratio since the turn of the 21st century.

and downs, there are no lengthy periods of "regression to the mean" during which the ratio returns to a previous level – that is, the gains experienced during the convergence episode are sustained. The convergence episodes are of moderate duration, approximately one human generation (1870-1900) or somewhat longer (1940-1980).

A consensus narrative has emerged to accompany the Higgs-*cum*-census series. That some racial convergence took place between 1870 and 1900 is very plausible. The vast majority of Blacks lived in the South before 1900, and events in that region dominate movements in the numerator of the income ratio. Post-Emancipation, former slaves were able to migrate on their own accord in seek of better economic opportunities (Higgs 1977). Migration within the South was substantial, even if a large scale flow to the North was still in the future (Boustan 2015). Adult Black illiteracy declined between 1870 and 1900, absolutely and relative to White; literates had higher incomes on average than illiterates, regardless of race (Collins and Margo 2006). In the six Southern states that kept records after the Civil War, Blacks accumulated taxable wealth more rapidly than Whites from 1870 to 1900 (Higgs 1982; Margo 1984). Consistent with this, census data show Blacks moving up the agricultural ladder, especially in owner-operator status which increased from hardly any in 1870 to around a quarter in 1900 (Higgs 1977; Collins and Margo 2011).

But a backlash followed. Black voting rights established for men under the 15th Amendment were drastically curtailed in the South in the late nineteenth century, and *de jure* segregation expanded its reach (Woodward 1955; Kousser 1974; Valelly 2004). When law alone proved inadequate to enforce White supremacy, Blacks were kept "in their place" through terror and violence. Working in the opposite direction to narrow the income gap, Black migration to the North increased when migrants got a "foot in the door" during and after World

War One (Whatley, 1990; Collins 1997). The economic gains to migrants were substantial but evidently insufficient in the aggregate to further narrow the racial gap at the national level prior to World War Two (Collins and Wanamaker 2014; Boustan 2015).

Convergence resumed in the 1940s. During the War the United States experienced a "Great Compression" in incomes. All incomes rose in real terms but especially those at the bottom, which includes Black incomes (Goldin and Margo 1992; Maloney 1994; Margo 1995). Black migration from the rural South picked up substantially during the War, and there were special gains for those who found employment in the defense industry. Early attempts at federal anti-discrimination intervention into the labor market, such as Roosevelt's 1943 executive order also played a role in fostering racial convergence (Collins 2001). Absolutely and relative to White women, Black women substantially increased their incomes and upgraded their occupational status after 1940 (Bailey and Collins 2006).

The gains of the 1940s were sustained in the 1950s, and then further enhanced during the Civil Rights Movement of the 1960s. In a famous article, John Donohue and James Heckman (1991; see also Wright 2013) identified 1963 to 1975 as the key period of "episodic change". The locus was the South. By this time Black-White ratios outside the South were already relatively high, and significant convergence in the aggregate ratio required a reduction in the racial gap in the South. This gap did decline, and Donohue and Heckman argue that it did so largely in response to anti-discrimination pressure from the federal government.

Between 1940 and 1970 the Black-White income ratio rose by about 7.7 percentage points per decade. If this pace of convergence had continued for the next forty years, the Black-White ratio in 2010 would have been 0.88, instead of its actual value of 0.64. As Figure 1 shows, convergence slowed markedly around 1979. There is a vast and ever growing literature

in modern labor economics examining post-1980 racial differences, and no shortage of explanatory factors for the convergence slowdown. A partial list would include de-industrialization, skill-bias technical change, and other forces leading to widening of wage inequality; the emergence of "bad ghettos" in the 1970s and related aspects of central city (economic) decline, some associated with the 1960s riots; a slowdown in racial convergence in educational attainment; mass incarceration and its attendant effects on employment and earnings; rising immigration; a slowdown in government employment, particularly at the federal level; a reversal of some of the political and regulatory gains of the Civil Rights era; and continued racial prejudice, less public than in the past but burrowed deeply into the nation's institutional framework and White consciousness.[8] It is far easier to list plausible causes of the post-1980 convergence slowdown than to convincingly quantify their relative importance, and I shall not attempt to do so here.

From my recounting it is clear that the Higgs benchmarks are a central part of the consensus narrative. I shall be revising these benchmarks in what follows but readers should keep in mind that the main point that Higgs (1977, 1989) wished to establish was that some convergence occurred before World War Two, including during the post-bellum era. Not only do I reach the same conclusion, cumulatively the absolute amount of convergence in percentage points between 1870 and 1940 –10 percentage points -- is the same as Higgs. The difference is in how I allocate pre-World War Two convergence pre-1900 versus after.

My revisions to the Higgs benchmarks and their rationale are described in detail in Appendix B. In brief, I contend that Higgs over-estimated Black per capita income in 1900 but underestimated it in 1870 and 1940.

[8] The literature here is very long. See, for example, Juhn, Murphy, and Pierce (1991); Bound and Freeman (1992); Cutler, Glaeser, and Vigdor (1999); Collins and Margo (2000, 2004, 2007); Neal (2006); Boustan and Margo (2009); Borjas, Grogger, and Hanson (2010); Neal and Rick (2014); and Bayer and Charles (2015).

The over-estimation of Black per capita income in 1900 occurs in part because Higgs over-adjusted for non-wage perquisites received by farm laborers and also overestimated their annual incomes; in addition, I argue that Higgs overestimated the average annual income of Black farmers. In 1870 and 1900 Higgs estimated Black per capita income first, and then computed White per capita income as a residual from the identity linking national per capita income to its race-specific components. Thus, if Black income is over-estimated, White income is too low, and the Black-White income ratio is overstated. I contend this happens in 1900. The Higgs 1900 benchmark is 0.35; mine is 0.32.

For 1870 my benchmark (0.28) is higher than Higgs (0.24) for two reasons.[9] First, I estimate a somewhat higher figure for Black agricultural income. Second, my estimate pertains to 1870 proper, whereas the Higgs benchmark pertains to 1867-68 (and thus is c. 1870). Agricultural labor markets in the South were severely disrupted in the immediate aftermath of the Civil War, and it is plausible this temporarily depressed Black incomes.

For 1940 Higgs used a different procedure to estimate his benchmark, working directly with an equation for the Black/White ratio. As described in Appendix B, I argue that Higgs underestimated Black non-wage and salary income. Adjusting for this raises the Black/White ratio and thus my 1940 benchmark (0.38) is higher than the Higgs benchmark (0.34).

Returning to Figure 1, my new benchmarks suggest that, instead of convergence occurring entirely before 1900 *a la* Higgs, it now occurs more or less continuously between 1870 and 1940. As previously noted, the <u>total</u> amount of convergence between 1870 and 1940 is the same, but the timing is different.

[9] As Higgs (1989, p. 12) notes, Ransom and Sutch (1979) thought the Higgs 1870 benchmark (0.24) was biased downwards whereas Sholmowitz (1983, p. 274) thought it was biased upwards; my revision sides with Ransom and Sutch.

Aside from the qualitative differences with Higgs in the timing of pre-1940 convergence, my new benchmarks show greater quantitative change between 1900 and 1940 than suggested by Smith (1984). However, a *prima facie* case can be made that that Smith understates the extent of pre-1940 racial convergence in male worker incomes, and therefore in per capita incomes. To understand why it is useful to review first how Smith originally made his estimates.

Although Smith labels his estimates as "income" ratios they are not. Rather, they are occupation-status ratios. Smith estimates national average, race-specific income-occupation weights for 1970 based on the federal census and he uses these (same) weights to value the race-specific occupation distributions for the census years 1890 to 1980. His Black/White ratios change only if Black men shift into higher income occupations (as measured in 1970) relative to White men.[10] Pointedly, they do <u>not</u> change when the wage distribution shifts.

The recent book by Claudia Goldin and Lawrence Katz (2008) shows there was a secular decline in the returns to schooling from 1890 to 1940. During the post-World War Two period, there is a significant negative correlation (time series or cross-section) between relative Black incomes and the returns to schooling – that is, when returns to schooling decrease Black-White income differences narrow, and vice versa (Mahoney 1994; Margo 1995; Juhn, Murphy, and Pierce 1991; Bayer and Charles 2015). There is no reason to suppose a different dynamic before World War Two. Because Smith's income weights are constant, they cannot, by design, accommodate the plausible impact – positive -- of the pre-1940 decline in the returns to schooling on Black-White income convergence.[11]

[10] By the same logic in the text, Smith's ratios also understate convergence between 1940 and 1980 because they fail to reflect wage convergence within occupations as well as the effects of the "Great Compression" of the 1940s; see Smith and Welch (1989), Goldin and Margo (1992), and Margo (1990, 1995).

[11] Goldin and Katz document a 14 percentage point decline in the returns to schooling from 1915 to 1940. To get some idea how this might have affected relative Black incomes before World War Two, I estimated a cross-state bivariate regression using state-level data for 1960. The dependent variable is the actual Black/White income ratio in the state, relative to the Black-White ratio of occupational status, and the independent variable is the ratio of

Second, in the late nineteenth century per capita incomes in the South were far below the national average (Engerman 1966; Goldin 1979). The overwhelmingly majority of the African-American population lived in the South at the time, a far higher percentage than Whites. Economically speaking, Black workers suffered from a substantial income "spatial mismatch" across states, primarily one of region – the South versus the non-South. I shall more to say about spatial mismatch later. Here, I simply point out that at the national level the Black/White income ratio in the aftermath of the Civil War would have been far below one even if both races received the per capita income of the states in which they resided.

[Table 1 about here]

Over time, there was pressure on the Southern economy to converge on the non-South through out-migration, capital inflows, and factor price equalization. Table 1 presents three simulated Black-White income ratios. These are measures of Black cross-state "spatial mismatch".[12] The first computes the Black/White ratio multiplying state per capita incomes by the race-specific population shares for the given year. This captures the overall change in spatial mismatch. The second holds per capita income constant at the 1920 level but allows population shares to change over time; this captures the migration, or population redistribution effect. The third holds population shares constant at 1920 levels but allows per capita income to change. This is the "regression to the mean" effect.

Overall, Black cross-state spatial mismatch worsened slightly between 1880 and 1900. However, after 1900, mismatch declined. Most of the erosion occurred because of the spatial

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college to high school average incomes for Whites. The regression coefficient is negative – a reduction in the White returns to schooling is associated with a higher Black-White (true) income ratio, relative to Black-White occupation status. Details are available from the author on request.

[12] The simulated ratios are obviously much higher than the actual ratios because, within states, Black incomes were lower than White incomes. The notion of spatial mismatch originates in the iconic article by John Kain (1968), who argued that the suburbanization of jobs after World War Two coupled with the continued segregation of urban Blacks in central cities reduced Black employment and incomes.

redistribution of the Black population but some, particularly in the 1930s, happened because of regression to the mean. A portion of the population redistribution effect is captured by Smith because some transitions of Black labor out of agriculture are positively collated with migration out of the rural South.[13] None of the regression to the mean effect – 4 percentage points in total between 1880 and 1940 -- is captured by Smith, however. To summarize, it is very likely that Smith's ratios understate the extent of racial income convergence among adult men prior to World War Two and, as such, the overall extent of Black-White convergence in per capita income.

At this point caution is warranted. While I believe my new benchmarks improve upon Higgs they are based on reworking of existing evidence with many judgement calls on my part (see Appendix B). There are five census years between 1870 and 1940 for which there are no benchmarks, Higgs or Margo. I cannot dismiss the possibility that the pre-1940 continuity evident in the Margo-*cum*-Census series might evaporate with new data or more benchmarks. I have offered an explanation why Smith's series understates Black-White convergence before World War Two, but that is different than providing direct evidence.

To conclude this section, I have reviewed the long-run history of Black/White per income differences. In doing so, I have revised pre-World War Two benchmark estimates of Black/White per capita income ratios. The caveats just noted aside, the revised benchmarks do not change the overall amount of convergence before World War Two but do indicate a smoother time path, with one major medium-run transitional deviation that occurred between 1940 and 1980.

[13] However, many Southern blacks already had non-agricultural jobs before migrating to the North. To the extent that their occupation remained the same – unskilled non-farm laborer, say – there would be no impact on Smith's ratios, because his income weights do not incorporate regional differences in pay.

3. Interpreting the Time Series: Intergenerational Transmission

--"But what on earth is whiteness that one should so desire it? Then always, somehow, some way, silently but clearly I am given to understand that whiteness is the ownership of the earth forever and ever, Amen!"

W. E. B. Du Bois, *Darkwater*

Between 1870 and 2010 the Black/White ratio of per capita income increased from 0.28 to 0.64, or by 36 percentage points. Ten points of the increase, or about 28 percent, occurred before 1940 – the midpoint of my long run -- with remainder, 26 points (72 percent) occurring after. There is still a large racial divide in income but, relatively speaking, the divide is much smaller than in 1870 or 1940. This has two basic implications, as noted in my Introduction. Because we have come fairly far, it is much easier to find examples of economically successful African-Americans today than in the distant (or not-so-distant) past. Because we have far to go it is, regrettably, easy to find numerous contemporary examples of Black poverty.

In this section I focus not on the ups and downs of convergence *per se* but rather its long run pace. Assuming a human generation to be 25-30 years there are roughly 5-6 generations between 1870 and 2010. On average, each generation experienced a 7.7 percentage point increase in the Black-White income ratio. How shall we interpret this number? As a way of approaching this question I propose to think in terms of a model of intergenerational transmission of inequality (Becker and Tomes 1979; Solon 1992, 2014, 2015).

By "intergenerational transmission" I am referring to the relationship between economic status in generation T and status in the prior generation, T – 1. In economics, interest has mushroomed with the availability of modern household panels, such as the Panel Study of Income Dynamics and the National Longitudinal Survey, which track households across

generations (see, for example, Solon 1992; Mazumder 2005; Aaronson and Mazumder 2008; Black and Devereux 2011; Davis and Mazumder 2013). The canonical regression is given by equation [1]:

[Eq. 1]: $\text{Ln } y_t = \beta \text{ x Ln } y_{t-1} + \varepsilon_t$

Here, y_t is income, t is the current generation and t – 1 the previous generation; ε is an i.i.d. random error; and β is the intergenerational elasticity, or IGE. In estimating the IGE steps need to be taken to reduce the effects of transitory variation in income over the life-cycle, otherwise, β will be biased towards zero.[14] When this is done, modern IGE estimates for the United States fall in the range of 0.3 to 0.6, with 0.5 being a focal point (Solon 2015). Historical estimates are less common and are almost never truly comparable with modern estimates, because historical estimates typically measure the transmission of occupation or occupational status rather than income *per se* (Ferrie and Long 2013; Olivetti and Paserman 2015). This caveat aside, historical estimates also tend to fall into the same numerical range (see, for example, Olivetti and Paserman 2015).

In expectation, [Eq. 1] gives predicted or average mobility across generations – if a child grows up poor, on average the child may or may not be as poor as an adult. The expectation depends on initial conditions – how poor the upbringing -- and the magnitude of the IGE. If the

[14] In recent work, Gregory Clark (2014) has made a provocative argument that, despite steps typically taken to reduce measurement error in individual earnings data, standard IGE estimates are biased downward, and 0.7-0.8 is a plausible estimate of the "true" IGE. Clark's argument can be recast as follows (see Solon 2015). Let S be true "social status" which in any generation is measured with error by income: $S = Y + \varepsilon$. Because S is not observed, we are forced to use data on Y to estimate [eq. 1]. However, because S is measured with error by Y, the coefficient β in [eq. 1] will be biased downward. Averaging Y or similar measures within a group reduces the impact of the measurement error, raising the estimate of β. "Social" mobility is not the same, in other words, as "income" mobility, and the history of race in America offers a pertinent example.

IGE is close to zero, there is little or no correlation on average between poverty as a child and as an adult. However, if the IGE is one, there is perfect immobility on average.

In applying this logic to the problem at hand, the idea is that, even if generation t-1 of Blacks has much lower income than Whites in t-1 on average, if $\beta = 0.5$ there should be fairly substantial "regression to the mean" evident in generation t. again on average. As an example, suppose the IGE ca. 1870 is 0.5, and the initial Black-White income ratio is 0.28. The predicted Black-White income ratio one generation later, ca. 1900, is 0.53.[15] This is far higher than my 1900 benchmark, 0.32 – that is, [eq.1] seems to over-predict the extent of convergence in the late nineteenth century.

Alternatively, we could start with a ratio of 0.32 in 1900 (my benchmark), and predict the ratio in 1930. The predicted ratio is 0.57. There is no benchmark for 1930, but if there were it is inconceivable it would be this high. In 1980, the income ratio is 0.58; with an IGE of 0.5, the predicted ratio in 2010 is 0.76, compared with an actual ratio of 0.64. The general pattern, then, is that an IGE of 0.5 significantly over-predicts racial convergence across adjacent generations. A partial exception is mid-century. If I start with my 1940 (1950) benchmark of 0.38 (0.41), the predicted ratio for 1970 (1980) is 0.62 (0.64), which is not much higher than the actual ratio of 0.57 (0.58).

To solve the over-prediction problem, labor economists propose adding a "group fixed effect" to [eq. 1] (Becker and Tomes 1979; Hertz 2007; Bhattacharya and Mazumder. 2011; Mazumder 2014). The group effect is negative, implying less intergenerational mobility for Blacks than for Whites, controlling for income in the previous generation. In an instructive mathematical example, Solon (2015) shows that a group fixed of the correct magnitude will

[15] Ln (0.53) = 0.5 x Ln (0.28). I am playing somewhat fast and loose with the prediction from [eq. 1] because per capita income is a weighted average across generations, and some of the over-prediction error in the late nineteenth century reflects the continued presence of ex-slave generations in the labor market.

reproduce the pattern of Black-White convergence across generations, and yet maintain an individual-level IGE in the standard range within race.[16]

In thinking about this standard fix, I wish to stress two points. First, [eq. 1] does not describe a causal mechanism. The underlying "cause" of the Black-White income ratio in the current generation is not the income ratio in the previous generation.[17] Rather, there are causal factors that determine income in today's generation, along with race and "luck" (the error term). These causal factors are transmitted across generations -- along with racial identity itself, because the groups have to be reproduced for the group effect to be economically meaningful.

Second, in quantitatively assessing the factors accounting for the pace of convergence over time, we can only do as well as the data permit. I believe that if we could better measure the factors explaining income in each generation as well as how race impacted the ability of each generation to acquire these factors (or not), social scientists could better account for the pace of racial convergence in the long run.

To facilitate this argument I sketch a toy intergenerational model that allows for an endogenous race effect. The model, inspired by Stuhler (2014) and Stuhler and Nybom (2014), focuses on labor income (see below for a discussion of wealth). There are three equations:

[16] In Solon's (2015) numerical simulation, Black-White differences die out in accordance with a β of about 0.8, which happens to be the value that also rationalizes my long run time series. The recent study by Collins and Wanamaker (2015a) can also be interpreted along the same lines. Collins and Wanamaker examine the dependence of son's position in the income distribution relative to father's, using linked samples of Black and White southerners from 1880 to 1900, and 1910 to 1930. As in Smith (1984) "income" in Collins and Wanamaker is really occupational status, but the authors take great care that their protocol captures at least some relevant racial, geographic, and temporal variation. At my request Collins and Wanamaker estimated [eq. 1] with a race dummy using their linked 1880-1900 and 1910-1930 samples; as my argument in the text suggests, the coefficient of the race dummy is negative.

[17] I recognize that income can have a causal effect via the intergenerational transmission of human capital. For example, in a model of optimal schooling if individuals are unable to borrow fully against future earnings parental income will serve as a substitute (Loury 1981). Higher income parents will likely have higher human capital on average, creating a positive correlation across generations. This is certainly relevant to the long-run evolution of Black-White schooling differences; see Margo (1990) and Baker (2015). For an alternative perspective see Cameron and Heckman (2001)

Equation [2a]: $\ln y_t = \beta_w w_t + \beta_h h_t + \varepsilon_{yt}$

Equation [2b]: $w_t = \lambda_r w_{t-1} + \varepsilon_{rt}$

Equation [2c]: $h_t = \gamma w_t + \lambda_h h_{t-1} + \varepsilon_{ht}$

Here as before, y is income and t indexes the generation. The variable w is "whiteness" – recall the quote from DuBois that opens this section -- or racial identity; h is "human capital" and the β's are their market prices; $\beta_w > 0$ and $\beta_h > 0$. Racial identity and human capital are transmitted from generation t – 1 to t via the λ parameters and subject to the error terms.

The model is obviously simplified in the extreme. Equation [2a], for example, subsumes any explicit role for labor force participation or gender in the analysis of racial convergence.[18] Equations [2a] and [2b] are reduced-form shorthand for highly complex processes that are difficult to model formally but which can be described verbally, albeit with limited rigor.[19] The processes begin very early in life, indeed, in *utero*. In infancy and early childhood, w and h are produced close to home which may include interactions with siblings and other relatives, including prior generations (e.g. grandparents), friends and neighbors. Around age 6 or so children venture forth, interacting with their peers and other adults (e.g. teachers) away from home – for example, in school or neighborhood play. The nature and extent of these interactions remains affected by the home environment, to which may be added institutions and

[18] Labor force participation is important empirically because, in the very long run, the racial gap in aggregate participation (labor force/population) has widened. One cannot, however, compute the effect of the widening on per capita income convergence because some of the widening is endogenous. The most important component is schooling; instead of entering the labor force full time at a very young age as was true under slavery, post-Civil War generations of Black children attended school. In the early 20th century this was a clear tradeoff made by their parents between current consumption and the well-being of future generations, which began to change as technology and other factors lowed the value of child labor in the Southern economy (Margo 1990; Baker, 2015).

[19] Another obvious limitation is that the setup of the model treats the λ parameters as independent of the β parameters but this would not be true in an optimizing framework in which the incentives to invest in human capital or racial identity are determined in part by their labor market prices.

social norms, technology, and the government. Finally, children grow up and leave home with their stocks of w and h, forming households of their own, starting the process anew.

Importantly, [eq. 2c] includes a direct role for racial identity to affect human capital development. In terms of my verbal description of the process, this occurs primarily because "social capital" matters in human capital production and because racial identity influences access to institutions and social networks complementary to human capital production (Loury 1977, 2002; Bowles, Loury, and Sethi 2014; Chay and Munshi 2015). The presumption is that $\gamma > 0$ because of *de jure* and *de facto* segregation. *De jure* segregation matters because, historically, Blacks were legally excluded from or discriminated against in access to institutions that would have promoted human capital development, the most obvious example being schools. *De facto* segregation matters because social capital and institutional access continue to be correlated with racial identify even without the force of law.

Appendix C derives the IGE for income in adjacent generations in the model. The crucial points are: (1) if w and h explain most of the variance in ln y; (2) intergenerational transmission of w and h is strongly persistent or γ is absolutely large; then the IGE will be substantial and racial convergence across generations potentially very slow. This coupled with very large initial gaps in w and h creates strong links across generations – what I have referred to elsewhere as "intergenerational drag" (Margo 1990) -- making racial inequality persistent.
In what follows I shall focus mostly on intergenerational transmission of w and h – equations [2b] and [2c] – but I will return to the role played by the β parameters at the end of the section.

As I conceive it, racial identity is not readily observable by the econometrician except for one correlate – namely, whether individuals are classified in a census-type survey as Black or White. We might assume a cutoff value, w*, such that if $w < w^*$, the individual is classified as

Black and if w > w*, as White.[20] Although racial identity is not readily measurable in a statistical sense, it can be described. It is, to be sure, complexion, but it is much more than skin color – behavior, culture, dress, speech.

There can be little doubt that λ_w has been close to one, right up the present day. The proximate cause is the extraordinary low rate of formation of racially mixed Black and White households, historically and at present, coupled with high rates of residential and social segregation (Cutler, Glaeser, and Vigdor 1999; Fryer 2007). To be sure, racial intermarriage was illegal under state law in many states until the Supreme Court declared such legislation unconstitutional in *Loving v. Virginia* in 1967. But even in places were marriage between Blacks and Whites was technically permitted by law prior to *Loving*, it was still very rare. Until quite recently in American history, the multitude of factors that kept Black women from forming households with White men with greater frequency, or (even more strongly) Black men with White women were extremely rigid and severe. Consequently, the very great majority of Black children had (and have) Black parents – white children, White parents.

The above speaks to the divide between races but, historically, within the Black population there was a long history of social differentiation along various dimensions. The origins of this differentiation can be traced to slavery, in which light-complexioned chattel commanded a higher market price (Bodenhorn 2015). Sexual contact between master and slave was not infrequent, with the consequence sometimes being light-complexioned progeny. The frequency of interracial sex post-slavery cannot be readily tracked but, of course, still happened.

[20] Historically, w* might be identified with the so-called "one drop" rule – namely, any degree of African genetic ancestry, no matter how small. During the period of *de jure* segregation, the one drop rule served to distinguish legal access to racially separate public facilities. However, as discussed in the text we know from recent studies of racial passing (Mill and Stein 2012; Nix and Qian 2015) some individuals managed to get themselves classified as White in the current census when they were Black in the previous census. The key point about a categorical (as opposed to continuous) measure of racial identity is that, to the extent that w and h positively co-vary, inadequate measurement of h will be reflected in a larger value in the coefficient of a race dummy in, for example, a regression of labor earnings.

Mixed-race individuals -- mulattos – account for approximately 20 percent of the Black population in 1910. For the post-Civil War censuses that so enquired there is abundant evidence of positive correlations between mulatto status and socioeconomic outcomes (Bodenhorn 2015).

Beyond complexion there was differentiation with respect to behavior and other characteristics. In her remarkable memoir *Negroland*, Margo Jefferson (2015) writes about her childhood growing up among Chicago's Black elite, a tiny sliver of economic privilege. Jefferson's father was the chief of pediatrics at Provident Hospital; her mother, a "socialite" (p. 8). Jefferson played piano, attended Interlochen arts camp in Michigan in the summer, graduated from the University of Chicago Laboratory School and later Brandeis. Her parents warned her that "few Negroes enjoyed their privilege and plenty" (p. 163). She was taught to have "gloves, handkerchiefs, pocketbooks for each occasion … [g]ood diction … skin care (no ashy knees or elbows); hair cultivation … [m]anners to please grandparents and quell the doubts of any white strangers loitering to observe your behavior in schools, stores and restaurants" (p. 165). To become pregnant and drop out of college was the equivalent of "matricide"; a girl who slipped up "destroyed the good reputation her mother, her grandmothers and her grandmothers' grandmothers had fought for since slavery" (p. 166). The elite believed that other Blacks should "be emulating us when too many of them (out of envy or ignorance) went on behaving in ways that encouraged racial prejudice" (p. 3). To themselves the elite were "self-designated aristocrats, educated, affluent, accomplished" but to Whites they "were oddities, underdogs, and interlopers" (pp. 90-91).

Perhaps the most extreme historical manifestation of differentiation within the Black population was racial "passing". Instances of racial passing can be inferred when an individual who was classified as Black in one census shows up as White in another. To pass at all required

a person not only to be sufficiently light-skinned but also exhibit sufficient "whiteness" in all other respects to be credible within one's social and residential network, which may explain why passers are found more frequently among migrants settling among dark-complexioned, foreign born Whites. Recent advances in computing have permitted economic historians to investigate the quantitative extent of racial passing, although it may be some time before a consensus is reached on the magnitudes (Mill and Stein 2012; Nix and Qian 2015). For my argument, what matters is not the exact percentage of the Black population that passed at some point before World War Two, but that passing was not extraordinarily uncommon – which appears the case.

Changes in racial identity that served to assimilate Blacks into the majority culture would tend to push λ_w away from one. But working in the opposite direction is the historical development of a distinctive, shared "Blackness" creating strong pressures against "acting white" (Austen-Smith and Fryer 2005; Fryer and Torelli 2010; Fryer, Kahn, Levitt, and Spenkuch 2012). It is sometimes argued that this development was largely a manifestation of the Civil Rights Movement but there is abundant evidence that it long pre-dates the 1960s. An important and recently studied example involves naming patterns. Black parents, it turns out, were giving their offspring distinctively Black names in the early twentieth century, long before the practice become common in recent decades (Fryer and Levitt 2004b; Cook, Logan, and Parman 2014).[21]

The above discussion speaks to the supply-side of racial identity. But there is also a demand side, and this is reflected in the portion of β_w that represents pure racial discrimination in the economic sense. At its root discrimination must reflect prejudicial tastes as in Becker (1957) or imperfect information as in Arrow (1973), or some of both. But tastes and imperfect information is not *deus ex machina*. The transmission of racist attitudes across generations plays

[21] Using death certificates from North Carolina from 1802 to 1970, Cook, Logan, Parman (2016) show that Black men with distinctively Black names had slightly longer life expectancies compared with other African-American men.

an important role – as Oscar Hammerstein II put it succinctly in one of the songs from *South Pacific,* "You've got to be carefully taught".

There is no doubt that expressions of racial prejudice in their most extreme public forms have diminished over time in the United States. In the early twentieth century popular culture was permeated by racial stereotypes. The expression of racial epithets by public figures was unremarked upon, with little or no consequence to the perpetrator at the time. But gradually attitudes began to change and society no longer tolerated overt expressions of racial prejudice by public figures. Various features of Black culture and racial identity that were formerly shunned have long entered the mainstream. This is different, of course, from what people carry in the hearts and minds. Nevertheless, it seems reasonable to argue that β_w today in the United States is smaller in absolute value than was the case early in the twentieth century, in part because of local, state, and federal anti-discrimination legislation but also because of the secular decline of overt prejudice (Neal and Johnson 1996; Fryer 2011).[22]

The second component of my argument invokes human capital. Again, I am arguing that λ_h is substantial and, moreover γ, which is the race-specific component of human capital production, has also been large at various historical junctures. I will illustrate by focusing on schooling at some length, but the same general argument applies to other forms of human capital, such as location (see below).

The vast majority of slaves received no education. Antebellum free Blacks in the South were also severely constrained in their schooling opportunities, if somewhat less so than slaves. Black children in non-Southern states could (and did) attend school before the Civil War but were a small fraction of the Black population at the time.

[22] As discussed later in the section and in Appendix C a decline in β_w will speed up the process of convergence in my toy model, with the effect being most dramatic during the transition period (Nybom and Stuhler 2014).

Consequently it is not surprising, if depressing, to find extraordinarily high rates of Black illiteracy in 1870, the first post-bellum census. In 1870, 79.1 percent of the Black population age 20 and older was illiterate, compared with 8.3 percent of the Whites, implying a racial illiteracy gap of 70.8 percentage points. Illiteracy here corresponds to total inability to read or write in any language, implying no schooling whatsoever.

Economic historians and labor economists have stressed that the initial racial illiteracy gap eroded fairly quickly over time (Higgs 1977; Smith 1984; Margo 1990; Collins and Margo 2006). In 1930, 18.6 percent of Blacks ages 20 and older were illiterate compared with 3.4 percent of Whites, a racial gap of 15.4 points. This represents a reduction of 55 percentage points in six decades, or two generations.

The racial gap in illiteracy could have narrowed through widespread teaching of adult Blacks. This never happened. Instead, the gap eroded as successive generations of Black children attended school. The vast majority of these were public schools established in the ex-Confederate states as a condition for returning to the Union. These schools were *de jure* segregated about which I will have more to say momentarily but my point here is that the schools were crucial to the erosion of the illiteracy gap. Had they not been established in the first place or had emancipation been delayed, the racial illiteracy gap would have persisted (Collins and Margo 2006, p. 119). In 1870 just shy of 10 percent of Black children ages 5-19 attended school at some point during the census year, compared with 53 percent of White children, a racial gap of 43 percentage points. In 1930, the last year the literacy question was asked, the racial gap in school attendance in the same age group had declined to 11 percentage points, a reduction of 32 percentage points again in two generations.

The substantial reduction in Black illiteracy across two post-bellum generations would seem to belie the claim that the initial racial gap in human capital gap eroded slowly across generations. But the reduction in Black illiteracy overstates the erosion of the human capital gap because census literacy could be achieved through a quite limited exposure to formal education – as little as two years (Margo 1990). On its own, the racial gap in literacy can explain statistically only a relatively small part of the racial difference in occupational status before World War Two, leaving a much larger role for a race dummy in any regression (Collins and Margo 2006).

It is possible to go beyond literacy and say something about long-run trends in the racial gap in educational attainment. The 1940 census is the first national survey to ask about years of schooling. The post-1940 censuses and related surveys (for example, the Current Population or American Community Survey) routinely do so. Combining these various sources yields an annual time series of educational attainment by birth cohort. Figure 2, which is from Goldin and Katz (2008), shows the racial gap (White – Black) in educational attainment by birth cohort, measured at age 35. The series begins with the 1905 cohort, because this is the first to have its educational attainment measured at age 35 contemporaneously – that is, in the 1940 census.

[Figure 2 about here]

Figure 2 reveals that the racial schooling gap narrowed more or less continuously from the earliest birth cohort represented in the diagram (1905) until cohorts born in the 1960s, at which point convergence ceased. Convergence in years of schooling occurred against a backdrop of rising educational attainment nationally. Blacks caught up with Whites in elementary school graduation rates and, later, in attending high school. Convergence ceased at about the same time educational attainment began stagnating for the overall population – that is, the point at which college graduation became more or less a necessary (if not sufficient)

condition for upward mobility and a middle (or higher) class lifestyle. Unfortunately, the absence of any narrowing of the attainment gap in recent decades is one of many reasons why racial convergence in per capita income has stalled since 1980.

What about the pre-1905 cohorts? There is a long tradition of using the 1940 data to back-cast attainment by race for cohorts born in the nineteenth century (Smith 1984). However, there are serious pitfalls in doing so such that, if ignored, strongly bias the trend in the racial gap. We may never know the exact course of the racial attainment in schooling for post-bellum cohorts but plausible estimates suggest that the gap did narrow more or less continuously over time (Margo 1986a,b) – but, crucially for my argument, more slowly than the erosion of the literacy gap.

Further, Figure 2 significantly understates the racial attainment gap at any point in because it is not adjusted for racial differences in the quality of schooling. The public schools established for Blacks in the South just after the Civil War were legally separate but, for two decades or so were (mostly) equal, in the sense that expenditures per pupil and other measures of school inputs were similar by race. But, relative to schools elsewhere in the country, the Southern schools were poor in quality. Most Black children received their instruction in such schools until a significant share of the adult Black population had left the South and began having children and sending them to school elsewhere in the country. In the late nineteenth and early twentieth century a gap in school quality between Black and White schools emerged, reaching a peak around World War One (Margo 1990). From that point on the gap began to narrow, slowly at first and then more rapidly in the decade or so prior to the Supreme Court's

decision in *Brown v. Board of Education*.[23] At the time of the decision, Southern schools were probably more "equal" than at any time since Reconstruction, but they were still of lower quality than elsewhere.

Economic historians have attempted many times to gauge the economic impact of racial differences in the quantity and quality of schooling. The most recent study, and in my view the best to date, is by Celeste Carruthers and Marianne Wanamaker (2015), who match earnings data for Southern-born adult men in 1940 with data on school inputs in the counties where the men grew up. Carruthers and Wanamaker find that up to 40 percent of the racial earnings gap can be explained by racial differences in the quantity and quality schooling, a very substantial proportion. The Carruthers and Wanamaker study pertains to the South. We have no good sense how large racial differences in school quality were outside the South before World War Two and their importance in the labor market at the time.

The upshot is that γ was large during most of the era of *de jure* segregation in public education. We know from the important study by Ashenfelter, Collins, and Yoon (2006) that legal dismantling of *de jure* segregation started by Brown hastened the pace of Black-White convergence across cohorts, implying that γ declined in absolute value. But we also know that desegregation did not happen overnight and that school districts in the United States are still separate and unequal through the influence of *de facto* segregation, implying that γ is still positive. A small army of labor economists today continue to measure the relative quality of Black educational outcomes, typically focusing on test scores. A racial gap in test scores now emerges very early in school, and it remains stubbornly present in later grades, even after

[23] For a discussion of the factors behind pre-Brown convergence in Black-White school quality, see Margo (1990). Economic historians have recently begun to investigate one of these factors – philanthropic assistance to Black schools – econometrically; see Aaronson and Mazumder (2011).

controlling for a long list of family background and school variables (Fryer and Levitt 2004a, 2006)..

Thus, while research on the historical evolution of racial schooling gaps can and should continue, it is almost certainly the case that the gaps as measured at any point in time understate true racial differences. It is also possible that these systematic measurement problems are worse today than in the past when schooling levels were much lower, implying that the extent of long run racial convergence is potentially quite a bit less than implied by Figure 2.

As pointed out in Section 2, another important initial gap was spatial mismatch which, following Sjaastad (1962), can be thought of as a type of human capital in the model. I phrased this in terms of per capita income but it is more general than this, encompassing employment and occupational mobility as well.

The initial spatial mismatch pertained to region. Like the schooling gap, this gap eroded over time slowly, and somewhat irregularly, over time and much later, morphed into a different character (see below). The timing and rate of Black outmigration from the South is a perennial topic in American history. The incentive to leave was present immediately after the Civil War. The first generation of ex-slaves did move around within the South but as my calculation shows, this had no effect on aggregate mismatch. Movement from the South received a large boost during World War One, in part due to the decrease in European immigration which continued in the 1920s with the imposition of quotas (Collins 1997; Boustan 2015). Prior to this time, Black migration out of the South was positively selected but during the first wave of the "Great Migration" migration was more general (Margo 1990, Collins and Wanamaker 2015b). Outmigration slowed during the Great Depression but regional mismatch continued to decline because incomes and employment in the South took less of a direct hit

during the downturn. The second wave of the Great Migration came during, and shortly after World War Two and continued through the 1950s. In the process the Black population was transformed from overwhelmingly rural to overwhelmingly urban.

As Blacks moved into cities, distinct Black neighborhoods began to form and the level of residential segregation increased (Cutler, Glaeser, and Vigdor 1999). There is mixed evidence of the effects of residential segregation on Black economic outcomes, at least before 1970. On the one hand, segregation appears to have slowed the rate of growth of Black homeownership (Collins and Margo 2011). On the other, the segregation pertained to race and not income, and thus Black communities in the period were diverse in social class. This diversity may have created positive externalities that promoted human capital investment in lower income households, increasing the pace of racial convergence (Cutler and Glaeser 1997).

After the passage of federal fair housing legislation in the late 1960s and subsequent efforts to enforce it, middle and higher income Black households began to suburbanize, causing Black residential communities in central cities to be less socially and economically diverse. As Cutler and Glaeser (1997; see also Collins and Margo 2003) show this was a factor in the emergence of so-called "bad ghettos". After 1970 higher levels of residential segregation are associated with a greater incidence of non-employment, out-of-wedlock births, and poverty in general. But even before this, the economies of urban Black neighborhoods came under stress as jobs started to suburbanize in the 1950s, before the Black population could follow. This created another spatial mismatch, one that was not regional as at the turn of the twentieth century but instead was intra-metropolitan (Kain 1968). This mismatch, too, has diminished over time as residential segregation has lessened but it remains a significant problem to the present day (Boustan and Margo 2009).

Schooling and location are far from the only types of human capital for which there were profound initial gaps. There are many other cognitive and non-cognitive components to human capital that are shaped within households, schools, and social networks and, as such, are transmitted across generations. Historically, Blacks were at risk of violence from Whites if they violated prevailing social norms of behavior. These norms required Blacks to behave deferentially or face reprisal (Higgs 1977). Although I know of no conclusive, causal analysis it is not a stretch to argue that the sort of deferential behavior that shielded Blacks from personal violence in the Jim Crow era could easily have impeded economic success in the broader economy. Health status is another feature of human capital for which there was a large initial gap. While in the long run there has been significant convergence in relative Black health, especially in life expectation at birth, convergence is far from complete (Boustan and Margo 2015).[24]

As specified my theoretical model pertains to labor income. To incorporate wealth properly requires modeling intergenerational transfers and consumption-savings decisions (White 2007). I shall leave the extension for another day but will review here the evolution of racial differences in wealth as far as it is known.

On average, the initial post-slavery generation of African-Americans grew up in households that were extremely deprived in terms of physical and financial wealth. The 1870

[24] Blacks today continue to face higher mortality at birth and up until approximately age 70. Health status of the living is also worse because Blacks are more likely to suffer from chronic conditions. The causality between health and economic outcomes is always a matter for dispute and, in the end, probably goes in both directions. That said, there is much suggestive evidence that health and other forms of human capital were complements. Better educated Blacks were more likely to leave the South before World War One but some of his reflects a positive correlation between health and education – migrants were also healthier (Logan 2009). In the early twentieth century South children of both races suffered from high rates of hookworm infection which sapped their ability to perform well in school or even to attend. The Rockefeller Foundation's campaign to end hookworm was successful and led to an increase in school attendance, and a narrowing of the Black-White schooling gap (Bleakley 2006). For modern evidence of complementarity between health and human capital formation as it affects racial inequality, see Chay, Guryan, and Mazumder (2009).

census records the ownership and value of real estate wealth of every person, and personal property (excluding clothing) over $100 (1870) dollars. Black/White ratios derived from these data are, in various ways, inconsistent with modern ratios. For example, the 1870 census did not record debt, so the wealth data are gross, not net (worth). The $100 cutoff on personal property is non-trivial; for an (unknown) fraction of the population reporting zero personal property, the true value was greater than zero (but less than $100).

Despite these problems, the 1870 census data are clear that, on average, adult Blacks had very little wealth relative to Whites. I have examined a sample of adults ages 15 and over; for this sample, the mean Black/White per capita wealth ratio is 0.039, and the median ratio is exactly zero. The extreme wealth poverty of African-Americans just after the Civil War is not surprising. It would have been difficult for adult slaves to have accumulated wealth of any kind prior to Emancipation (DeCanio 1979). The 1850 and 1860 censuses which, like the 1870 census, inquired about wealth, suggest that free Blacks, too, had very little relative to the White population.

The 1870 was the last nineteenth century census to ask about wealth in a fairly comprehensive way. But six states, all in the South, collected information on taxable wealth by race and published the statistics on a regular basis. Like the 1870 census, the tax data indicated that, on average, Blacks had very little wealth relative to Whites. The data unequivocally suggest, however, that Blacks accumulated wealth more rapidly than Whites in the South after the Civil War, at least up to World War One (Higgs 1982; Margo 1984).[25]

[25] Using the data reported in Margo (1984) a state-level panel regression of Black/White per capita wealth ratios on a time trend and state fixed effects implies racial convergence at a rate of 1.5 percentage points per decade from 1870 to 1910. Interestingly, if the trend rate of convergence from this regression is projected 120 years into the future from the mid-point of the period (1890) the implied level of the Black/White wealth ratio is approximately the level observed in the early 21st century.

Other than home ownership (Collins and Margo 2011) there are no nationally representative race-specific wealth data prior to World War Two. After World War Two there have been a variety of regular surveys of household wealth which also include information on race. The most widely used today are from the Census Bureau's Survey of Income and Program Participation (SIPP). Figure 3 shows Black/White wealth ratios, median and mean, from 1984 to the present based on the SIPP data. The unit of observation is the household, and the data refer to total net worth.

[Figure 3 about here]

The typical Black household today has very limited net worth relative to the typical White household. From the early 1980s until 2005 the median ratio was stable at slightly less than 10 percent. The ratio declined in the Great Recession but shows some recovery very recently. For the years for which the SIPP survey has provided sample means by race, the Black/White ratio of mean wealth is typically twice as high or higher, than the median ratio, but still far below the per capita income ratio.

To summarize, a high degree of intergenerational persistence in the transmission of racial identity, human capital, and wealth, coupled with a belief that causal factors, if properly measured, largely explain income differences (as opposed to random error) goes a long way in accounting for the slow pace of racial income convergence in the long run. However, as Appendix B shows, the IGE in my theoretical model also depends on the labor market prices (the β's) in [Eq 2a]. I conclude this section with a discussion of how changes in these parameters might have affected the persistence of racial income gaps at different junctures after the Civil War.

Consider first the early twentieth century. The discussion above suggests that *de jure* segregation and racial discrimination, particularly in education, increased at this time. This would have increased the IGE, slowing racial convergence. However, as pointed out in section 2, the returns to schooling decreased before 1940 as did the degree of cross-state spatial mismatch, which would have lowered the IGE, speeding up the convergence process. If my benchmarks are taken at face value, these effects more or less cancelled out, allowing convergence to continue apace in the four decades before World War Two.

The pace of convergence between 1940 and 1980 was much quicker than before 1940. Here, the reduction in β_h in the 1940s, which was largely sustained until the 1970s, lowered the IGE, as did federal anti-discrimination efforts in the 1940s and, later to much greater effect, during the Civil Rights movement (Donohue and Heckman 1991). Increases in the relative quality of Black schooling, some of which began before *Brown v. Board of Education*, and others that were a consequence of school desegregation, further reduced the IGE (Ashenfelter, Collins and Yoon 2006). It is thus no accident that the standard intergenerational regression, with an IGE of 0.5, is reasonably good at predicting Black-White convergence in this period. Lastly, during the period from 1980 to the present, there has been a substantial rise in the returns to human capital in the labor market. This serves to increase the IGE, both directly and also indirectly to the extent that there are still race-specific barriers to human capital production (a non-zero value of γ in the model) causing racial convergence to slow relative to the 1940-80 period.[26]

[26] In models of the type considered by Nybom and Stuhler (2014) changes in the parameters in any of the equations can generate transitional dynamics that impact the IGE across multiple, not just adjacent generations. The initial impact will affect the current generation, but the effects will also continue into subsequent generations before a new steady state is achieved. The discussion in the text sidesteps this point, but it could be important empirically.

4. Concluding Remarks

--"America is not another word for Opportunity to all her sons."
W. E. B. Du Bois, *The Souls of Black Folk*

The Black/White ratio of per capita income rose from slightly more than a quarter in 1870 to about two-thirds in 2010, a span of about 5-6 human generations. In the not so distant past in the United States, the gap in income between Blacks and Whites was more like a chasm and examples of economically successful African-Americans were uncommon. Today, they are many more examples, absolutely and relative to Whites, but Black poverty is still with us and will likely be for the foreseeable future.

I have argued that to understand racial economic progress in the century and a half since Emancipation, it is useful to think inter-generationally. At any point in time the labor market establishes prices on human capital and racial identity; Blacks earn less than Whites because there are racial gaps in human capital and because of racial discrimination. Labor market prices are affected by technical progress, supply/demand factors, and institutions. Black incomes are also lower because Blacks own much less of the capital stock. The gaps in human and physical capital today reflect the slow erosion across generations of what were extremely large initial differences in the aftermath of the Civil War. Modern labor economists have at their disposal many tools and much evidence to study intergenerational transmission in the US today and its racial implications. To better understand why racial inequality has eroded so slowly in the United States, economic historians need to devote more attention to historical patterns of intergenerational transmission and how these played out in the ongoing evolution of America's most enduring dilemma.

5. Appendix A

I begin with Fogel and Engerman's (1974) estimate of slave per capita income in 1860 as reported in Vedder (1975, p. 455), $43 (in 1860 dollars). Sacerdote (2005) argues that, within the Black population after the Civil War the intergenerational elasticity (IGE) was approximately 0.5 and that the gap in economic status – positive -- between former free Blacks and ex-slaves eroded more or less completely by 1920. I will assume, therefore, that free Black per capita income in 1860 is 20 per cent higher than slave per capita income ($52), as this is consistent with Sacerdote's findings.[27] In 1860 free Blacks were 11 percent of the total Black population, implying a figure of $44 for overall Black per capita income (= 0.89 x 43 + 0.11 x 52). Using Fogel and Engerman's (1974, p. 248) estimate of national per capita income in 1860, $128, and a Black population share of 0.14, White per capita income is $142, and the Black/white ratio is 0.31 (= 44/142).

Fogel and Engerman's estimate of slave income has been criticized as too generous or, equivalently, that their estimate of the expropriation rate is too low (David and Temin 1974; Vedder 1975). If I adopt Vedder's estimate of $30 for slave income (I consider this a plausible lower bound) and perform the same calculation (again assuming a 20 percent income premium for free Blacks), the estimated 1860 Black/White ratio is 0.22 in 1860. If I adopt $35 as a middling estimate (see Vedder 1975, p. 455), the estimated 1860 Black/White ratio is 0.26.[28] As mentioned in the text, the range of estimates, 0.22 to 0.31, brackets the Higgs ca. 1870 benchmark (0.24) and my revision to it (0.28).

[27] After two generations with an IGE of 0.5, a premium of 20 percent would decline to a little more than 4 percent assuming exponential decay. A 20 percent premium is also consistent with the differences in occupation status for former free Blacks and ex-slaves in the early post-bellum period; see Sacerdote (2005, Figure 5, p. 227).

[28] Lindert and Williamson (2016, forthcoming, Table 7.7) estimate 0.26 for the 1860 Black/White per capita income ratio. Lindert and Williamson estimate of slave incomes is roundabout; in particular, they estimate labor productivity in southern agriculture, which is then reduced by an assumed rate of expropriation as applied to slaves.

6. Appendix B

This appendix describes the construction of Figure 1, which includes my new benchmark estimates of Black-White per capita income ratios for 1870, 1900, and 1940, contrasting with previous estimates made by Robert Higgs (1977, 1989). I begin with the 1900 benchmark rather than 1870 because its estimation is the more elaborate of the two and the estimation of the 1870 benchmark uses some of the same assumptions Higgs made for the 1900 estimation.

1900: Higgs (1977, p. 145) made benchmark estimates of the Black-White per capita income ratio for 1870 and 1900. The estimation begins with the following identity for per capita income:

Per capita income = (income per rural worker x rural labor force participation rate x rural population share) + (income per capita of the urban population x urban population share)

Higgs estimates the various components in this equation for Blacks, plugs these into the expression, and computes Black per capita income. Using an estimate of national per capita income and the percent Black, he backs out an estimate of White per capita income. His Black/White ratios for ca. 1870 and 1900 are based on these race-specific estimates.

The first step is to estimate income per Black farm laborer. Higgs (1977, p. 64) uses daily wage rates for harvest and non-harvest labor, assuming 50 days of harvest work and 150 days of non-harvest work. This gives him an annual income estimate, which he then inflates to account for perquisites, including board (Higgs 1977, p. 99). There are two problems with his procedure. The daily wage rates he uses are quoted "without board"; these are higher than wage

rates "with board", the difference being the value of board per day. To impute board to wages quoted without board is double counting. Second, while some farm laborers were certainly hired by the day, most full time workers were hired monthly (or annually). On a *per diem* basis monthly wages were lower than daily wages because monthly pay included a compensating differential for unemployment risk (Margo 2000).

My calculation begins with an estimate of average monthly wages of farm labor with value of board imputed for the South, taken from Margo (2004): $15.00.[29] I assume 8 months of full time equivalent employment for farm laborers (this is slightly higher than Higgs), or $120 per year. This figure does not include perquisites other than board. I assume these to be worth $2.50/month of full time employment, which is 50 percent of the total value per month of perquisites assumed by Higgs (1977, p. 99). This gives an estimate of $140 of annual income per full-time equivalent (FTE) farm laborer. To estimate the racial distribution of FTE farm laborers in the South in 1900, I use the 1900 IPUMS sample, assuming that FTE means 4 or fewer months of unemployment; my estimates are that FTE farm laborers were 51 percent Black and 49 percent White. Following Higgs I assume that Black farm laborers earned 10 percent less than Whites (a Black/White ratio of 0.9). My final estimate of income per Black farm laborer is $133.00.

For Black farmers, I divide these into owner-operators and tenants.[30] I estimate income per Black owner-operator following the protocol described by Abramitzky, Boustan, and Ericsson (2012, Appendix A, p. 29; see also Olivetti and Paserman 2015), which uses information reported in the Census of Agriculture to estimate owner-operator incomes. There is sufficient information reported in United States Bureau of the Census (1904) to apply this

[29] This is an average of the average monthly farm wage for the South Atlantic and South Central regions in 1899, rounded to the nearest dollar.
[30] Tenants include share, cash, and farm managers.

protocol for all farms operated by Black farmers and for Black owner-operators separately. For Black owner-operators the estimate is $300 per owner-operator.[31] For Black farmers overall, the estimate is $342. In 1900 25.2 percent of Black farmers were owner-operators; therefore, on farms operated by Black tenants, income per farm is estimated to be $356. I shall assume, following Higgs (1977, p. 79) that half of this income was retained by the tenant, or $178. Thus, income per Black farmer is estimated to be $209 (= 0.252 x $300 + 0.748 x $178). These figures do not include any earnings off the farm; Higgs (1977, p. 79) assumes these to be 20 percent of average farm income. Adopting this figure, annual income per Black farmer is $251.[32]

Income per Black agricultural worker is a weighted average of income per farm laborer and income per farmer. I estimate the weights from the 1900 IPUMS, restricting the population to Blacks reporting to be in the labor force with no more than 4 months of unemployment, living in a rural area, and who report an occupation of farmer or farm laborer. The assumption on months of unemployment is an attempt to adjust for full-time equivalent employment. The weight for farm laborers is 0.54 and that for farmers is 0.46. Therefore, income per Black agricultural laborer is $133 x 0.54 + 0.46 x $251 = $187.

Next, I follow Higgs and assume that all rural Black workers earn the same amount as the average Black agricultural worker. I use the 1900 IPUMS to estimate the full-time equivalent

[31] The Census report gives the necessary data for "colored" farm owners, by which is meant non-White; this includes, for example, farmers in Hawaii and Native Americans; I have no way of computing averages just for Black owner-operators. However, the vast majority of non-White farm owners in 1900 were Black.

[32] By comparison, Higgs (1977, p. 99) estimates an average income of $300 per black farmer in 1900. Of this $300, $250 is Higgs' estimate of income from farm operations. This is 83 percent of my estimate of the net income per farm of owner-operators, which seems too high a ratio, given that farm owners were at the top of the agricultural ladder. In producing his $250 figure, Higgs assumed that the typical Black farmer was a sharecropper who grew only cotton, managing to produce 10 bales worth $500, retaining half ($250). However, according to data reported by U.S Bureau of the Census (1904, pp. 75, 76, 85), average bales of cotton per farm operated by Black farmers in 1900 was 4.8 bales, and cotton's share of gross farm output (not fed to livestock) was 71 percent. The protocol adopted in the text is far from perfect, but seems a better way to estimate Black farm incomes in 1900.

labor force participation rate of rural Blacks. The initial estimate is 0.34, but this includes individuals who failed to properly answer the unemployment question in 1900 but who are coded by the IPUMS as a zero. I assume the true figure is 0.3 (slightly higher than Higgs, who assumes 0.25). My final estimate of rural Black per capita income is $56.

For urban Blacks, I adopt Higgs' (1977, p. 97) estimate of $100.[33] Per capita income is a weighted average of rural and urban = 0.77 x $56 + 0.23 x $100 = $66. This compares with $73 for Higgs. The final step is to infer White per capita income using the overall identity for national per capita income. For per capita income ($192) and the black population share (0.12) I use the same figures as Higgs (1977, p. 246). White per capita income is $209, so my estimated Black/White ratio is 0.32 (= $66/$209), compared with the Higgs (1977, p. 246) benchmark of 0.35.

1870: I begin by estimating income per Black farm laborer. Based on Margo (2004) I estimate a monthly average farm wage (with value of board imputed) of $20 per month for the South in 1870.[34] To this I add $3.00 for perquisites other than board.[35] I assume that, as in 1900, Black farm laborers earned 90 percent of the average for White farm laborers. I have no way of estimating FTE farm laborers by race in 1870, so I assume the same weights as in 1900, 51 percent Black and 49 percent White. The resulting estimate of the average monthly wage of

[33] As will become clear shortly in the text, I am privileging the Higgs estimate of urban per capita income ($100) in my calculations for 1870 and 1900. As Higgs notes, his urban figure is 50 percent higher than his rural figure. If I assume that the 50 percent excess is correct rather than the absolute number, urban Black per capita income would be $84 in 1900, overall Black per capita income would be $62, and the Black-White income ratio would be 0.30. I also use the $100 figure as an estimate of urban Black per capita income in 1870. If, instead, I use the 50 percent excess ratio, urban Black per capita income is $86 in 1870, overall Black per capita income is $61, or $36 in 1900 dollars, and the Black-White income ratio would be 0.27.

[34] The $20 figure is an unweighted average of my estimates for the South Atlantic and South Central regions, rounded to the nearest dollar.

[35] I am assuming that, in 1870, the ratio of perquisites other than board to money wages is 0.15, approximately the same as in 1900.

Black farm labor is $21.80. As in 1900 I assume 8 months of FTE employment, so income per Black farm laborer is $174. This compares with Higgs' (1977, p. 101) estimate of $150.

To estimate income per Black owner operator, I assume that the ratio of income to farm value in 1870 was the same as in 1900, 0.413. I use the 1870 IPUMS to estimate the average value of Black owner-operated farms (this is the total value of real estate reported to be owned by Black farmers in 1870 divided by the number of Black farmers reporting a positive value, $760).[36] My estimate of income per Black owner operator is $314. There are no published data comparable with those for 1900 to estimate tenant incomes in 1870; I shall simply assume that tenants earned on average 50 percent more than farm laborers, the same assumption made by Higgs (1977, p. 101), or $264.

According to the 1870 IPUMS, 15 percent of Blacks who reported having a farm occupation (1950 codes) were farmers (occupation code 100 or 123), 13 percent of whom reported owning real estate; I consider the real estate owners to be owner-operators. My weights for the farm worker income estimate, therefore, are: farm laborer, 0.85; owner operator 0.02 (= 0.13 x 0.15) and tenant, 0.13. Income per farm worker is 174 x 0.85 + 264 x 0.13 + 0.02 x 314 = $189. As in 1900 I assume that rural nonfarm workers earn the same on average as rural farm workers. I use the same rural FTE participation rate as in 1900, 0.3, so rural per capita income is $57. This is virtually identical to my (nominal) estimate for 1900, so I assume that urban Black per capita income is $100, as in 1900. Thirteen percent of the Black population is urban in 1870, so my overall estimate of Black per capita income is $63. To put this into 1900 dollars, I follow Higgs (1977, p. 101) and multiply by 0.6, or $38; this compares with Higgs' estimate of $30.

[36] To place this figure in perspective, if I use the same procedure to compute the average value of White owned-farms in 1870, the Black/White ratio of average owner-occupied farm values is 0.168; this is a national average.

I assume income per head in 1870 of $122 in 1900 dollars (slightly higher than Higgs, whose estimate of $111 pertains to 1867-68).[37] For the Black population share I use an average of 1860 and 1880 census figures, 0.136. From the per capita income identity I back out White income, $135. The resulting Black/White ratio is 0.28 (= 38/135), compared with the Higgs benchmark of 0.24.

1940: The Higgs (1989, p. 26) benchmark for 1940 is based on the equation:

$$\text{Black/White income ratio} = E \times L \times \beta$$

where E = is a weighted average of the "male earnings ratio" (0.45) from Smith (1984) and the female earnings ratio from Gwartney (0.36), with weights of 0.67 for males and 0.33 for females; L = 1.03, the ratio of black labor force participants per capita to white labor force participants per capita, from the 1940 published census. Higgs sets the parameter β equal to labor's overall share of national income for 1937, 0.79, taken from Hendricks (1961). [38]

This calculation has several problems. First and most important, the equation will understate the Black/White ratio unless Blacks literally have zero non-labor income in 1940, which is surely incorrect. Second, the term β should be labor's share of total income among

[37] On average per capita GNP grew very rapidly in real terms between 1869-1878 and 1879-1888, 3.9 percent per year. Assuming that 2.5 years separates Higgs' estimate of $111 from the 1870 value and applying this growth rate gives a per capita income of $122.

[38] Gwartney's estimate of the female earnings ratio appears to be biased downwards, based on careful analysis of the 1940 IPUMS by Baily and Collins (2005). What Higgs calls the "earnings ratio" in his equation is actually a mixture of wage and salary income and business/farm income for males, and wage and salary income only for females. The 1940 census collected information on the amount of wage and salary income, but not the amount (only the incidence, if the amount was in excess of $50) of other income, such as self-employment or business income, dividends, interest income, or rents. By using Smith as the source of the earnings ratio for males, Higgs is implicitly including more than wage salary income because Smith's income weights are derived from the 1970 census, which collected information, for example, on the incomes of farmers and other self-employed individuals. In my re-computation of Higgs' formula, I divide income into two parts, wage and salary, and non-wage and salary income. I use the 1940 IPUMS to estimate the Black/White ratio of per capita wage and salary income and, as discussed in the text, make assumptions about the ratio of per capita non-wage and salary income.

Whites, but as noted above the value actually used in the calculation pertains to labor's share of national income. The value among Whites will be lower than this, because the aggregate is a weighted average of race-specific figures, and labor's share for Blacks will be higher than for Whites (because Blacks derived relatively more of their income from labor; as just noted, Higgs' calculation assumes that for Blacks, labor's share is one).

To compute my 1940 benchmark I start with the same formula as Higgs. I use the 1940 IPUMS to estimate race-specific per worker averages of wage and salary income for persons who are in the labor force in 1940 and whose class of worker is wage and salary worker with at least $1 of wage and salary income in 1939, ages 15+. Under these assumptions, the Black/White ratio of earnings is 0.42. Such workers are 31.9 percent of the Black population (ages 1 and over) and 31.2 percent of the White population (ages 1 and over) in 1940. We do not know the share of wage and salary income in total income for Whites in 1940. I will assume that it is 0.78, very slightly lower than Kendrick's figure for the overall economy.[39] We also do not know per capita non-wage income by race in 1940; I shall assume it is 0.23.[40] According to the 1940 IPUMS, 17.8 percent of White population (ages 1 and over) received non-wage income of $50 or more in 1940 compared with 14.6 percent of the Black population; I assume these are accurate estimates of the shares receiving non-wage income of any amount.[41] My overall

[39] A value of 0.78 for Whites is implied if the national average is 0.79 (as in Kendrick), the Black/White per capita income ratio is approximately 0.4 (which it is in 1940, according to my benchmark), the wage and salary share for Blacks is 0.9 (unknown, but plausible), and the Black population share is 0.1 (the value in 1940). Based on the IPUMS, tn 1950 (1960) the wage and salary share of White income is 0.74 (0.76) for persons reporting non-negative values of total personal income and wage and salary income. It is plausible that the wage and salary share for Whites is higher than either of these values in 1940 because of the effects of wage compression during the 1940s (Goldin and Margo 1992).

[40] This is an average of Black/White ratios computed from the 1950 (0.26) and 1960 (0.20) IPUMS samples for all persons reporting non-negative values of business/farm income.

[41] Strictly speaking, the 1940 IPUMS yields estimates of the shares of individuals ages 14 and over receiving non-wage income of $50 or more; I am assuming no persons under age 14 of either race received non-wage income.

estimate of the Black-White income ratio in 1940 is 0.38 [= 0.78 x (0.42 x (0.319/0.312)) + 0.22 x (0.23 x (0.146/0.178))], compared with 0.34 for Higgs.[42]

1948-2012: The basic source is http://www.census.gov/hhes/www/income/data/historical/people/, Tables P1, P3. For 1967-present the Census produces annual estimates of per capita income by race (Table P1). For 1948-present, the Census Bureau reports average annual earnings for persons age 15 and over, by race and sex (Table P3). I use the reported number of workers by gender to produce race-specific earning series for 1947-1966. Let BWEARN be the Black/White ratio of average annual earnings, BWPINC be the Black/White ratio of per capita income, and Z(t) = BWPINC/BWEARN for year t, t = 1967-2012. I compute the median value of Z(t); call this μ. My estimate of BWPINC(t) for t = 1948-66 is μ x BWEARN (t).

7. Appendix C

This appendix derives the IGE for the theoretical model in Section 3. To derive the IGE, I lag [Eq.2a] by one generation:

$$\ln y_{t-1} = \beta_r w_{t-1} + \beta_h h_{t-1} + \varepsilon_{yt-1}$$

I substitute [Eq. 2a] and [Eq. 2b] into [Eq. 2a] for generation t:

$$\ln y_t = (\beta_w \lambda_w + \beta_h \lambda_h \gamma) w_{t-1} + \beta_h \lambda_h h_{t-1} + \varepsilon^*_{yt}$$

Here, ε* is a function of the error in y in generation t, lagged errors in the human capital and racial identity equations, and the various parameters.

I shall assume that all errors are uncorrelated with each other across equations within a generation and also across generations. I shall also assume that the variance-covariance matrix

[42] No adjustment is made for top-coding, which understates White per capita income more than Black.

of y, w, and h has unit values on the diagonal. With these assumptions the IGE between generation t and t- 1 is given by equation [3]:

[Eq. 3]: $IGE\ (t, t\text{-}1) = (\beta_w^2 + \beta_w\beta_h\gamma)\lambda_w + \beta_w^2\lambda_w + [\beta_w\beta_h(\lambda_r + \lambda_h) + \beta_h^2\lambda_w\gamma]\sigma_{rh}$

As an example, suppose that $\beta_w = \beta_h = 0.5$, $\lambda_w = \lambda_h = 0.8$, $\gamma = 0.2$, and $\sigma_{rh} = 0.7$. Then w and h explain 85 percent of the variance of ln y and the IGE is 0.75. Stuhler (2014) points out that in models of this type the multi-generational IGE – for example the correlation between generation t and t-2 – decays more slowly than exponential. A high level of initial inequality, therefore, can persist across multiple generations.

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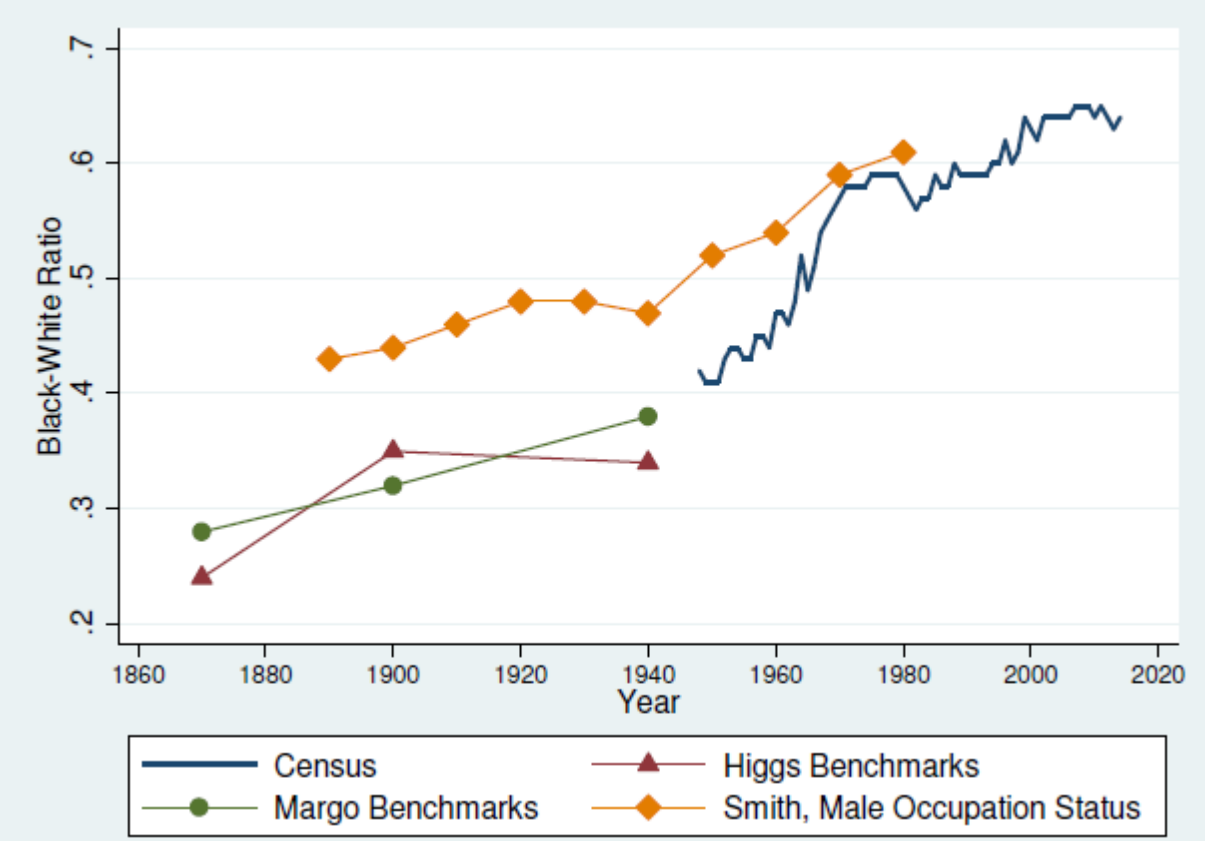
Table 1: Black/White Cross-State Spatial Mismatch, 1880-1940

Year	Simulated B/W Income Ratio, Overall	Simulated B/W Income Ratio, Fixed 1920 Incomes	Simulated B/W Income Ratio, Fixed 1920 Population
1880	0.64	0.63	0.64
1900	0.61	0.63	0.63
1920	0.66	0.66	0.66
1930	0.68	0.70	0.63
1940	0.73	0.72	0.68

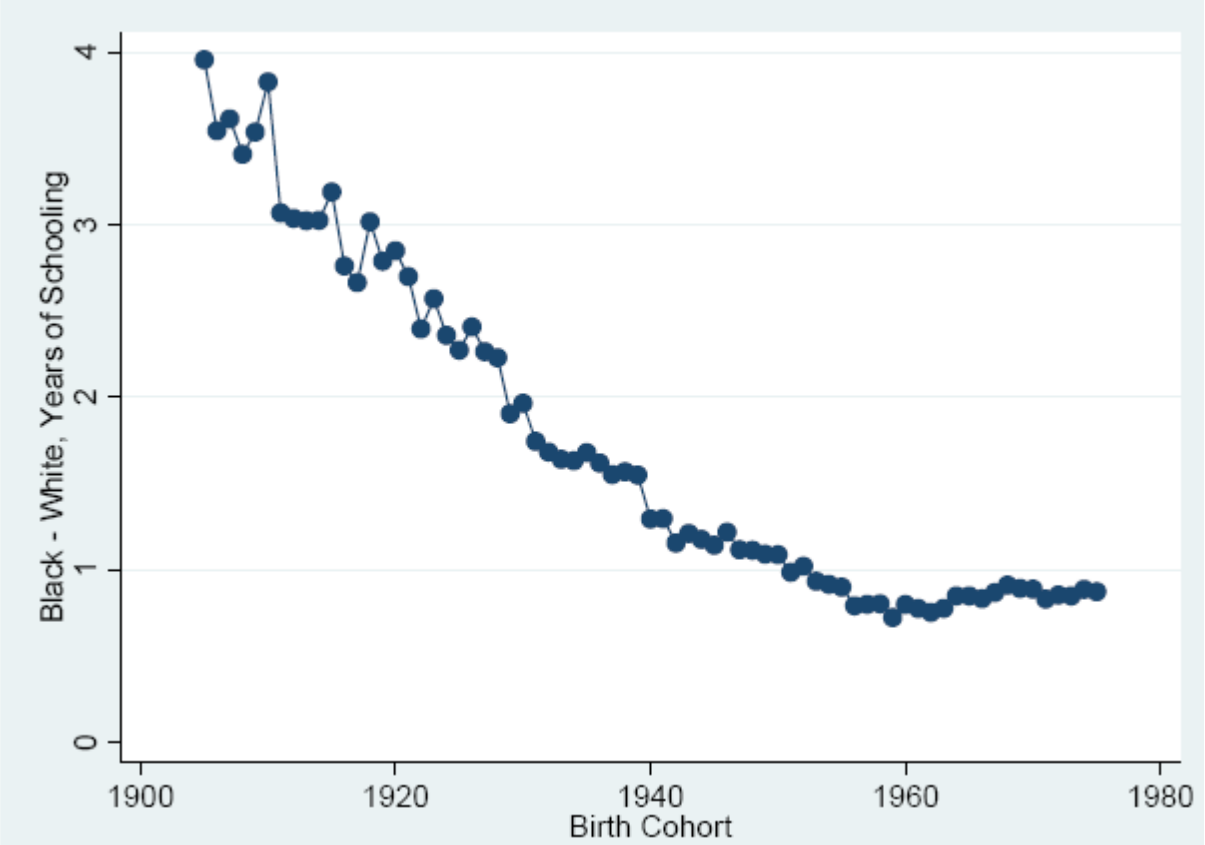
The columns in this table are produced by multiplying state per capita income by race-specific population shares by state, summing across states, and dividing the Black total by the White total. In column 1, per capita income and population shares are for the given year (e.g. 1880). In column 2, income per capita is held fixed and population shares vary across years. In column 3, income per capita varies across years and population shares are held fixed at 1920 values. Race-specific population totals are from the Census. Income per capita data: see Easterlin (1960).

Figure 1: Black/White Income Ratios, 1870-2014



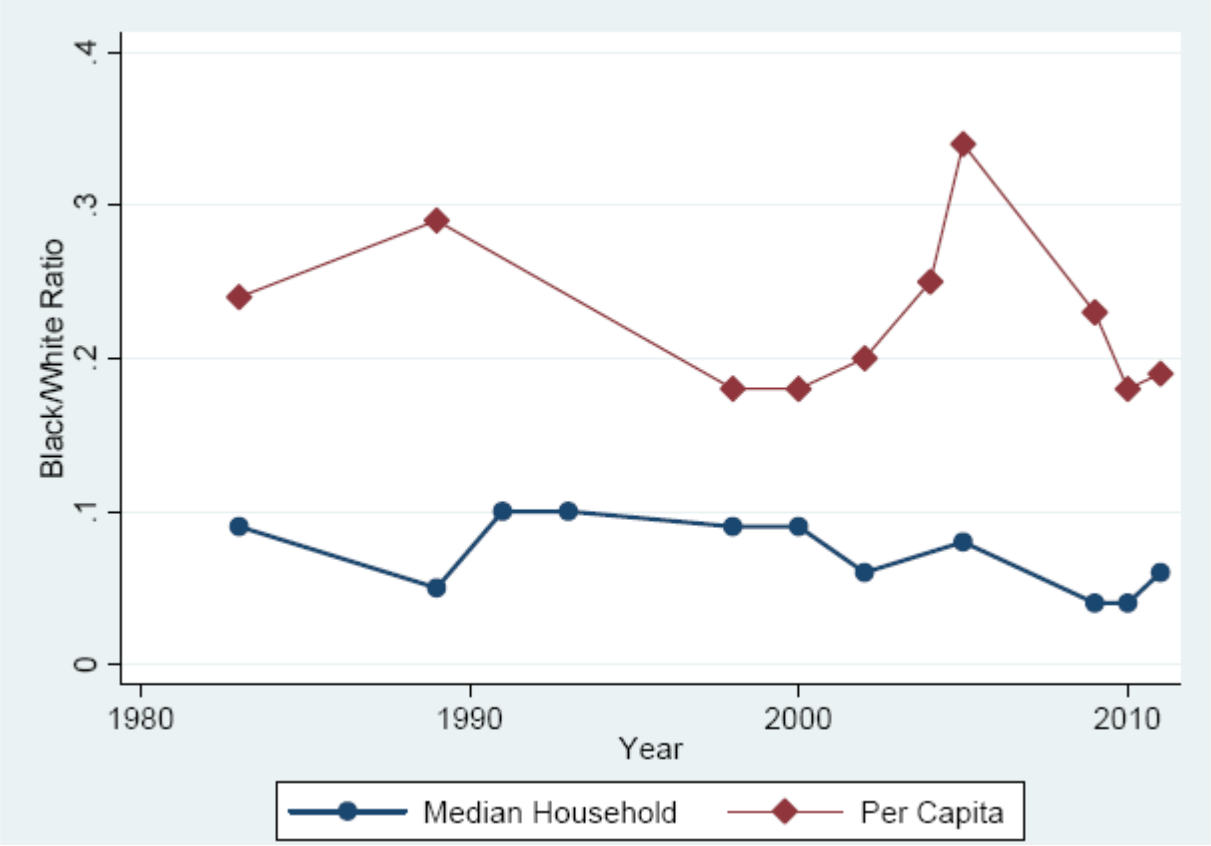
Source: Appendix B.

Figure 2: The Racial Gap in Years of Schooling at Age 35



Source: Goldin and Katz (2008).

Figure 3: Black-White Wealth Ratios, 1983-2012, Per Capita and Median Household Wealth, Census SIPP Data



Source: compiled from http://www.census.gov/people/wealth/data/dtables.html for 1999-2012 and for prior years from various reports in http://www.census.gov/people/wealth/publications/.