Black and White Fertility, Differential Baby Booms: The Value of Civil Rights

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Abstract

This paper presents new estimates of the benefits of equal education opportunity for blacks over the period 1820-2000. For the better part of US history, blacks have enjoyed less access to schooling for their children than whites. This paper attempts to quantify the value of this discrimination. Our estimates of the welfare cost of this form of discrimination prior to the Civil War range between 1.7 and 10 times black wealth, and between 1.6 and 4 times black wealth prior to 1960. Further we find that the Civil Rights era was valued by blacks in the South by between 1 percent to 2 percent of wealth. Outside of the South we find significant costs of discrimination prior to 1960, ranging from 8 percent to 100 percent of black wealth! For these divisions from 1960-2000 blacks have attained rough parity in schooling access. The welfare magnitudes are similar to the hypothetical gains to blacks if they had white mortality rates.

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For the better part of two centuries, black parents faced extraordinarily high barriers to educating their children, both during slavery and, due in no small part to the establishment of Jim Crow laws, after its abolition. The average white child born in 1850 received 3.76 years of schooling, compared with just 0.25 years for blacks. It was not until 1920 that the average black child received an elementary school education of 6.3 years, compared to an average of 9.4 years of schooling for whites.

The high costs faced by black parents to educate their children has implications beyond a single generation because of the cumulative nature of human capital accumulation. The family is a key – perhaps the key – mechanism for transferring this period's stock of knowledge to the next generation. Institutions that prevent families from educating the next generation penalize all future generations as well.

This paper presents estimates of the benefits of equal schooling opportunity for blacks over the period 1820-2000. The estimates are calculated by calibrating a dynamic model of fertility and human capital accumulation for the U.S., by state and race. The model is parameterized to fit time series data, some of it new, on fertility and schooling, by state and race. The key parameter in the model that governs the ability of parents to invest in child quality is modeled as the efficiency of time devoted to schooling, first introduced in Tamura and Simon (2012). The schooling efficiency parameter is allowed to vary between blacks and whites, across states as well as over time. We interpret the differences in the calibrated schooling parameters between blacks and whites as reflecting the effects of racial discrimination.

Other parameters to be calibrated include the disutility to parents of young adult mortality – higher rates of young adult mortality generate a higher demand for child quantity – and the unit price of living space, which was introduced in Murphy, Simon and Tamura (2008), the price of which is adjusted so as to allow the model to fit the baby boom. We allow the price of living space to differ for blacks and whites, which we intend to capture at least some of the potential effects of discrimination in the housing sector. The model also incorporates a precautionary demand for children, first introduced by Kalemli-Ozcan (2002, 2003) and later implemented in Tamura (2006) and Murphy, Simon and Tamura (2008). The decline in mortality is one important factor used to fit the long-run secular decline in fertility.

The model estimates permit us to calculate the cost of discriminatory schooling policies. In particular, it is possible to calculate the transfer of wealth necessary to compensate whites, were they to face the level of schooling efficiency that we fit for blacks. We are also able to calculate the amount of wealth that would need to be transferred to blacks– that is, the equivalent variation necessary – to yield the level of utility enjoyed by having access to the white schooling efficiency. To foreshadow our findings, the estimates indicate that prior to 1960, black wealth would have had to increase by a factor of nearly 3.

This paper is by no means meant to characterize or measure fully the burden of discrimination against blacks, either economically or psychically. Given the complexity of the present paper, however, we feel that the simplifications are reasonable for a first pass at the question.

The remainder of the paper is organized as follows. Section 1 presents our data. Section 2 outlines our theoretical model. The numerical solutions to the model are presented in Section 3. Section 4 presents a robustness check on the paramterization. Section 5 examines the plausibility of our estimates of human capital. Section 6 concludes with a brief summary and an outline of future paths of research.

1 Data

In this section we present new data on fertility, schooling, and mortality risk, by race.

1.1 Fertility

Our fertility data are derived from information on children ever born to women aged 35-44, collected from decennial Censuses. We extended the procedures used in Murphy, Simon, and Tamura (2008) to calculate data by race.[1]

Figure 1 graphs white and black fertility for the US as a whole between 1800 and 2000. White fertility in 1800 was 7.9, and declined to 7.4 in 1820, 6.3 in 1840, and 5.0 in 1850. Black fertility averaged 6.1 in 1820 (the start of the series), rose to 6.8 in 1830, and fell to 6.3 (the white level of fertility) in 1840. Fertility among blacks and whites thereupon declined steadily until 1950, to 2.0 for whites and 2.5 for blacks, rise during the baby boom until 1970, and resumed their decline until the end of the data period in 2000. The fertility of blacks exceeded that of whites thereafter, but had converged to within 0.19 by 2000. The black-white fertility differential is largest in 1890, equal to nearly 2 children ever born (6.6 - 4.7). By 1950, the gap had shrunk to just (2.48-2.09) 0.4.[2]

1.2 Schooling

Estimates of schooling by race and state are obtained by extending the procedures of Turner, Tamura, Mulholland and Baier (2007), seen in Table 3 and in Figures 3 and 4, by cohort.[3] Starting in 1850, blacks obtained an average of just 0.25 years of schooling, compared with 3.76 years among whites, a figure not achieved by blacks until 1890. By 2000, both blacks and whites are predicted to have between 15 and 16 years of schooling.[4]

Although the Baby Boom is not the primary focus of the current paper, it is worth pointing out that for every division but one (East South Central), the white Baby Boom cohort enjoys a higher level of schooling than any other white cohort but for the year 2000. A similar pattern holds for blacks, albeit for only 5 of the 9 census divisions. That the rise in child quantity during the Baby Boom for both races was not accompanied by a decline in child quality is a challenge for any model of fertility that incorporates a quantity-quality tradeoff (Becker and Lewis 1973; Becker, Murphy, and Tamura 1990). We will accomplish this feat in our model via the schooling efficiency parameter [5]

1.3 Mortality

Our data on mortality are collected from life tables of so-called "death registration states," available for selected states starting in 1890 and available for almost all states by 1920. For years not covered in the life

[1]The derivation of the data is complicated, so we direct the interested reader to that paper for more detail. Briefly, we collected information on children ever born by race back to 1890 from the decennial Censuses and, for 2000, from fertility supplements to the 1998-2004 Current Population Surveys. The figures for 1800-1840 are based on fertility data from Yasuba (1962), adjusted using information on the population under 10 years old adjusted for the probability of survival. Fertility rates are obtained by dividing these figures by the appropriate population of women, white or black, between the ages of 16 and 44. Fertility data between 1850 and 1880 are constructed in a similar way, but our adjustment for survival is based on the population between 0 and 5. These fertility estimates are divided by the number of women between ages 15 and 44. For years 1800-1840 (whites) and 1820-1840 (blacks) we use the average probability of dying before 10 from 1850-1890 for whites and blacks, respectively.

[2]The cohort of women age 35-44 in 1950 was born between 1906 and 1915, and in 1970 between 1926 and 1935. The spike in fertility in 1890, visible for both races, is likely an artifact of the estimation procedure, necessary to produce figures for children ever born prior to 1890.

[3]These figures are not adjusted for migration. Table 3 shows data from 1850 to keep the Table on a single page.

[4]We do not present data for 1840 because of the high level of measurement error for that year.

[5]In Tamura and Simon (2012), which uses a similar model to fit the time series of fertility and schooling for 21 countries, the rise in schooling is found to require a similar decline in schooling cost. The model's fitted schooling cost series is closely correlated with national level data on expenditures per pupil relative to per capita income.

tables, we combined information on (potentially error-ridden) reported deaths in the decennial Censuses with our own back-forecasts of state-specific mortality. The resulting data series begin in 1800 for whites and in 1820 for blacks.[6]

The mortality data are graphed in figures 5-12, for infants in figures 5 and 6, young adults in figures 7 and 8, middle-aged individuals in figures 9 and 10, and the elderly in figures 11 and 12. Dramatic declines in mortality across all divisions are evident, as is divisional convergence in mortality. The higher mortality observed among northerners reflects the impact of urbanization, with its accompanying problems of waste disposal, lack of sewer and water treatment, and generally high density and sanitation problems documented by McNeill (1977), Melosi (1999), and Troesken (2004).

1.4 Price of Living Space

We use a variant of the model from Tamura and Simon (2012), and Murphy, Simon and Tamura (2008) to calibrate for white and black fertility in each state. In those papers the forcing variable that induces the Baby Boom is a reduction in the price of space. Like those papers, we have a variable that affects the cost of schooling. This allows for schooling to rise even with a dramatic event like the Baby Boom. We demonstrate in Tamura and Simon (2012) that this variable is closely related, both economically and statistically to the observed data on the US from 1850-2000, as well as the data for the other 20 countries that also experienced a Baby Boom.[7]

2 Model

This section presents a model in which parents choose their consumption, the amount of space for each child, the number of children born and child quality, given the constraints imposed by their initial human capital stock, the probability of child survival, the price of living space, and most importantly for our purposes, the efficiency of resources – here, time – devoted to schooling.

[6]For some states even after becoming a death registration state, there are missing values. For these years we initially seed those observations with interpolated values. We refine the estimates below. Based on the information without interpolated values, we run state specific regressions of log infant survival on time and time squared. We then predict log infant survival for the missing years. Next, for each state, we regress log survival probability to age 5 against log infant survival rates, without a constant. We use the results of this regression to predict missing values of log survival to age 5. We continue in this manner, for each state, regressing log survival to age X+5 against log survival to age X, without a constant. Having produced estimates of the log survival probability for infants (age 0) all the way to age 75 for each state, we then regress log survival of blacks (whites) to age X against the log state survival to age X. For missing values of log survival probabilities for blacks (whites) we used the predicted value from these regressions. We then produce estimates of black (white) probabilities of dying before age X, i.e. 1 - survival probability to age X. For those observations in which we have predicted values of death probabilities, and interpolated values of death probabilities, we then take the arithmetic average of the two values, for blacks and whites. Finally we use these estimates along with those that come from the reported deaths contained in the censuses (covering years 1850-1900, inclusive) to produce our final estimates of death probabilities for years 1850-1900. We calculated the convex combination of the back-forecasted death probabilities and the census-derived measure. The weights were chosen so as to match the national infant mortality rate reported in *Historical Statistics of the United States* (2006) for whites 1850-1900, and blacks 1850 & 1900. For whites we exactly fit the national data, and for blacks we fit 1850 and 1900. For the years 1860-1890, inclusive, we log linearly interpolated the weights 1850 and 1900. For years after 1900 and before the year the state became a death registration state, we used our forecasted estimates from above, as there are no census reports of deaths to blend. Due to data limitations, these calculations led to estimated cumulative rates of mortality that were non-decreasing in age. In order to preserve monotonicity in cumulative mortality with age, we imposed an upper bound on infant mortality of 37.5 percent, and an upper bound on the probability of dying prior to age 15 of 57.5 percent.

[7]These 20 countries are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and the UK. Some of these countries had a Baby Boom in that fertility deviated from the secular decline in fertility rather than having an absolute increase in fertility.

Whites and blacks are assumed to have utility functions of the same functional form, but with different parameters. In the limit, the preferences of whites and blacks are identical, where the limit is achieved at zero mortality risk. We assume that prior to 1820, the cost of schooling for blacks was prohibitive, and became less so between 1820 and 1950. After the Civil War, black schooling began to catch up to white schooling in the former slave states. A black six year old in 1860 would attain only 0.44, 0.50 and 0.62 years of schooling in the South Atlantic, East South Central and West South Central census divisions. By contrast a white six year old in 1860 would attain 3.25, 4.27 and 2.79 years of schooling in these same census divisions. Thus they attained only 14%, 12% and 22% of the schooling attained by their white counterparts. Twenty years later, at the end of Reconstruction, black children would attain 2.77, 3.11 and 1.92 years of schooling in these census divisions. This would be 45%, 51% and 35% of their white counterparts. The 1940 cohort, which would complete schooling before the landmark Brown vs. Board of Education in 1954, attained 7.67, 7.11 and 8.10 years of schooling in these three divisions. This represented 72%, 73% and 767% of their white counterparts. On average all 1940 black children completed 8 years of schooling.[8] The Civil Rights era, with dramatically improved access to schooling available to black children, induced black parents to have both more and better educated children.

Each household (parent) chooses its consumption, c_t, fertility, x_t, space per child, S_t, and the per child human capital stock, h_{t+1}. Parental preferences are given by:

$$\alpha \left(c_t^{\psi} S_t^{1-\psi} \right)^{\varphi} \left[(1-\delta_t) x_t - a \right]^{1-\varphi} + \Lambda h_{t+1}^{\varphi} \left(1 - \frac{\beta_t \delta_t^{\nu_t}}{\left[(1-\delta_t) x_t - a \right] (1-\delta_t)} \right). \tag{1}$$

The purpose of including living space per child, S_t, in the model is to allow the model to produce a baby boom.[9] Because the Baby Boom coincided with the suburbanization of the United States, we model it as resulting from a decline in the price of living space.[10] However, the results in this paper do not hinge on this particular interpretation; all that is required is a decline in the price of some good that is complementary with fertility, we defer further discussion until we present the budget constraint in equation (4).

The fertility and investment choice is similar to the one in Jones (2001), in which declining mortality induces a demographic transition. However, in contrast to Jones (2001), in which the decline in mortality

[8]Despite the existence of discrimination, southern blacks surpassed the schooling of their foreign counterparts throughout most of the 20th century! For example by 1890 southern black schooling exceeded the cohort schooling of 1890 Italians, and have continued to have more schooling years since. The 1910 southern black cohort, and all succeeding black cohorts attained more years of schooling than their French or German counterparts! The 1930 southern black cohort surpassed the schooling of their UK counterparts. Finally all cohorts starting with the 1950 cohort of southern blacks have attained more years of schooling than their Canadian and Japanese counterparts.

[9]Lifetime fertility among American women prior to the Baby Boom averaged 2.4 children, increasing to 3.2 during the peak of the Baby Boom, and declining to about 2.0 at the very end of the Baby Boom.

[10]Murphy, Simon and Tamura (2008) used similar preferences and declining price of space to produce Baby Booms for each state of the US, while Tamura and Simon (2012) use these preferences to produce Baby Booms in 20 other countries. Simon and Tamura (2009) show that fertility is negatively related to housing costs. Also Dettling and Kearney (2011) find the rising housing prices lead to declining fertility of renters and rising fertility to homeowners. Alternative theories of the Baby Boom abound. Easterlin (1961, 1966) provided a model of preference formation that caused Depression children to have low expectations of adult consumption. When the Depression ended and the Post World War II Boom occurred, they consumed some of the unexpected wealth in the form of larger families. These boomer children, accustomed to 1950s and early 1960s abundance, expected high levels of adult consumption. When they became adults in the productivity slow down they reduced their fertility to deal with the unexpected slower growth. Greenwood, Seshadri and Vandenbroucke (2005) argue that labor saving appliances in the household increased the demand for children, but this increased productivity was not continuous, but rather a one time shock to the level of household technology. However see Bailey and Collins (2011) on the effects of electrification and fertility for some contrary evidence. Doepke, Hazan, Moaz (2007) argue that differential rates of female mobilization during World War II sowed the seeds of the post war Baby Boom. Albanesi (2011) and Albanesi and Olivetti (2010) provide evidence on the effect of declining maternal mortality risk and possible baby boom responses. Jones and Schoonbroodt (2010) relax some assumptions of the Barro-Becker altruism utility function in order to provide the possibility of baby booms.

arises due to rising consumption, we take the decline in mortality as parametric, and model a precautionary demand for children as in Kalemli-Ozcan (2002, 2003) and Tamura (2006).[11] The rate of young adult mortality, δ_t, has both an indirect effect on utility by reducing net fertility below gross fertility, x_t, and a direct effect in the final term. As child mortality declines, gross fertility declines and as child mortality goes to zero, the final term disappears. Parental preferences are permitted to differ between races, across states, and across cohorts (that is, time), but to reduce clutter only the time subscripts are shown. Higher child human capital, h_{t+1}, raises parental utility but also increases the disutility of child mortality; it seems reasonable that the death of a young child is more onerous, the greater the parental investment in that child. To prevent fertility from falling too much, it is assumed that $a \geq 0$.

The technology of human capital accumulation is a modification of Tamura (1991, 2006) and Tamura, Dwyer, Devereux and Baier (2012), and is given by:

$$h_{t+1} = A\overline{h}_t^{\rho_t} h_t^{1-\rho_t} \tau_t^{\mu} \tag{2}$$

$$\rho_t = min\{.5, \frac{50\tau_t}{27.5}\} \tag{3}$$

Parents choose the amount of time spent educating their child, τ_t. The productivity of time spent educating one's child is higher, the higher is the existing stock of their human capital, h_t. This functional form permits us to generate the divisional convergence in human capital levels (and incomes) seen in the data via a spillover that operates through the frontier level of human capital in the economy, $\overline{h}_t$, with parameter ρ governing the strength of the spillover and the level of $\overline{h}_t$ determined by the state with the highest level of human capital at time t. The parametric choice for ρ_t seen in equation (3) is taken from Tamura, et. al. (2012). Parents are assumed to have perfect foresight regarding the effect of τ_t on ρ_t. However because each individual parent is only a small part of the economy, she ignores the effect of her choice of τ on $\overline{h}_t$.[12]

The parent's budget constraint requires that total consumption be equal to total income, where income is equal to the fraction of time devoted to the labor market. Parents divide their time between the labor market and raising children. There are two cost components: θ, which can be thought of as basic rearing, and a component that is related to the time τ_t spent educating the child and equal to $\kappa_t\tau_t$, where κ_t can be thought of as the efficiency of education time. The higher is κ_t, the more time must be diverted away from the labor market in order to achieve any given level of human capital investment.[13]

The budget constraint is given by:

$$pc_t + r_t x_t S_t = h_t \left[1 - x_t \left(\theta + \kappa_t \tau_t\right)\right] \tag{4}$$

where p is the price of consumption and r_t is the unit price of per person living space, S_t. Because S_t is living space per child, total living space is equal to S_t multiplied by x_t.

[11] Tamura (2006) allows for the endogenous determination of mortality as a function of human capital of the child, average human capital in the country and the maximum human capital in the world.

[12] Identical parents in a state choose τ_t taking into account its effect on ρ_t, but not on $\overline{h}_{t+1}$. This is akin to mandatory schooling laws which do not take into account the benefits of longer schooling accruing to other states.

[13] This was used in Murphy, Simon and Tamura (2008) to fit US state young schooling. It is also used in Tamura and Simon (2012) to fit the young schooling data. Tamura and Simon (2012) also show that the model κ_t is strongly, positively correlated with estimates of κ_t obtained from cross country schooling expenditure data.

2.1 Parameterizing Racial Discrimination

Unequal access to schooling, although not the only manifestation of racial discrimination against blacks in the United States, is surely one of the most important , see Canaday and Tamura (2009).[14] Human capital accumulation among blacks improved throughout the first half of the 20th century despite the passage of Jim Crow laws that impeded their progress of blacks throughout the south.[15] We parameterize the inequality of educational opportunity in our model through the schooling efficiency term κ_t. Higher values of κ_t reduce the demand for child quality – h_{t+1} – by reducing the optimal choice of τ_t.

The values of κ_t are chosen to fit each state and race's time series of observations as well as possible, independently of the values for other series. No effort was made, for example, to force the values of κ_t for whites to be lower than those for blacks. Rather, lower values of schooling tend to translate into higher values of κ_t. We expect the Civil Rights era improvements in access to schooling for blacks to manifest itself in the form of declining κ_t for blacks relative to that of whites.

2.2 Model Solution

We substitute equations (2) and (4) into equation (1) and differentiate to produce the three Euler conditions that determine human capital investment h_{t+1}, optimal fertility x_t and space per child S_t:

$$\frac{\partial}{\partial \tau} : \frac{\psi\alpha c_t^{\psi\varphi-1} S_t^{(1-\psi)\varphi}\left[(1-\delta_t)x_t - a\right]^{1-\varphi}}{p} = \frac{\mu A^{\varphi}(\overline{h}_t^{\rho} h_t^{1-\rho})^{\varphi}\tau_t^{\mu\varphi-1}\left(1-\frac{\beta\delta_t^{\nu_t}}{[(1-\delta_t)x_t-a](1-\delta_t)}\right)}{h_t x_t \kappa_t} \tag{5}$$

$$\frac{\partial}{\partial x} : \psi\varphi\alpha c_t^{\psi\varphi-1} S_t^{(1-\psi)\varphi}\left[(1-\delta_t)x_t - a\right]^{1-\varphi}\frac{wh_t\left[\theta+\kappa_t\tau_t\right]+r_t S_t}{p}$$
$$= (1-\varphi)\alpha c_t^{\psi\varphi} S_t^{(1-\psi)\varphi}\left[(1-\delta_t)x_t - a\right]^{-\varphi}(1-\delta_t) + \frac{\beta\delta_t^{\nu_t}}{x_t^2(1-\delta_t)^{\varepsilon}} \tag{6}$$

$$\frac{\partial}{\partial S} : \psi\varphi\alpha c_t^{\psi\varphi-1} S_t^{(1-\psi)\varphi}\left[(1-\delta_t)x_t - a\right]^{1-\varphi}\frac{r_t x_t}{p}$$
$$= \alpha(1-\psi)\varphi c_t^{\psi\varphi} S_t^{(1-\psi)\varphi-1}\left[(1-\delta_t)x_t - a\right]^{1-\varphi} \tag{7}$$

Using (7) to solving for c_t as a function of S_t and x_t yields:

$$c_t = \left(\frac{\psi}{1-\psi}\right)\frac{r_t x_t S_t}{p} \tag{8}$$

Substituting for c_t in the budget constraint produces:

$$r_t x_t S_t = (1-\psi)h_t\left[1 - x_t(\theta+\kappa_t\tau_t)\right]$$

[14] Racial discrimination against blacks was manifested in the markets for both labor Heckman and Payner, (1989), Holzer and Ihlanfeldt (1998), housing Collins and Margo (2000, 2001, 2003), and schooling Margo (1990). Because much of our interest focuses on the welfare cost of discrimination prior to 1940, the first year in which data on earnings are widely available for the U.S., we have opted to solve the model using information on fertility and schooling alone.

[15] Canaday and Tamura (2009) found that the effects of Jim Crow began to diminish as early as 1920, at which time class size, school year lengths, and teacher salaries began to converge. Access of blacks to schooling further improved in the wake of the well known ruling of the US Supreme Court in 1954 in *Brown v. Board of Education* that separate but equal provisions were unconstitutional, and the sweeping legislation passed by the US Congress in 1964, which enshrined at the federal level the sanctity of voting rights, thus giving blacks greater say in (among other things) the provision of schooling.

Substituting the budget constraint into the utility function gives the new maximand:

$$v\left(h_t|\kappa_t, r\right) = \max_{x_t,\tau_t} \left\{ \begin{array}{c} \alpha\left(\frac{\psi}{p}\right)^{\psi\varphi}\left(\frac{1-\psi}{r_t x_t}\right)^{(1-\psi)\varphi}\left(h_t\left[1-x_t\left(\theta+\kappa_t\tau_t\right)\right]\right)^{\varphi}\left[\left(1-\delta_t\right)x_t-a\right]^{1-\varphi} \\ +\Lambda\left(A\bar{h}_t^{\rho_t}h_t^{1-\rho_t}\tau_t^{\mu}\right)^{\varphi}\left(1-\frac{\beta_t\delta_t^{\nu_t}}{(1-\delta_t)}\left[(1-\delta_t)x_t-a\right]^{-1}\right) \end{array} \right\} \quad (9)$$

Because fertility x_t interacts with living space S_t and human capital h_{t+1}, the budget constraint equation (4) is not convex and equation (9) need not be globally concave. It is therefore not feasible to derive analytically tractable comparative statics.[16] However, conditional on fertility, the problem is concave in the remaining choice variables. We therefore solve the model in the same way as in Tamura (2006), and Tamura and Simon (2012), by constructing a grid of fertility values that range from 0 to the biological maximum of θ^{-1}, solving for the remaining choice variable $\tau_t(x_t)$, and choosing the level of fertility that yields the highest level of utility.[17]

3 Numerical Solutions

Data on years of schooling by cohort serve as our measure of τ_t. Each time period is assigned a calendar duration of 40 years, so $40\tau_t$ is the years of schooling for the typical individual born in year t.[18] The price of living space, r_t is measured using race-specific measures of population density computed as the population-weighted population density in each county.[19] The parameters β_t, ν_t and κ_t are chosen to fit the data on fertility and years of schooling as closely as possible.

Figures 13-17 show comparisons of the model solutions with the data. Data are represented as solid lines. State-level solutions, that is allowing $(\beta_t, \nu_t, \kappa_t)$ to vary by race, state and year, are represented as triangles. Division-level solutions, that is allowing (β_t, ν_t) to vary by race, census division and year, are represented as smaller squares.[20] National solutions, that is allowing (β_t, ν_t) to vary by race and year, are represented as circles.[21] As can be seen, the fit of all models is reasonably close.

Tables 5-7 contain the results of regressions of state fertility data against model solution fertility, and state schooling data on model solution schooling for each specification of preferences. In each case we regress the white outcome data on the white model solution, as well as the black outcome data on the black model solution. Table 5 presents the case with national, time varying preferences by race. Table 6 presents the results for divisional, time varying preferences by race. Finally Table 7 presents the results for state, time varying preferences by race. In the first column of each table we regress the data on all years. The next two columns present regression results for the 19th century and the 20th century (2000 included), respectively. The penultimate column contains the pre 1960 years, and the final column contains the 1950-2000 period.[22]

[16] Equation (9) is, however, homogeneous of degree φ in (h_t, h_{t+1}), a fact that proves useful in calculating approximate compensating and equivalent variations. In particular, for very low values of τ_t, then $\rho_t \approx 0$, and (9) is homogeneous of degree φ in h_t.

[17] The numerical solutions allow for the possibility that fertility is at a corner as in Ehrlich and Lui (1991). In practice, all of our solutions for the choice variables yielded an interior solution.

[18] We ignore the role of interstate migration.

[19] In a small number of cases – 85 of 947 for whites and 55 of 947 for blacks – fitting the data required choosing values of r_t by hand. Overall, the correlation between population density and the resulting r_t series is very high, see Table 29.

[20] For each census divisions we compute the race population weighted average of state specific (β_t, ν_t) as race, division and year preferences.

[21] For the country we compute the race population weighted average of state specific (β_t, ν_t) as race and year preferences.

[22] The careful reader will note that in the final two columns 1950 is contained in both samples. This is due to the fact that 1950 is the nadir of fertility before the Baby Boom, recall that fertility is defined as children ever born to women 35-44. Thus women in 1950 aged 35-44 were born between 1906-1915. They grew up during the Great Depression, and their fertility was

The final row of each panel contains the p-value of the joint hypotheses that $\beta = 1, \alpha = 0$. We are certainly able to match the data decently, with increasing fit as preferences are allowed more heterogeneity. Schooling is a trended variable, and hence is easier to fit than fertility. Still the overall fit, given by the results in the base column, indicate that the model can replicate the observed fertility data for whites and blacks. There is very little difference in the model's ability to fit black or white fertility, when preferences are state specific. Certainly it is much easier to fit the data in the 20th century, despite the fact that fertility is clearly not a pure trend, given the Baby Boom! We fit almost perfectly the post World War II period for fertility and schooling for whites and blacks. Focusing our discussion on the key parameters of interest, κ_t^b and κ_t^w are graphed in Figure 19. Table 8 presents the values of κ by race, year and census division. They decline between 1800 and 1890, rise slightly until 1950, decline between 1950 and 1970, rise between 1970 and 1990, and then dip in 2000. Although declining values in κ_t^j always lead to higher child quality, they need not induce substitution away from quantity. Indeed, black population density (that is, their price of living space) rises during their Baby Boom – see Figure 18. Because child mortality continued to decline over this period, it is the sharp decline in κ_t^b that produces the Black Baby Boom. Blacks' relative values of κ decline from 1.39 in 1940 to 1.11 in 1950, 1.10 in 1960, to 0.97 in 1970. By 1980, κ_t^b had declined to 0.88, and remained at roughly that level before rising between 1990 and 2000 to 0.98.

The model can reproduce the secular trend of schooling. Importantly the peak of Baby Boom fertility occurs for the 1970 cohort of women aged 35-44. This is also the local maximum of schooling! For both races, fertility for this cohort of women is the same as the 1920 cohort of women. Schooling levels for blacks and whites were 6.5 and 8.5 years, respectively. Schooling levels attained by whites and blacks of the Baby Boom cohort were 13 and 15 years, respectively.[23]

4 Value of Civil Rights

Once the parameters of the utility function have been calculated, it is straightforward to calculate the value of utilities for whites and blacks at any point in time, in any given state or division. To recap briefly, we have taken as given that whites and blacks may have different values of the utility function, face different mortality rates, face different prices of living space (population density), and most crucially for the present purpose, face different schooling efficiencies:

$$\kappa_t^b \neq \kappa_t^w. \tag{10}$$

where higher values of κ_t^j indicate lower schooling efficiency. In principle, nothing in our calibration procedure forbids $\kappa_t^b < \kappa_t^w$. This is virtually never the case in the pre-civil rights era, and only occasionally occurs after 1960. What is true, however, is that the relative values of κ converge markedly during the civil rights era.[24]

probably completed by 1945, just before the Baby Boom begins.

[23]We originally tried using a single set of preferences by race for all states. The solutions fit the aggregate time series for fertility and schooling well, but failed to pick up key features of the data at the state and divisional levels. We also solve the model using the same (r_t^i, κ_t^i), but with racial preferences that are common across division or common across the country. We use this exercise to judge robustness of our estimates of the compensating and equilibrating variations.

[24]To be precise, our calibration permits the preference parameters β_{it} and ν_{it} to vary by race, across states, and over time. Except for the limiting case of zero mortality risk, preferences of whites and blacks differ due to differences in the β and ν terms in the precautionary component. Otherwise the compensating variation and equilibrating variation would be similar except for income differences and the minimum fertility value, a.

Given the values of the parameters of the utility function, it is straightforward to carry out counterfactual exercises in the spirit of Lucas (1987).[25] Denote the utility of a black family in generation t with initial human capital stock h_t^b facing schooling efficiency κ_t^b and rental price of space r_t^b as $v\left(h_t^b|\kappa_t^b, r_t^b\right)$. Suppose now that this family is permitted to face the series (κ_t^w, r_t^w) and therefore achieve utility level $v\left(h_t^b|\kappa_t^w, r_t^w\right)$. We can then ask: How much additional human capital, $h_t^b\Delta_t^b$, is necessary to transfer to blacks so that $v\left(h_t^b + h_t^b\Delta_t^b|\kappa_t^b, r_t^b\right) = v\left(h_t^b|\kappa_t^w, r_t^w\right)$.[26] We compute this equivalent variation, $h_t^b\Delta_t^b = EV_t^b$, and is one of our measures of the welfare cost of discrimination against blacks in access to schooling. We report the EV_t^b as a proportion of h_t^b in Table 9.[27]

Alternatively, we can calculate the compensating variation as the amount of wealth that would have to be transferred to whites, were they to face the schooling efficiency and rental price of space faced by blacks. Using the above notation, the compensating variation, $CV_t^w = \mathrm{h}_t^w\Delta_t^w$, solves $v\left(h_t^w + h_t^w\Delta_t^w|\kappa_t^b, r_t^b\right) = v\left(h_t^w|\kappa_t^w, r_t^w\right)$. As a robustness check, the equivalent variation for blacks, EV_t^b should be similar to the compensating variation for whites, $CV_t^w = h_t^w\Delta_t^w$. In Table 10 we report the CV_t^w as a proportion of black human capital.

In a similar vein, we compute the white equivalent variation, $EV_t^w = -h_t^w\delta_t^w$. It is implicitly defined as $v\left(h_t^w(1-\delta_t^w))|\kappa_t^w, r_t^w\right) = v\left(h_t^w|\kappa_t^b, r_t^b\right)$. It is the amount a white parent would pay to avoid having black schooling efficiency and black rental price of space. The results are presented in Table 11. Similarly the black compensating variation is the amount of wealth a black would have willingly given up to purchase the white schooling efficiency and rental price of space: $CV_t^b = -h_t^b\delta_t^b$ is defined implicitly as $v\left(h_t^b(1-\delta_t^b))|\kappa_t^w, r_t^w\right) = v\left(h_t^b|\kappa_t^b, r_t^b\right)$. These are reported in Table 12.

We approximate the equivalent and compensating variation by taking advantage of the fact that for any fertility, x, and schooling choice τ, adult consumption, c and space per child, S, are linear functions of parental human capital, h and the utility function is homogeneous of degree φ in h.[28]

$$EV_t^b = h_t^b\Delta_t^b : \Delta_t^b \approx \left[\frac{v(h_t^b|\kappa_t^w, r_t^w)}{v(h_t^b|\kappa_t^b, r_t^b)}\right]^{\frac{1}{\varphi}} - 1 \tag{11}$$

$$CV_t^b = -h_t^b\delta_t^b : -\delta_t^b \approx \left[\frac{v(h_t^b|\kappa_t^b, r_t^b)}{v(h_t^b|\kappa_t^w, r_t^w)}\right]^{\frac{1}{\varphi}} - 1 \tag{12}$$

$$EV_t^w = -h_t^w\delta_t^w : -\delta_t^w \approx \left[\frac{v(h_t^w|\kappa_t^b, r_t^b)}{v(h_t^w|\kappa_t^w, r_t^w)}\right]^{\frac{1}{\varphi}} - 1 \tag{13}$$

$$CV_t^w = h_t^w\Delta_t^w : \Delta_t^w \approx \left[\frac{v(h_t^w|\kappa_t^w, r_t^w)}{v(h_t^w|\kappa_t^b, r_t^b)}\right]^{\frac{1}{\varphi}} - 1 \tag{14}$$

Tables 9-12 present estimates of welfare cost for four important sub-periods: slavery, Reconstruction (1870 to 1890), Jim Crow (1900 to 1950) and the civil rights era (1960 to 2000). We present the results

[25] Lucas (1987) calculated the relative welfare cost of business cycles versus lower economic growth.

[26] Because there is a great deal of variation in the price of living space across states, and because we suspect that a good deal of discrimination against blacks took the form of discrimination in housing, we chose to use (κ, r) for whites in a state for the blacks in the state. Thus we allow states to vary in (κ, r). Furthermore, since some discrimination in public provision of schooling was done via diversion of black tax dollars and corporate tax revenues to whites, there is some sense that states with larger black population shares would have values of (κ, r) potentially closer to their white counterpart values of (κ, r) compared with those in low black population share states.

[27] Canaday and Tamura (2009) examine a more detailed model in which tax revenues paid by blacks might be diverted to pay for the schooling of whites.

[28] Strictly speaking, this homogeneity holds only in the case of zero human capital spillovers.

pairing EV^b, CV^w, Tables 9 and 10, and EV^w, CV^b, Tables 11 and 12, because they are of similar magnitudes. In each table we present our measures by census division as well as for the US as a whole. For each census region we average the state estimates by the relevant population. Finally we report the welfare measures for all three specifications of preferences. State specific $(\beta^j_{it}, \nu^j_{it})$, state, i, race, j, and time, t, measures are contained in rows marked state. Similarly division preferences, $(\beta^j_{rt}, \nu^j_{it})$, division, r, race, j, and time, t, specific measures are contained in rows marked division. Nation preferences, (β^j_t, ν^j_{it}), race, j, and time, t specific measures are contained in rows marked nation. All three preference specifications produce very similar welfare estimates, and so we concentrate on the state specific measures.

Before going into specifics, the welfare losses to blacks due to discrimination in schooling and price of space are huge. We find measures overall of between 17% to greater than 100% of black lifetime wealth![29] These are extremely large. If wealth is on the order of 10 times income, we find welfare losses that range from 250% to 1000% of black incomes over all years. Prior to the end of slavery these numbers are orders of magnitude larger! Before 1870 welfare losses average 700% of black lifetime wealth for EV^b to over 1500% of black lifetime wealth for CV^w, respectively! Before 1870 welfare losses average between 70% to 500% of black lifetime wealth using CV^b and EV^w, respectively.[30] To place these numbers in perspective Lucas (1987) estimates that the welfare cost of a reduction of annualized economic growth from 3% to 2% is equal to a 30% of lifetime wealth.[31] In addition Lucas (1987) estimates for $\varphi = .55$ a welfare gain of .3% of lifetime wealth for the complete elimination of business cycles. Thus our measures of welfare losses are at least as large as those found in Lucas (1987) arising from growth rate reductions, and much larger than those identified as business cycle welfare costs.

For all years, schooling and housing discrimination against blacks imposed a welfare cost on them equal to 120% of their lifetime wealth.[32] Whites would have to have received 177% of black lifetime wealth had they faced black schooling efficiency and black price of space.[33] Recall that we are not assuming any labor market discrimination, so our measures of welfare cost are in addition to the costs associated with discrimination in the labor market.[34] Prior to the end of slavery, the welfare cost to blacks of discrimination was 700% of their lifetime wealth EV^b, or 1500% of their lifetime wealth, CV^w! While all census divisions had enormous levels of discrimination against blacks, it was most severe in the three divisions of the former Confederate slave states, South Atlantic, East and West South Central. In those three divisions the welfare cost of discrimination ranged from almost 500% to almost 1000% of lifetime wealth! The remaining six census divisions imposed welfare costs of discrimination ranging from 170% to 425% of black lifetime wealth, EV^b! The measures arising from the white compensating variation are even larger! Prior to the end of slavery, the three census divisions containing the former Confederate slave states imposed welfare costs ranging from almost 500% to almost 2300% of black lifetime wealth! The six remaining census divisions

[29] Using the white equivalent variation, EV^w, but expressing in terms of black lifetime wealth produces a welfare loss of 50% over all years when weighting by white population and greater than 100% when weighting by black population.

[30] For EV^w we expressed this in terms of black lifetime wealth and weighted by white population. For CV^b we weighted by white population in order not to produce differences arising from different population distributions.

[31] Using a value of $\varphi = .55$ like in this paper, assuming $\beta = .95$, we find that it would require a 30% permanent increase in consumption to accept the permanently lower growth rate of 2% instead of 3%.

[32] In Tables 9-12 we report the averages without D.C. D.C. is unusual in that it is a city, and hence the price of space is the same for whites and blacks. As a result we felt it best to ignore it for purposes of constructing averages. Also measuring years of schooling is especially difficult in D.C. as it has a large population of college students from out of state relative to other states.

[33] We present the white compensating variation measured in terms of black wealth in order to make the comparisons between Tables 9 and 10 easier. Also we weighted CV^b by black population.

[34] Canaday and Tamura (2009) provide a model of school discrimination and monopsony employment for blacks in South Carolina.

had welfare cost estimates ranging from over 200% to over 550% of black lifetime wealth![35] When measured by white equivalent variation or black compensating variation, the welfare cost of discrimination prior to the end of slavery ranged from 22% of white wealth to almost 80% of black wealth.[36]

During Reconstruction, 1870-1890, the welfare cost of discrimination declined in every division, as measured by black equivalent variation or by white compensating variation. For the entire US, the welfare cost was 450% of black lifetime wealth, EV^b, and 550% of black lifetime wealth, CV^w. The welfare cost was highest in the former Confederate slave states, ranging from 350% to almost 600% of black lifetime wealth, EV^b, and a similar range 325% to 925% of black lifetime wealth, CV^w. Outside of the three southern divisions, using EV^b, the welfare cost ranges from 85% to 300% of black lifetime wealth. However excluding the Mountain division, the range is a tighter 85% to 160% of lifetime black wealth. Similar results arise from CV^w based estimates. The non southern divisions have a range of 70% to 325%, but excluding the Mountain division the range is a nearly identical 70% to 140%.

During Reconstruction, there is a noticeable rise in the density of black population, and hence rise in their price of space. While mortality risks for blacks decline, they remain much higher than for whites. Thus even though their schooling efficiency improves over this period, they remain much higher than their white counterparts. As a result, black welfare costs of discrimination during Reconstruction, as measured by black compensating variation, CV^b shows smaller improvement relative to pre 1870 data. In the pre 1870 period, blacks nationally had CV^b measured welfare losses equal to 71% of their wealth, and during Reconstruction it only declines to 57%! There is almost no improvement for them in the three southern divisions, as well as in the Mountain and Pacific divisions. Larger gains accrue to them in New England, Mid Atlantic, West and East North Central divisions. These results are in contrast to the improvement measured by white equivalent variation. Using EV^w the welfare loss is equal to 9% of white lifetime wealth during Reconstruction in contrast to the 22% of white lifetime wealth cost prior to Reconstruction.[37] Outside of the Mountain, Pacific and West North Central divisions, the other six divisions have welfare losses tightly ranging from 6% (South Atlantic & East North Central) to 9% (New England & West South Central).[38]

We are a bit surprised to find that black welfare continued to improve after 1890, despite the presence of Jim Crow laws between 1900 and 1950. We surmise that much of the gain is actually from declining young adult mortality, which reduces the precautionary demand for children. This shrinking family size allowed for more education, despite potentially harsher schooling discrimination. Nationally the welfare cost to blacks was equal to about 100% of their lifetime wealth, EV^b, and 63% of their lifetime wealth, CV^w. It was highest in the three southern divisions measured by EV^b, ranging from 88% to 171% of lifetime wealth. However measured by CV^w, two of the three southern divisions have moderate welfare costs, 39% and 49% in West South Central and South Atlantic, respectively. The East South Central has welfare costs of 143%. Outside of the three southern divisions the welfare costs range from 3% (Pacific)

[35] In the six census divisions outside of the south, only one state allowed slavery, Missouri. In contrast all of the states in the three southern census divisions had slaves, except for Oklahoma, which was a Indian Territory before the Civil War.

[36] White equivalent variation is measured as a fraction of white wealth. Average black wealth relative to white wealth prior to the end of the Civil War ranges from 4%, using black population weights, to 8%, using white population weights. Thus measured in terms of black wealth, the white equivalent variation would be on the order of 480% of black wealth prior to the Civil War! In the three southern divisions, the white equivalent variation is equal to 1100% of black lifetime wealth. Outside of these three divisions, white equivalent variation is equal to 230% of black lifetime wealth.

[37] Measured in terms of black lifetime wealth EV^w welfare losses to blacks equaled 480% prior to 1870, 190% during Reconstruction.

[38] Measured in terms of black lifetime wealth, but weighted by white population, the national range across the nine divisions was 80% (West North Central) to 625% (East South Central).

to 60% (Mountain), using EV^b. The range for the non southern divisions using CV^w is 8% to 100%, but excluding both the Mountain and the West North Central the range is 8% to 18%.

When using CV^b, the Jim Crow era produced large welfare improvements for blacks, relative to the level of discrimination they suffered during Reconstruction. Whereas during Reconstruction, there was small welfare improvement for blacks nationally, during the 1900-1950 period blacks saw a reduction in welfare losses from 57% to 25% of their lifetime wealth. The reduction in welfare losses occurred in every division. The three southern divisions remain the most discriminatory, imposing welfare losses of between 28% to 50% of black lifetime wealth. In the six remaining divisions, the losses ranged from 9% (Pacific) to 33% (South Atlantic). In contrast the large welfare improvements measured during Reconstruction using EV^w of 9% welfare losses compared with 22% welfare losses prior to 1870, the Jim Crow era saw smaller improvements.[39] Nationally the welfare losses were about 5% of white lifetime wealth. The range is tightly bound, ranging from a low of 1% (South Atlantic & Pacific) to a high of 11% (Mountain & East North Central).[40]

During the Civil Rights era, 1960-2000, our calculations indicate almost complete equality between blacks and whites. For the US as a whole black welfare losses are measured as .3% of lifetime wealth, EV^b, and a welfare gain of .65% of lifetime wealth, CV^w. [41] A similar picture arises when using EV^w and CV^b, with black welfare losses equal to 1% of white lifetime wealth, and 1% in black lifetime wealth, respectively. In each case the South Atlantic division has blacks receiving a welfare gain of between 1.3% of their lifetime wealth and 1.3% of white lifetime wealth.[42] In the South Atlantic and East South Central divisions, blacks have welfare *gains* ranging from 1.2% to 1.7% of their lifetime wealth, EV^b, and between 3% and 7% of their lifetime wealth, CV^w. This calculation is almost certainly driven by the fact that we measure the quantity of schooling, but not the quality of schooling as documented by, for example, Margo (1990), Card and Krueger (1992) and Canaday and Tamura (2009). We leave extension of the analysis to school quality for future research.

The range of welfare losses outside of the South Atlantic and East South Central range from -.2% (Mountain) to 2.3% (East North Central) of black lifetime wealth, EV^b and -.9% (Mountain) to 3% (East North Central) of black lifetime wealth using CV^w. Again ignoring the South Atlantic and East South Central divisions, black welfare losses range from .3% (West South Central) to 3% (East North Central) of white lifetime wealth, EV^w, to .2% (West South Central) to 3% (East North Central) of black lifetime wealth, CV^b.

Figure 20 contains the results of the analyses for the nation. We used the computed EV^b and CV^w for both changes in only κ and those involving both κ, r). We averaged over the states weighting by the state black population or state white population. These are the red curves in the top half of figure 20. The solid red curve comes from the state preference model, while the circles and squares come from the nation and division preference models, respectively. These are paired with the compensating variations for whites, both for κ and (κ, r), and expressed relative to black human capital in the state, and averaged over

[39] Recall these are measures relative to white lifetime wealth. During Jim Crow, black welfare losses measured in black lifetime wealth, weighted by white population averaged 38% using EV^w.

[40] The range for EV^w measured in black lifetime wealth is 19% to about 100%.

[41] In all three census divisions containing the former Confederate states blacks have attained higher educational efficiency than whites. It should be noted that we are not holding constant school quality, but only matching school quantity, measured by years of schooling.

[42] Blacks in the East South Central have welfare losses equal to -.1% of lifetime white wealth, EV^w, or gains equal to .1% of their lifetime wealth, CV^b.

the states weighting by the state black population.[43] The national results reinforce the state-level analysis, with most of the black-white differences arising between 1840 and 1880, and declining thereafter.

In the bottom half of figure 20 we present the EV^w, both for κ and (κ, r), and average over the states weighting by the state white population. We also present the CV^b, both for κ and (κ, r), and average over the states weighting by the state white population. Since in these cases for most of the years $\kappa_t^b > \kappa_t^w$, the EV^w and the CV^b will be negative, but bounded below by -1, we expressed these as shares of their respective race human capital. Again we are generally pleased that the state model results are robust to aggregation of preferences. Prior to 1870, whites would have been willing to give up roughly 20 percent of their wealth to keep their schooling costs from becoming as bad as those faced by their state counterpart blacks. During this same period, blacks would have been willing to give up roughly 70 percent of their wealth in order to obtain the white prices for schooling in their states.

Since almost all of the action arises from differences in κ_t^i, we only graph the welfare costs associated with differences in (κ, r). Figure 21 presents the $EV_{r\kappa}^b$ and $CV_{r\kappa}^w$ by census division, and figure 22 presents the $EV_{r\kappa}^w$ and $CV_{r\kappa}^b$by census divisions for the (κ, r) case.[44] In order to reduce clutter we only present the results for the state preference model. Much of the information for the national and divisional preference model is contained in Tables 9-12. Clearly the most discriminatory regimes were the former Confederate slave states of the South Atlantic, East and West South Central divisions.

4.1 Schooling Efficiency versus Schooling Quantity

In this section we show that the large costs of discrimination mainly arise from lost access to the existing body of knowledge. A typical Mincerian calculation would state that additional schooling years are evaluated at something like a constant rate of return, i.e. ΔB, where Δ is the additional schooling years and B is the return per year of schooling, our measured gains are orders of magnitude larger than this. Hence as the body of knowledge grows, low levels of schooling cause the foregone gains from using this knowledge to rise. It is useful to distinguish between the effects of changes in schooling efficiency and changes in time spent at school.[45] Consider the second term in (1), and focus only on the utility gain from human capital accumulation of children. The relative utility gain between no discrimination and the historical level of discrimination to a black parent in state s in year t, measured in units of parental wealth, is:

$$(\frac{\bar{h}_t}{h_{st}})^{\rho_{\kappa^w} - \rho_{\kappa^b}} (\frac{\tau_{\kappa^w}}{\tau_{\kappa^b}})^{\mu} \tag{15}$$

[43]We expressed the white compensating differentials relative to black wealth in order to compare the total cost of discriminatory prices in black wealth units for each race. The national average CV^w is calculated as the black population weighted sum of state CV^w in order to ensure that the results are not unduly influenced by differences in the distribution of whites and blacks across states.

[44]As in the previous figures, $EV_{r\kappa}^b$ and $CV_{r\kappa}^w$ are expressed relative to state black human capital. The averages are from black population weights. The $EV_{r\kappa}^w$ and $CV_{r\kappa}^b$ are expressed relative to their own human capital. The averages are from white population weights.

[45]The large change from κ^b to κ^w exerts a wealth effect as well as substitution effect. Our calibration suggests, however, that parents will choose to invest more in each of a smaller number of children. Additionally we have ignored private schooling as an option. Thus our estimates of the welfare cost of discrimination are an upper bound. However private schooling is most likely more available in the 20th century relative to the 19th century, particularly for blacks. Thus we believe that the high welfare costs of the 19th century are generally robust.

The first term captures the feature that as schooling increases, the ability to take advantage of the spillover human capital rises.[46] The second term is the direct effect from rising schooling levels.[47]

Table 13 decomposes the gains in utility due to increased efficiency. The first row in each section is the direct Mincer effect from rising schooling levels, $(\tau_{\kappa^w}/\tau_{\kappa^b})^{\mu}$. The next row contains the effect from improved access to the body of knowledge, $(\overline{h}/h^b)^{\rho_{\kappa^w}-\rho_{\kappa^b}}$. The total effect on utility is equal to the product of these two components. Prior to 1870 in the three census divisions of the south, the welfare cost of unequal schooling access is worth between 5 times and 10 times black wealth. In these three divisions, the gains accrue from rising levels of human capital for the children of these parents. The gains from greater human capital range from 8.5 times to 14 times black wealth.[48] Observe that in all periods, except for the 1960-2000 period, the vast majority of welfare gains from eliminating discrimination come from the increased access to the body of knowledge that comes from rising schooling levels.

5 Mortality Differences and the Value of Rising Life Expectation

In this section we examine the robustness of the welfare costs of unequal education access by looking at two other welfare costs. The model can be used to compute the welfare costs of differential mortality risks, and the welfare gains from falling mortality risk. Using the same parameterization we can compute both the equivalent and compensating variations to both blacks and whites of mortality. We can see how much better off (worse off) a typical black (white) would have been if he or she faced the same mortality risk as his or her white (black) counterpart in the state. Additionally we can compute how much a black (white) would have been willing to give up (require additional wealth) in order to have the same mortality risk as his or her white (black) counterpart. Second we can use the model to compute the value of improved life expectancy over the period 1850-2000, 1900-2000, 1940-2000, 1970-2000. In the last case we can compare our results with those in Murphy and Topel (2006). In the first exercise we find that the value of differential mortality risks is similar to the value of differential education access. The timing of the maximum welfare gains are slightly different than those in education access. In the second exercise we find that improved survivor probability of the next generation young produce less welfare gains than those arising from improve survivor probability of parents at older ages.

In the first exercise, we can judge the robustness of these results by examining the results arising from mortality differences. As previously documented there were strong racial differences in mortality risks. Blacks generally faced much higher mortality risk in every division of the country. We can produce equivalent and compensating variations for whites and blacks by counterfactually presenting them with different mortality risks. Figures 23 and 24 and Tables 14-17 present the results of this experiment, again for national, divisional and state racial specific preferences. As with the welfare estimates for differential schooling access, we find that generally the results from the state specific preferences are robust to aggregation. We also find that the magnitudes of welfare costs of higher black mortality are similar to those measured for schooling access differences. One notable difference is that the period of maximum cost of higher mortality for blacks occurs during the Reconstruction period, 1870-1890. This is the period when blacks began to

[46] This effect is bounded at $\tau = .275$. At this value of schooling, rising levels of schooling does not affect ρ. For all values of τ below .275, less discrimination, which produces more schooling makes the gain from schooling more valuable.

[47] This effect is much like the Mincer return to more years of schooling.

[48] The gains in utility from higher human capital of children overstate the total gains, as black parents substitute toward more schooling and away from higher fertility. The reduction in fertility reduces parents' utility from surviving children measured in parental human capital units, $[(1-\delta_t)x_t - a]^{(1-\varphi)/\varphi}$.

migrate from healthier rural areas to dirtier and less healthy urban areas, both within the states and across states. The fact that the model produces similar welfare estimates makes us more confident in the size of welfare losses to blacks of differential schooling access.

In the spirit of Murphy and Topel (2006), one can also estimate the welfare gain to parents from improved life expectation of their children. Murphy and Topel (2006) estimated the value of increased longevity in the United States since 1970 to be equal to about $3.2 trillion per year, for a cumulative value of $95 trillion .[49]

Estimates of the compensating variation for differences in child longevity are contained in tables 18-21. Table 18 presents the value in the year 2000 of increased longevity since 1970. The estimates range from a low of .18% of wealth for blacks in New Hampshire to a high of 6.3% of wealth for whites in Michigan. That the estimates are only on the order of one-tenth those estimated by Murphy and Topel (2006) is not surprising in light of the differences in methodology.[50] Table 19 examines the value of increased longevity since 1940, which will capture the effect of the discovery of antibiotics. The estimates are much larger than in Table 18, ranging from a minimum of 1.6% of black wealth in Hawaii to a high of 16.8% of black wealth in Nebraska. For whites, the range goes from a low of 0.4% of wealth in Hawaii, to a high of 11.5% of wealth in Michigan. Moving to the gains over the century, our estimates of black gains range from a low of 5% in Maine to a high of 42% in Texas. For whites the gains range from 3% in Maine to 18% in Michigan. Finally, over the 1850 - 2000 period, the gains to blacks range from a low of 9% in Vermont, to a high of 68% in Texas. For whites the gain in longevity ranges from 5% in Vermont and North Dakota to 28% in Michigan.

6 Human Capital and Output

Another way to gauge the plausibility of our welfare estimates is to compare our estimates of human capital with data on output per worker. Human capital accumulates across generations, but remains constant over the life cycle. [51] We constructed the average human capital in state i and year t as the weighted average of human capital over cohort and race:

[49] The estimate of $95 trillion is sensitive to the interest rate chosen. This gain was partially offset by rising medical expenditures of $34 trillion for a net gain of $61 trillion, or roughly 125% of national wealth. We focus on the gross welfare gain because our exercise will not account for expenditures on health.

[50] Murphy Topel (2006) estimate the gains from increasing health and longevity to an adult. We measure the gains to a parent from rising longevity of their children.

[51] See Tamura, Dwyer, Devereux and Baier (2012) for a model that incorporates human capital acquisition over the life-cycle.

$$H_{it} = \sum_{j=1}^{2}\sum_{k=1}^{5} s_{ijkt}h_{ijkt} \quad (16)$$

$$h_{ij1t} = h_{ij,15-24,t} \quad (17)$$

$$h_{ij2t} = h_{ij,25-34,t} \quad (18)$$

$$h_{ij3t} = h_{ij,35-44,t} \quad (19)$$

$$h_{ij4t} = h_{ij,45-54,t} \quad (20)$$

$$h_{ij5t} = h_{ij,55-64,t} \quad (21)$$

$$1 = \sum_{j=1}^{2}\sum_{k=1}^{5} s_{ijkt} \quad (22)$$

The data on output per worker are from Turner, Tamura, Mulholland (2012), and cover each state from 1840 through 2000.[52]

Denoting the data on output per worker as y_{it}, we estimate:

$$lny_{it} = BlnH_{it} + \Gamma Mining_{it} + \mu_i + \gamma_t + \epsilon_{it}, \quad (23)$$

where we assume that ϵ_{it} is AR(1), and thus use a Prais-Winston correction. We include two dummy variables, denoted $Mining_{it}$, which are equal to unity for states engaged in gold or silver extraction in year t, and equal to zero otherwise. We estimated the regressions both unweighted, see in the first part of Table 22, and weighted by population, seen in the second part of Table 22. The regression results for the whole sample, seen in columns 1 through 3, indicate that our measures of human capital are highly correlated with state output per worker. The results in columns 4 through 6, which present estimates that are restricted to states and years in which output per worker was not imputed, reinforce this conclusion.

Two shortcomings of state output per worker is that it may reflect factors other than human capital, and does not capture the flow of income over a lifetime. Data on labor earnings are widely available only starting with the 1940 decennial census. We therefore used census data to calculate earnings by state, census year, race, and 10-year age cohort to construct measures of "permanent income," defined as the average annual earnings of men between the ages of 26 and 65. Consider, for example natives of South Carolina who were between 16 and 25 years old in 1930. Such individuals will be between the ages of 26 and 35 in 1940, 36 and 45 in 1950, 46 and 55 in 1960, and 56-65 in 1970. Permanent income is defined as the mean earnings, in constant 2009 dollars, over these four age groups (26-65), weighted by cell size.

Table 23 presents regressions, by race, of permanent income on lnH_{it}, augmented to include dummy variables for the years between 1990 and 2010, for which we have less than a complete life cycle of earnings. In all specifications the coefficient on log human capital is positive and significant at better than 1%.[53]

[52]Values prior to 1840 are imputed as a function of the national growth rate of output per worker. For states that we first observe after 1840, but have information on fertility, schooling and population prior to their first year of observation we imputed output per worker slightly differently. We first imputed the output per worker assuming the same national growth rate as the US, and then reduced output per worker by a factor $.96^{10}$ for each decade backprojected, up to a minimum of $.96^{30}$. This assumed a more rapid convergence rate than typically measured in the literature of 2% per year, for example, as in Barro and Sala-i-Martin (1992) and Tamura (1996).

[53]Our estimates suggest that there is a higher return on white human capital than to black human capital. There are many possible sources of this difference. One is measurement error; cell sizes for blacks are in some cases very low, generating measurement error in both the dependent and independent variable. Both types of error reduce precision, and the latter biases

Table 24 shows regression results when we replace the permanent income variable with contemporaneous measures of earnings. Broadly speaking, the results reinforce the conclusions based on permanent income.

Tables 25 and 26 examine the model's ability to explain the growth rate of output per worker using growth rates of human capital. Table 25 uses all of the data on output per worker, while Table 26 only uses the non imputed output per worker data. The bottom half of the tables examines only the annualized growth rate of output per worker from the initial year to the final year, 2000. In all of the regressions in Table 25, output per worker growth is strongly positively and significantly related to output per worker growth. For the panel regressions in Table 26, output growth is strongly positively and significantly related to human capital growth.[54] Only in the regressions without imputed output data, and with only one observation per state does the significance of the relationship decline. In three of the eight regressions the relationship is not significant at the 5 percent level, and only two are insignificant at the 10 percent level.

Finally Tables 27 and 28 present the results as related to the growth rate of black and white permanent income and growth rate of black and white state earnings. For blacks, growth in black permanent income is strongly positively and significantly related to the growth rate of black human capital. For whites the relationship is weaker. In two of the specifications the relationship is strongly negatively and significantly related to growth rates of human capital for whites. However once we include year dummies, this goes away. The results are uniformly positive for the growth rate of white and black state earnings.

Figures 25-26 contain the time series of human capital of whites and blacks by division.

7 Conclusion

This paper has used a quantity-quality model of fertility, calibrated to data for and across the United States, by race, between 1800 and 2000, to examine the value of improved schooling for whites and blacks. The estimates permit us to estimate the value of improvements in access to schooling for whites and blacks.

We estimate that prior to the Civil War, the welfare cost of discrimination in school access ranged between 1.7 and 10 times black wealth, depending on division. Taken as a whole, we estimate the welfare cost of discrimination in the south ranges at between 1.6 to 4 times black wealth prior to 1960. Interestingly, the value of schooling gains that occurred during the civil rights era was relatively modest, at just 1 to 2 percent of black wealth. Outside of the South we find significant costs of discrimination prior to 1960, ranging from 8 percent to 100 percent of black wealth. For these divisions from 1960-2000 blacks have attained rough parity in the quantity of schooling. Analysis of the value of access to quality schooling remains an important topic for research.

the estimated coefficient on human capital toward zero. We leave further investigation of this difference for future research.

[54] Here we report the weighted observations where the weights are labor force size. In the unweighted case the relationship is always insignificant.

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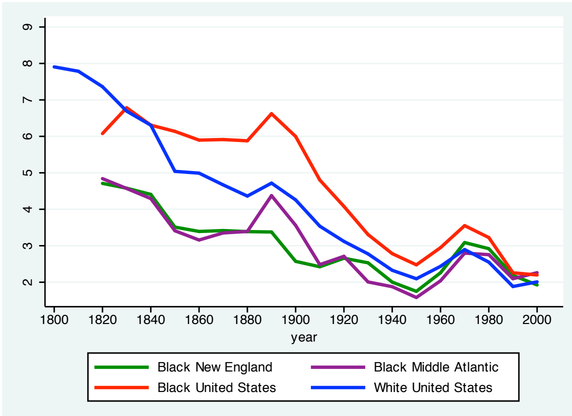

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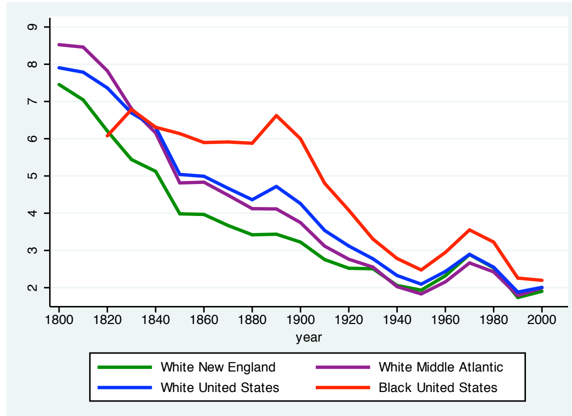

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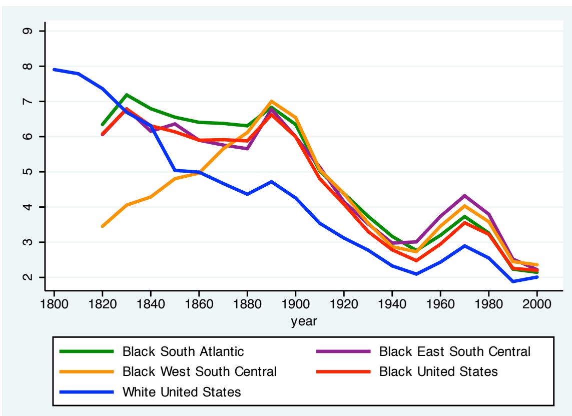

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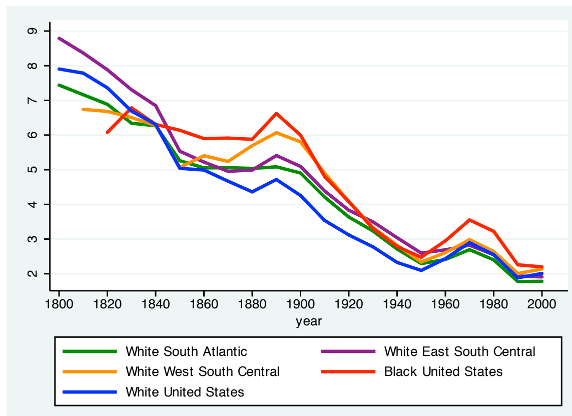

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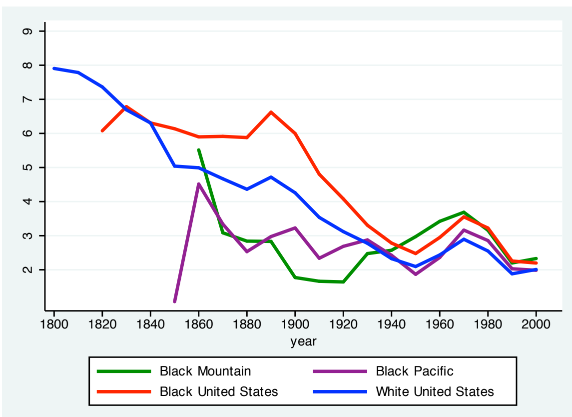
Figure 1: Cohort Black and White Fertility



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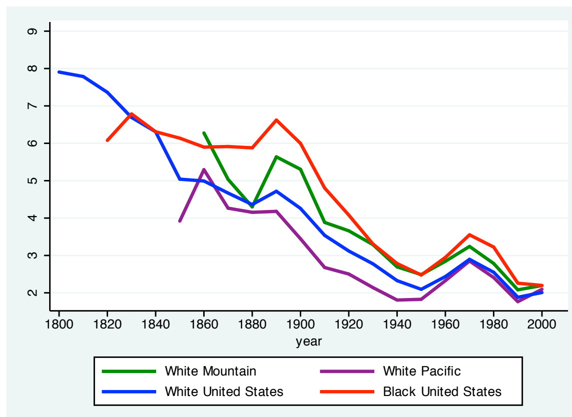

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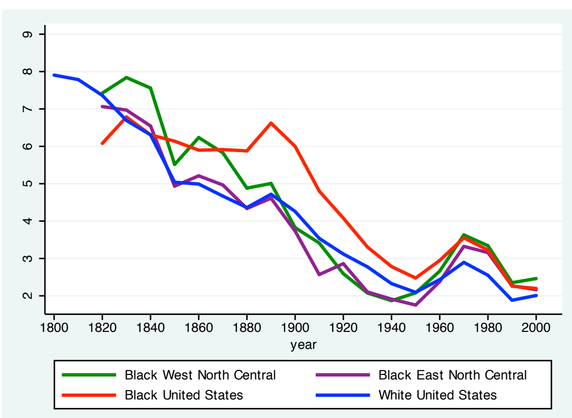

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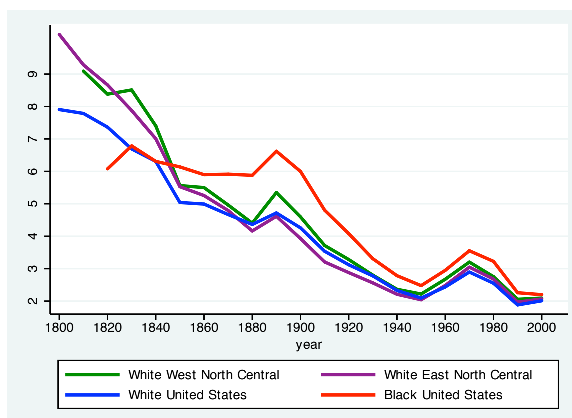

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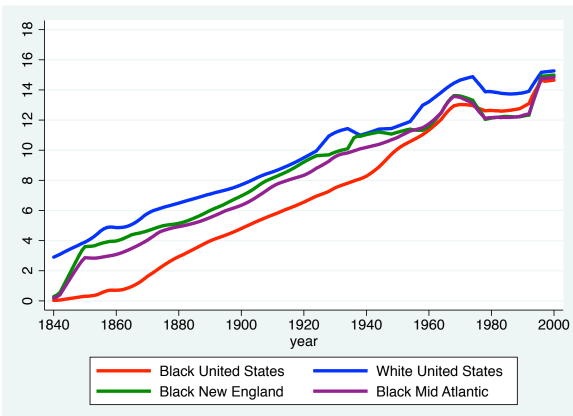
Figure 2: Cohort Black and White Fertility



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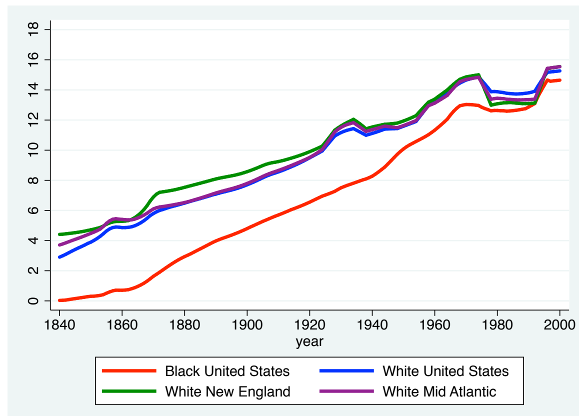

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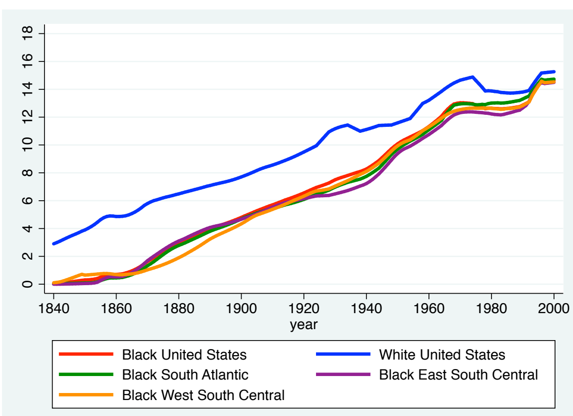

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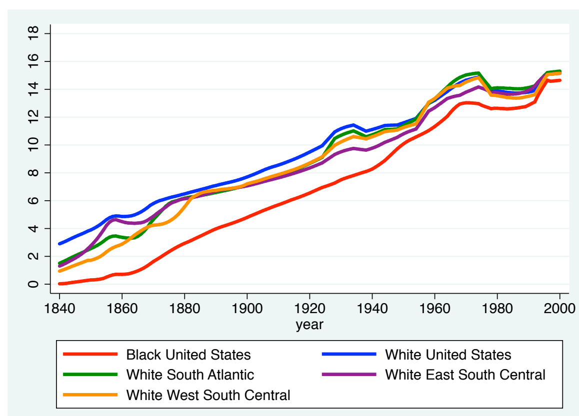

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Figure 3: Cohort Black and White Schooling

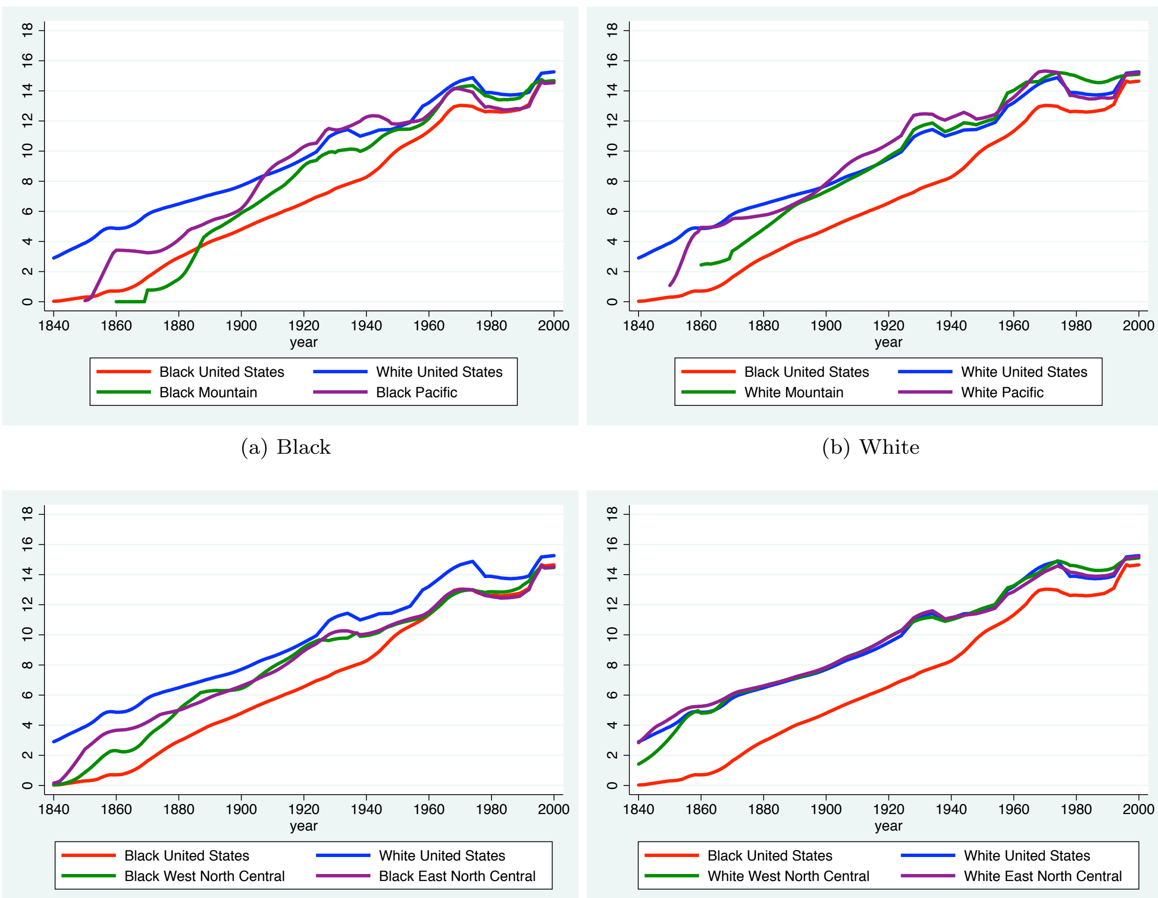

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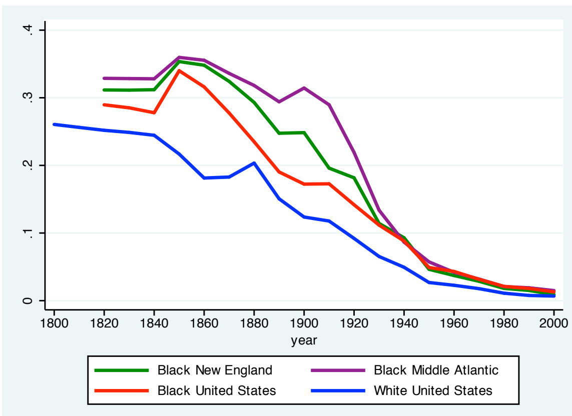
Figure 4: Cohort Black and White Schooling



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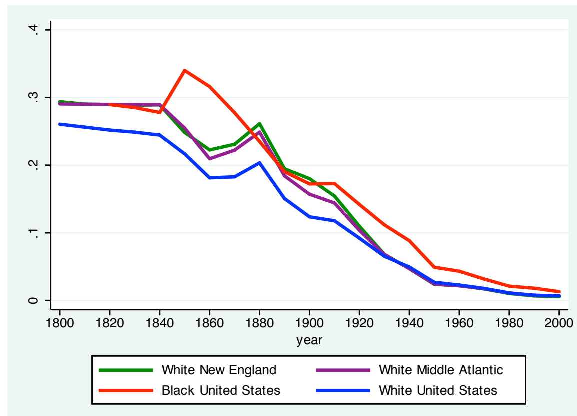

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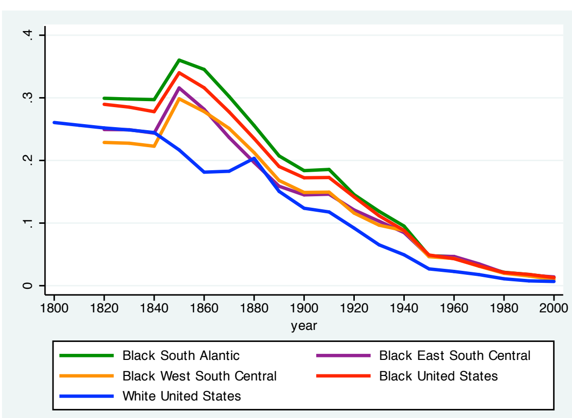

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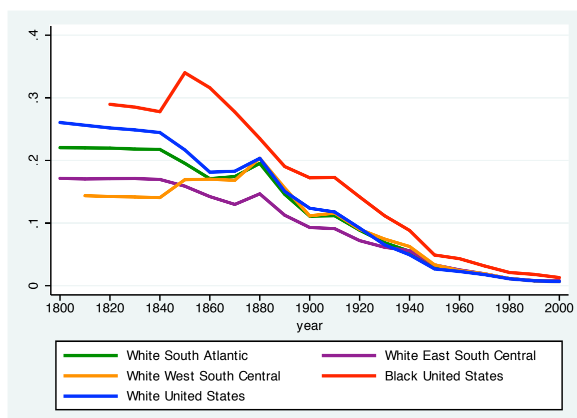

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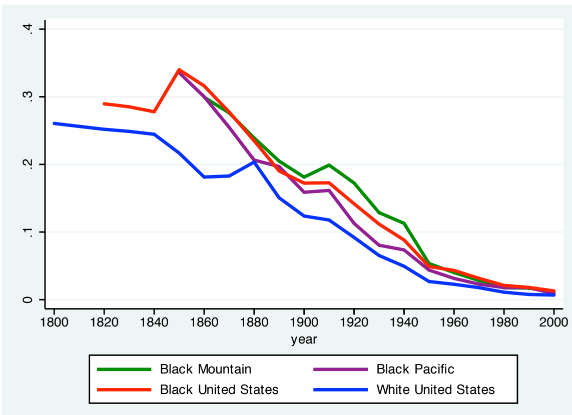
Figure 5: Cohort Black and White Infant Mortality



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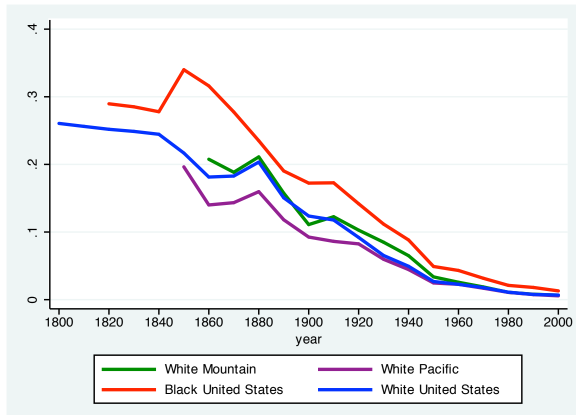

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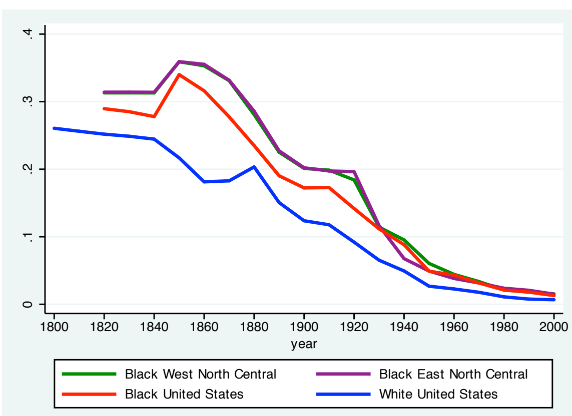

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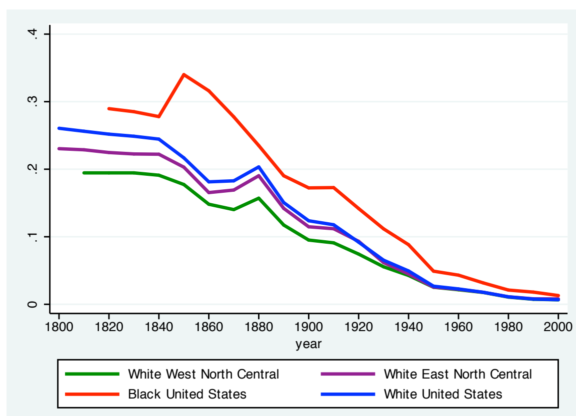

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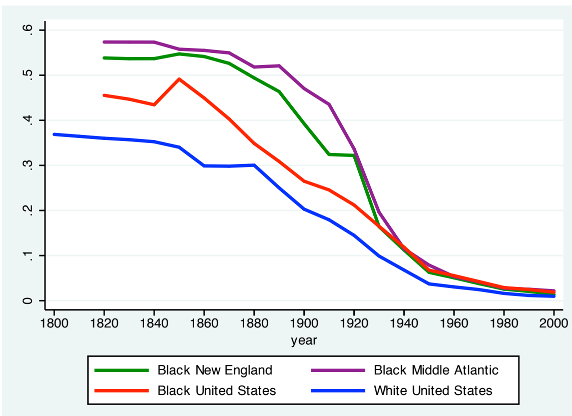
Figure 6: Cohort Black and White Infant Mortality



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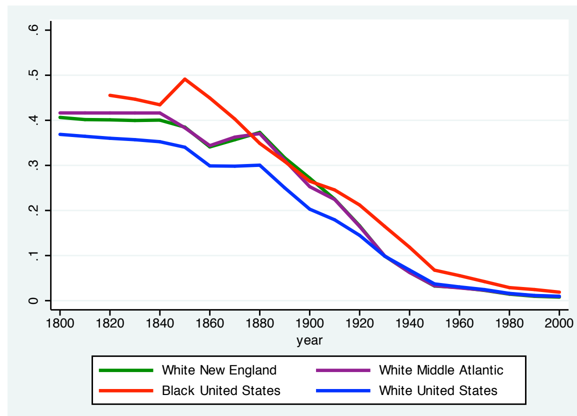

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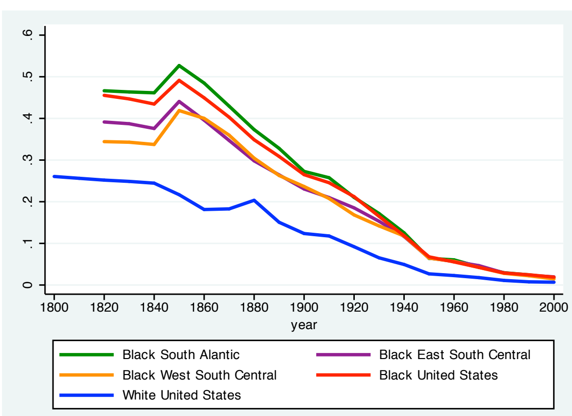

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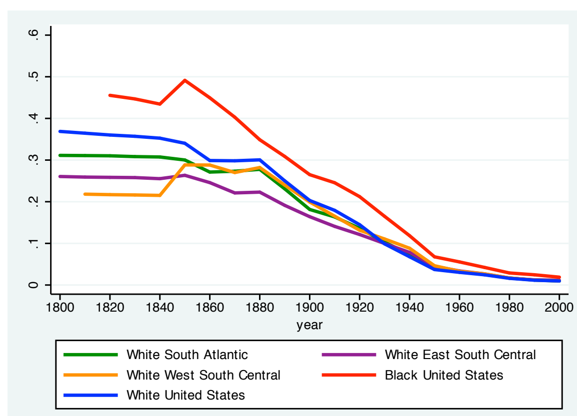

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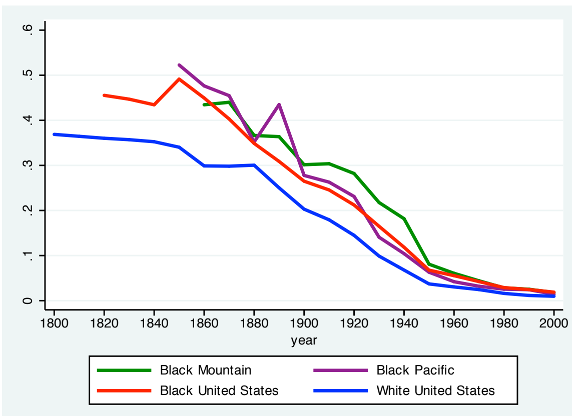
Figure 7: Cohort Black and White Mortality Before 15



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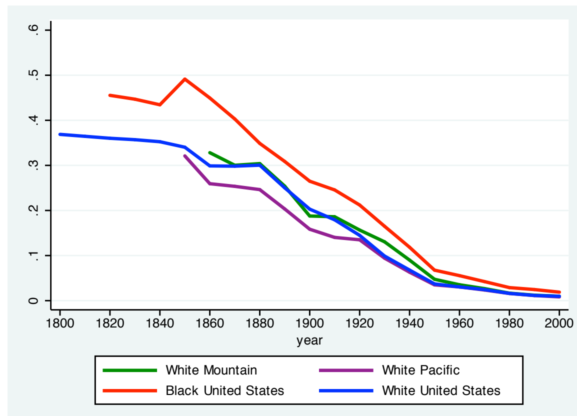

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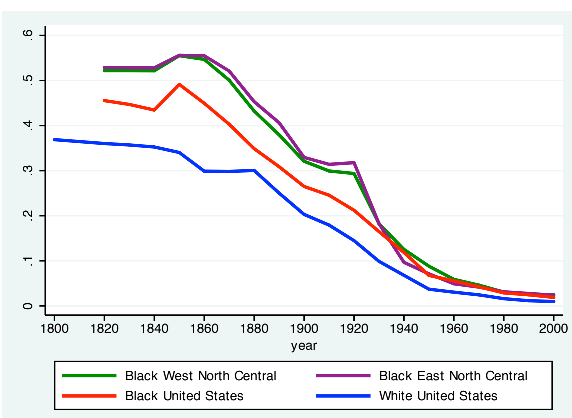

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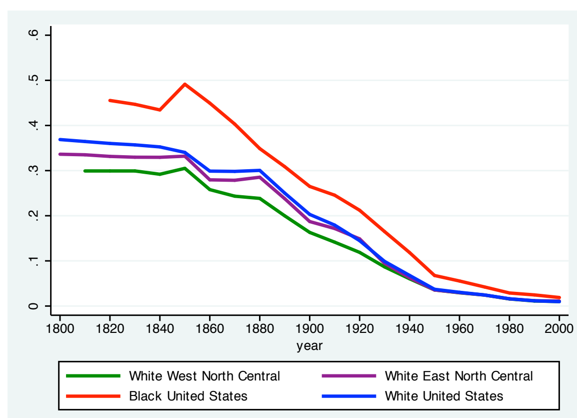

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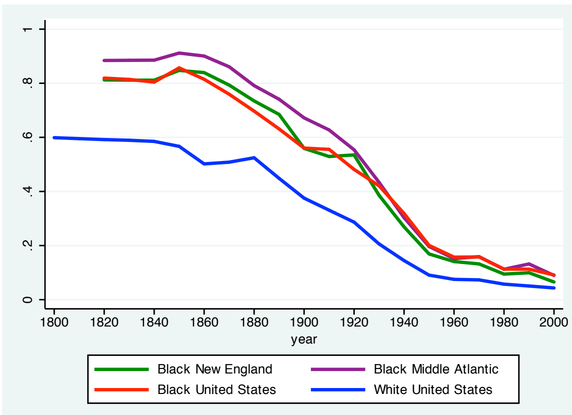
Figure 8: Cohort Black and White Mortality Before 15



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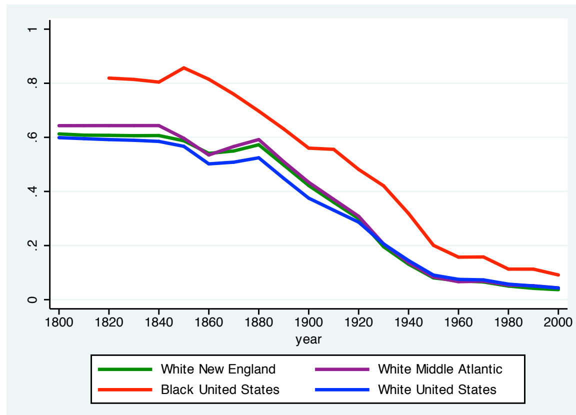

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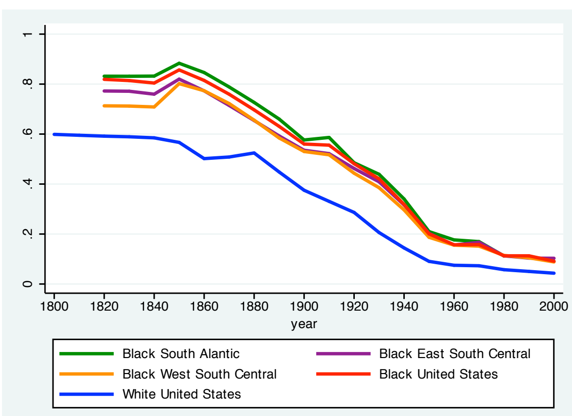

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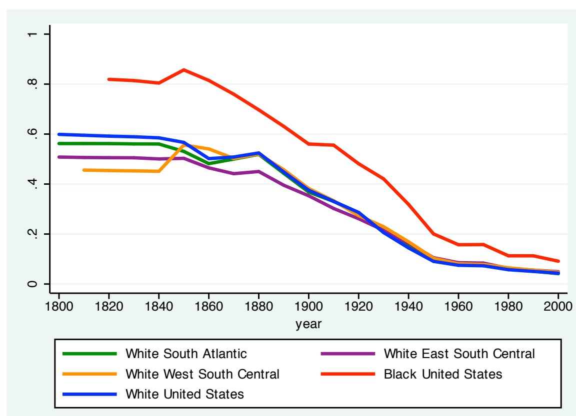

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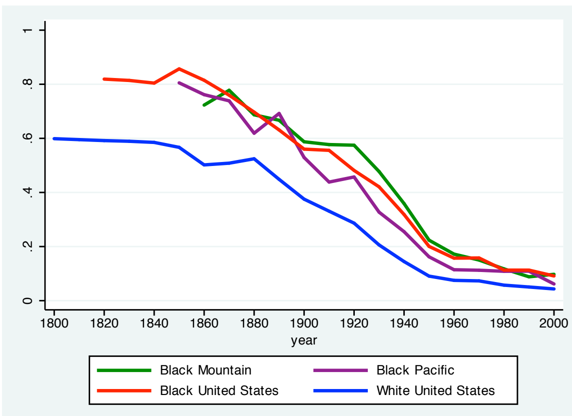
Figure 9: Cohort Black and White Mortality Before 45



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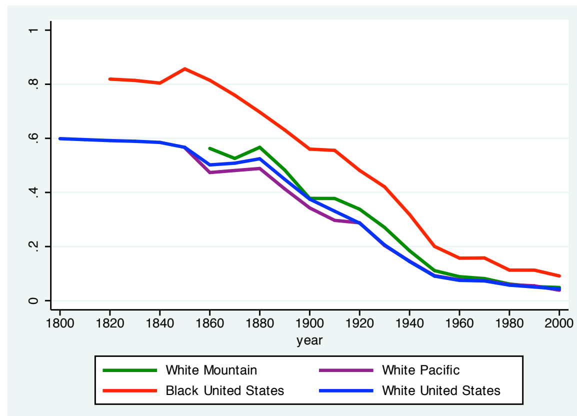

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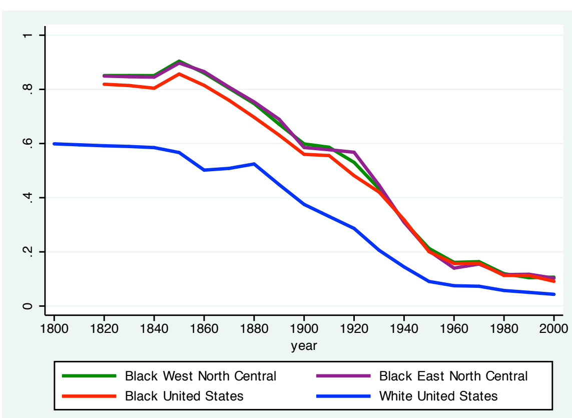

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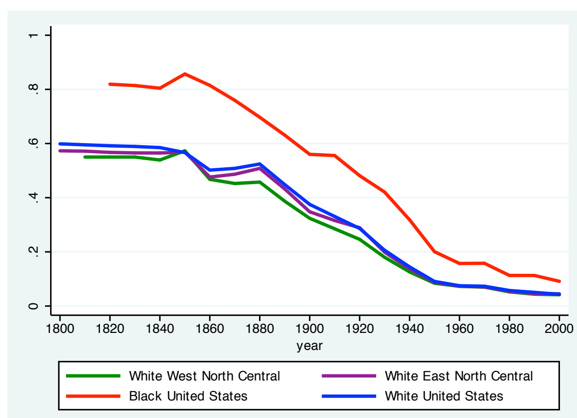

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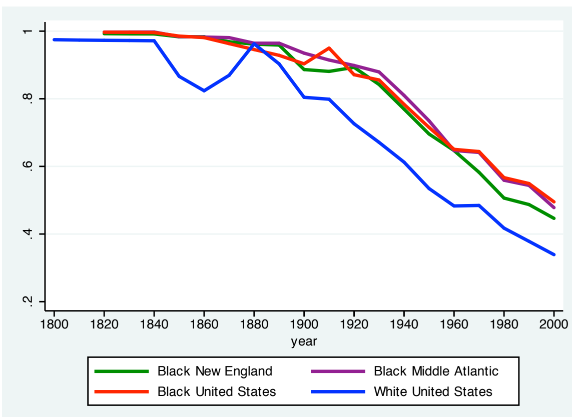
Figure 10: Cohort Black and White Mortality Before 45



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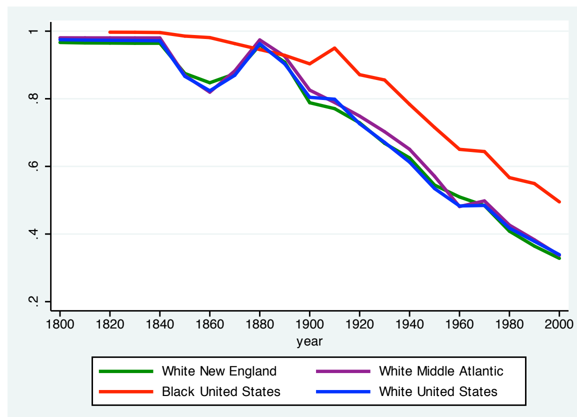

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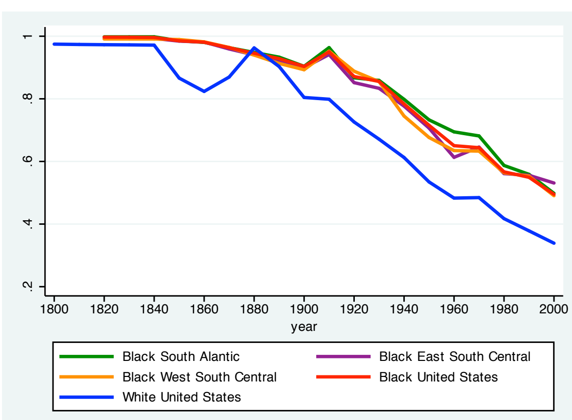

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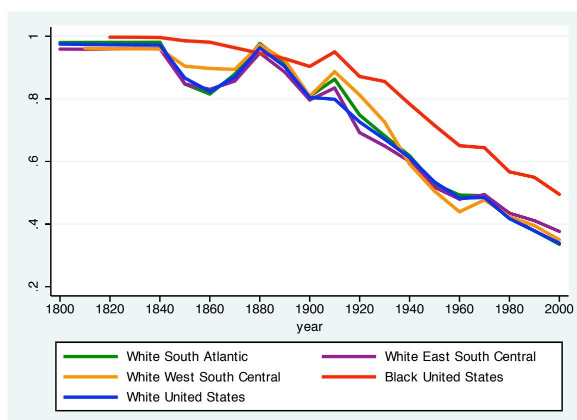

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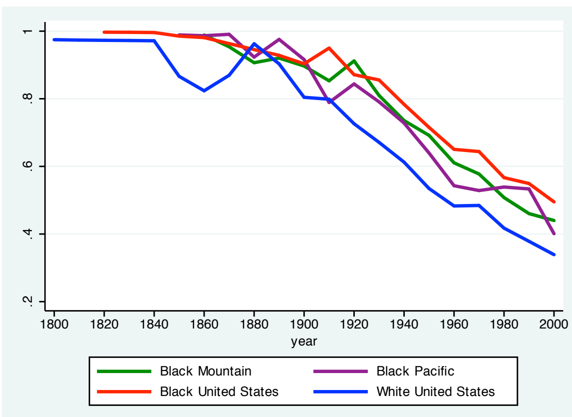
Figure 11: Cohort Black and White Mortality Before 75



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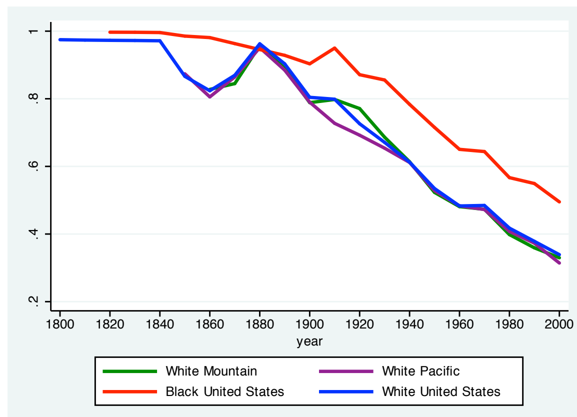

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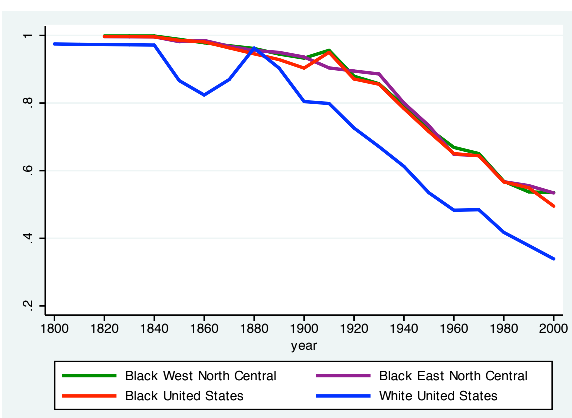

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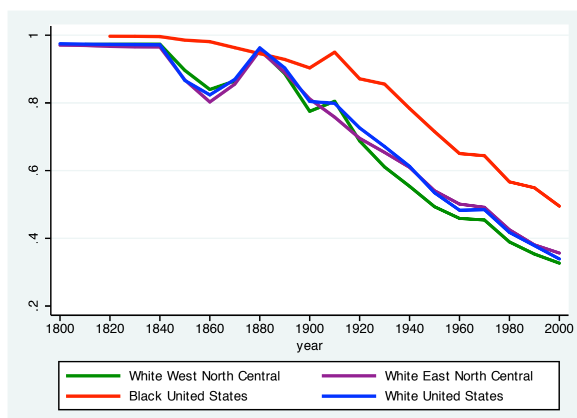

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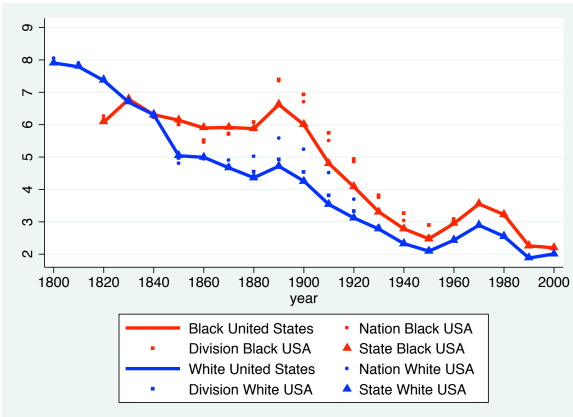
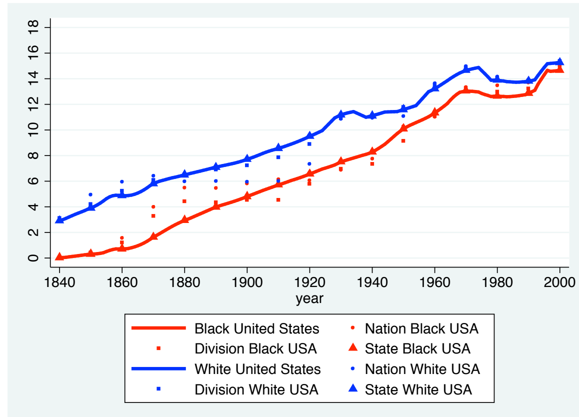
Figure 12: Cohort Black and White Mortality Before 75

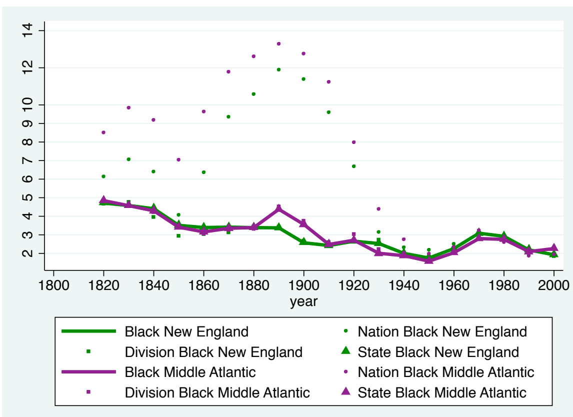


(a) Fertility: Data and Model



(b) Schooling: Data and Model

Figure 13: Cohort Black and White Fertility and Schooling



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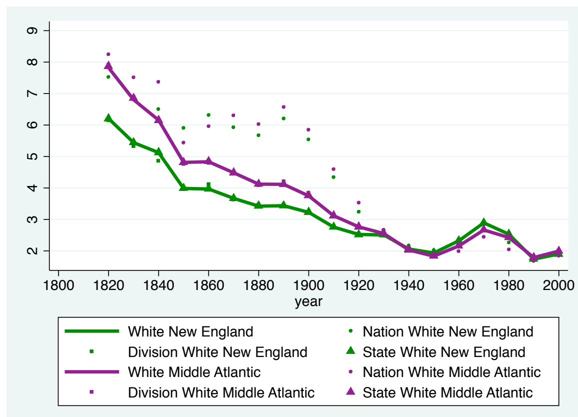
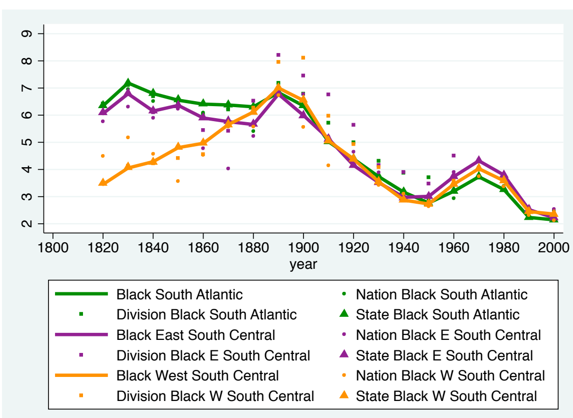
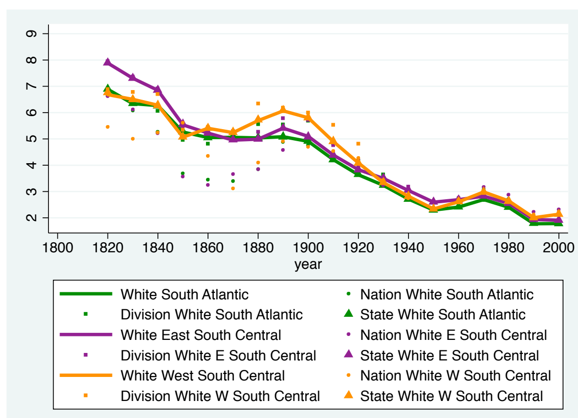


(b) White

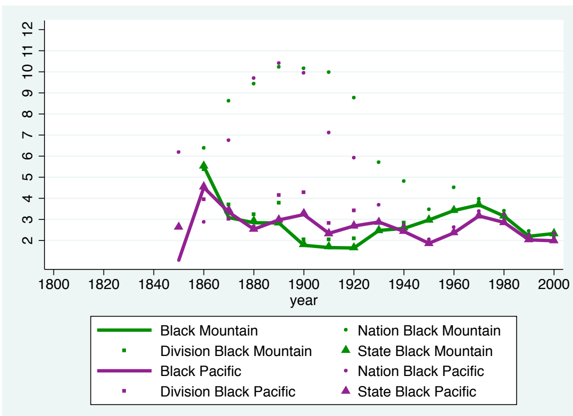


(c) Black

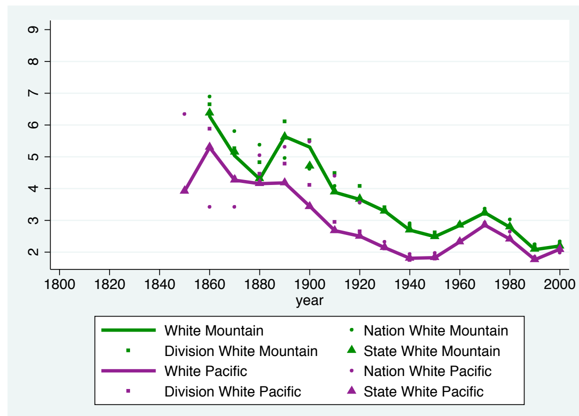


(d) White

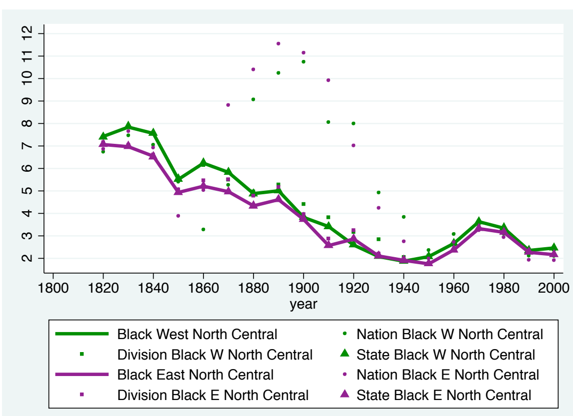
Figure 14: Cohort Black and White Fertility



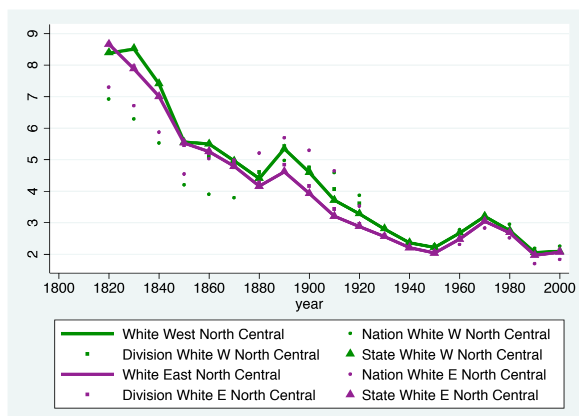
(a) Black



(b) White

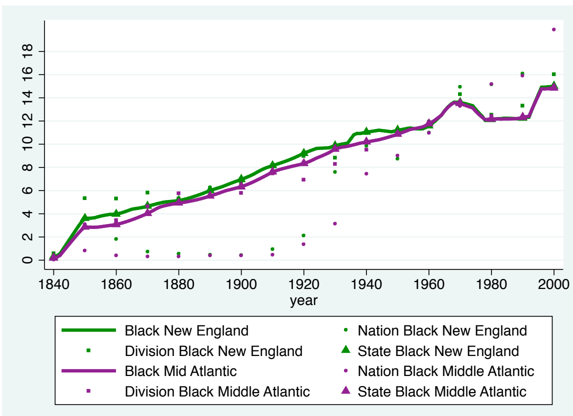


(c) Black

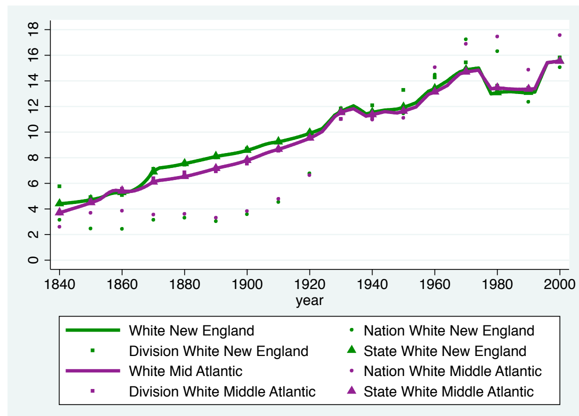


(d) White

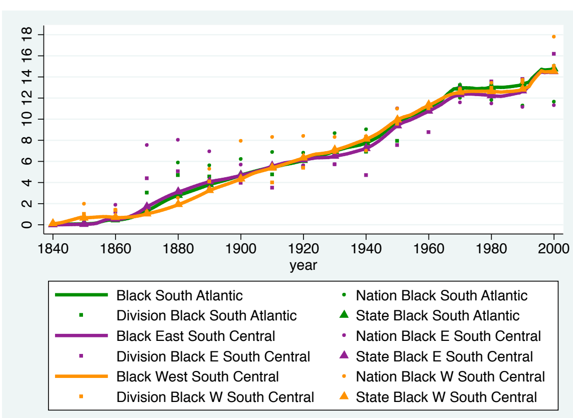
Figure 15: Cohort Black and White Fertility



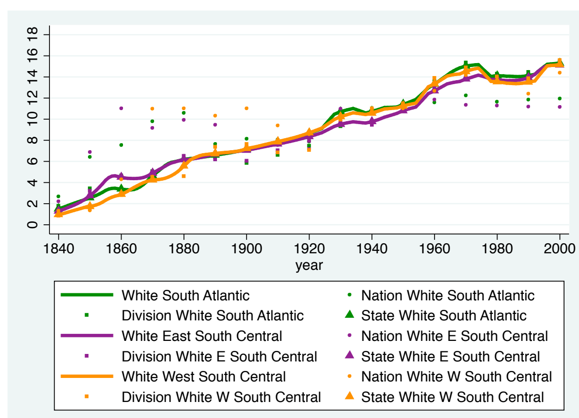
(a) Black



(b) White

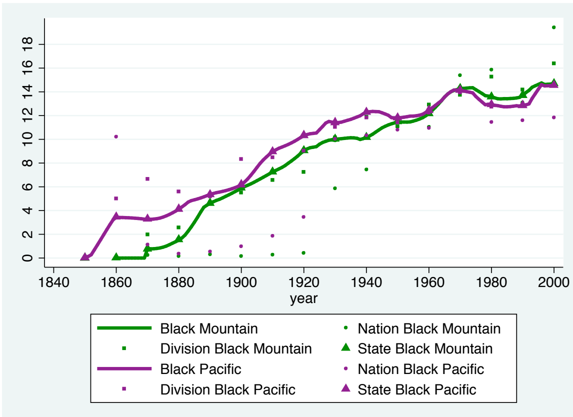


(c) Black

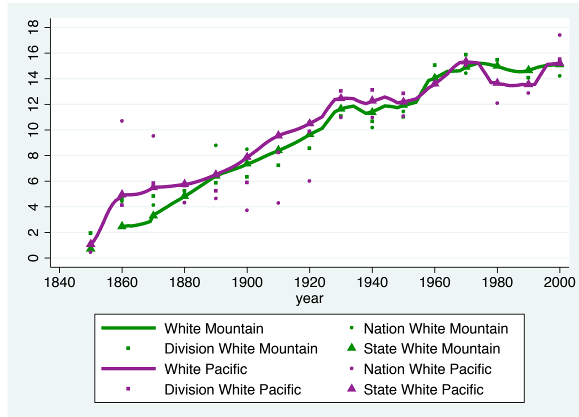


(d) White

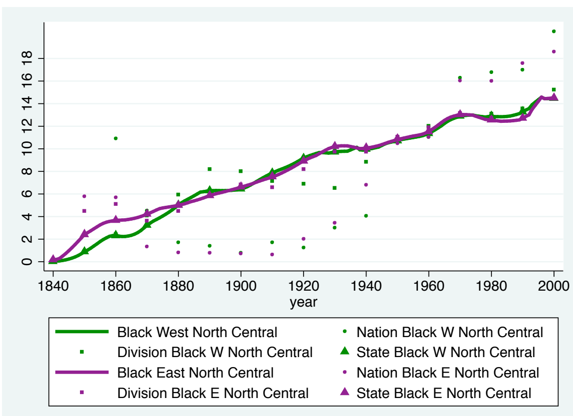
Figure 16: Cohort Black and White Schooling



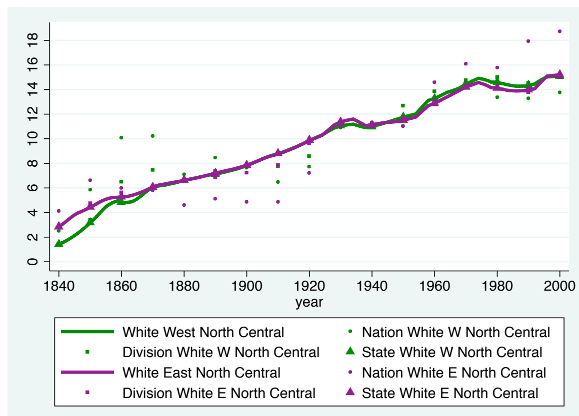
(a) Black



(b) White



(c) Black



(d) White

Figure 17: Cohort Black and White Schooling

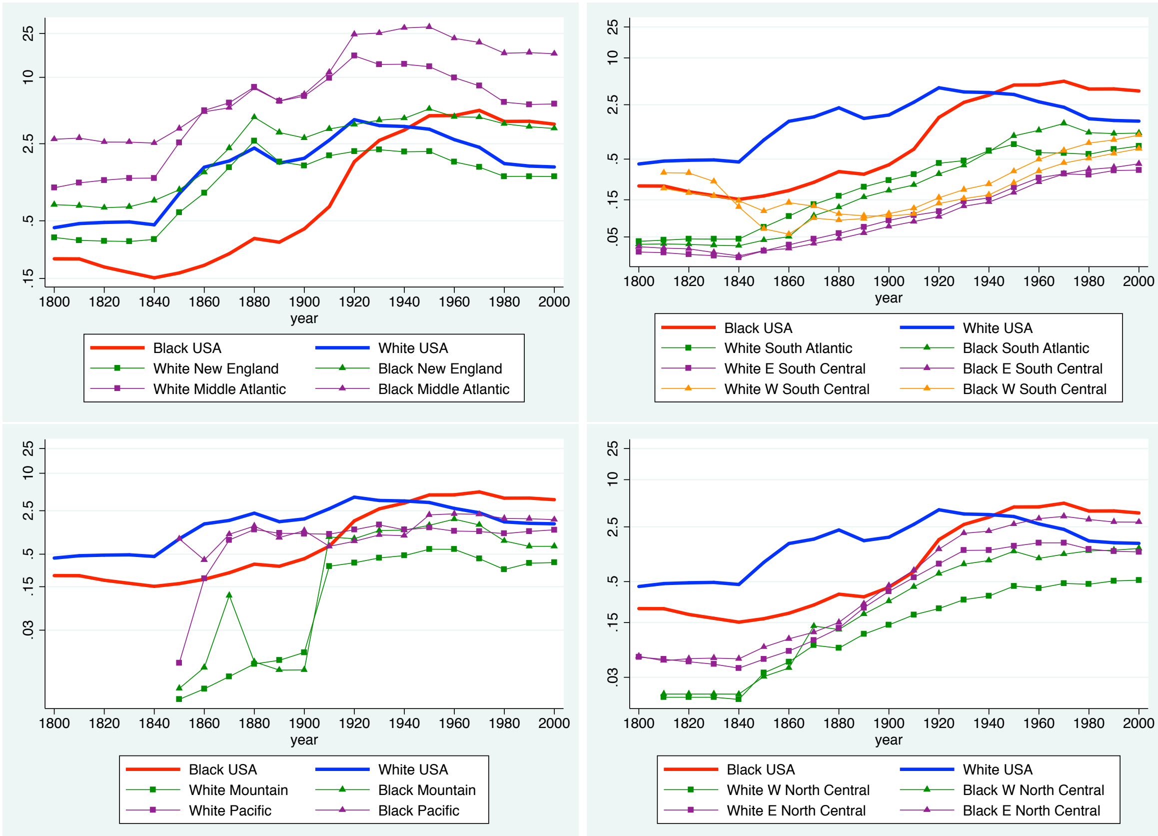


Figure 18: Black and White Price of Space,

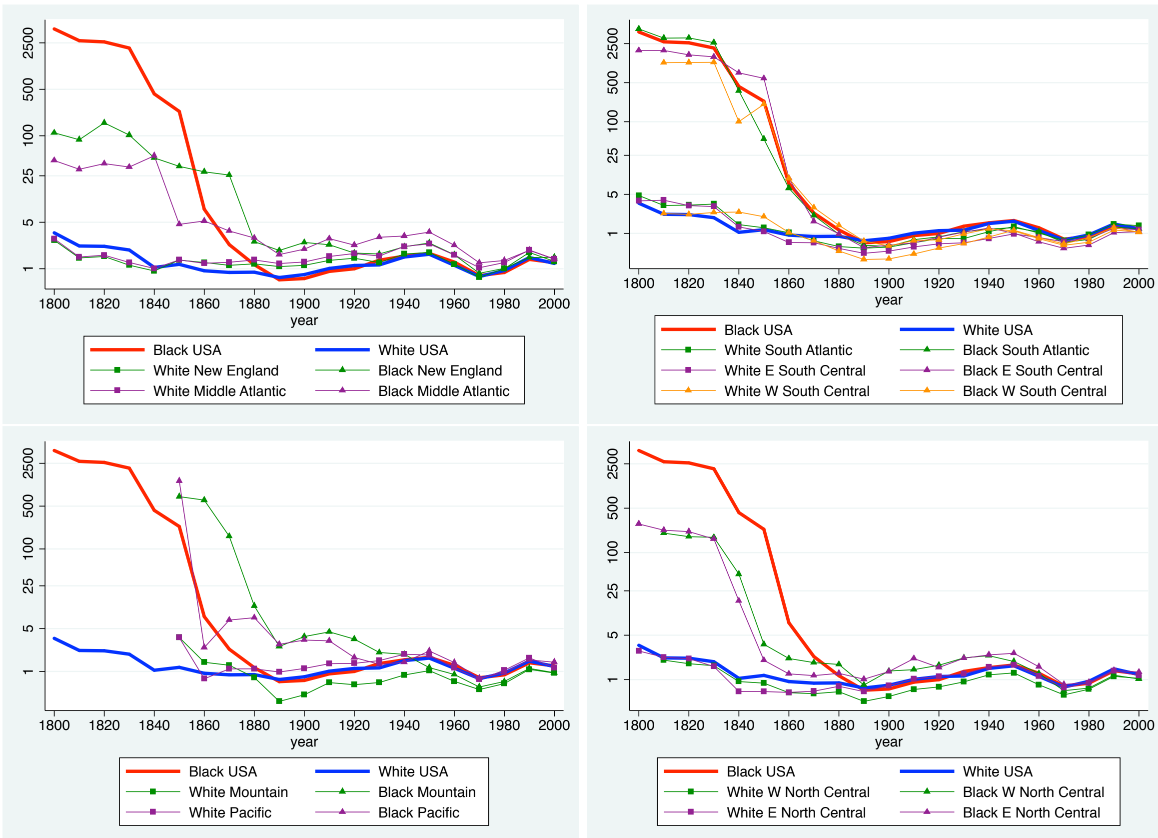


Figure 19: Black and White Cost of Schooling, $\kappa_t^{b,w}$

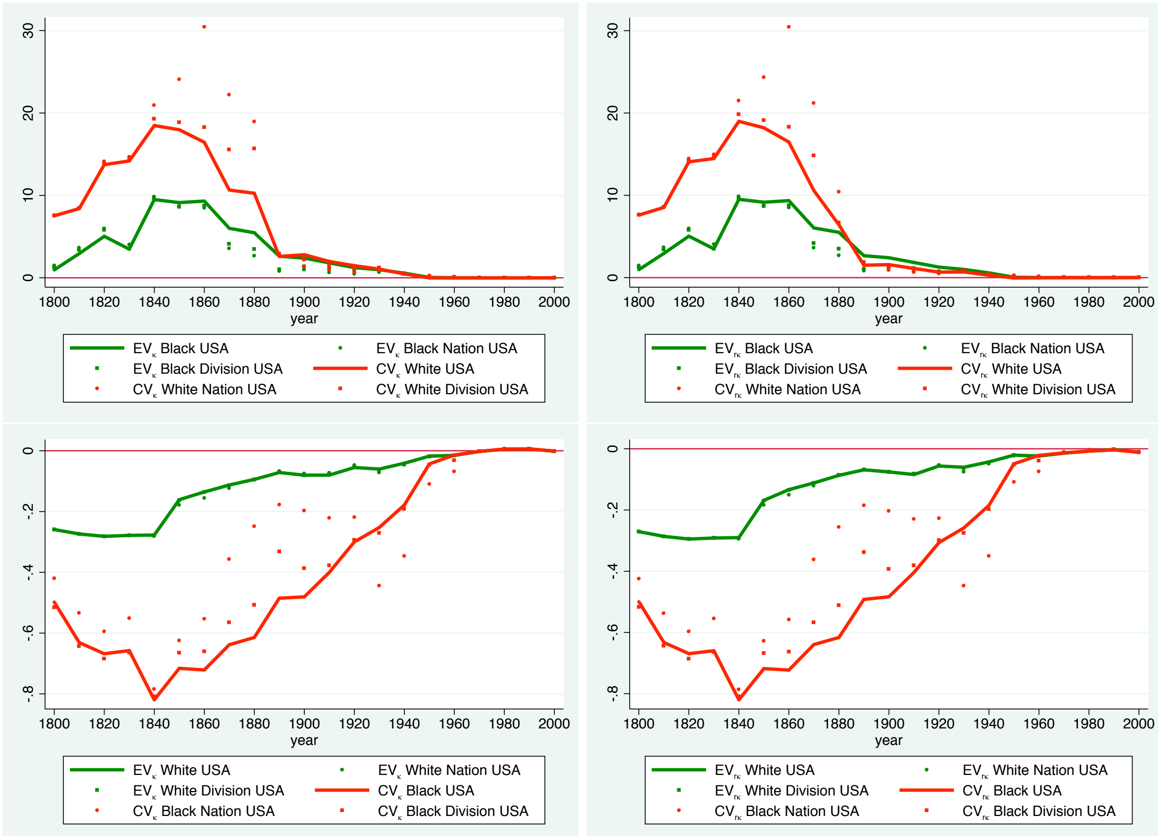
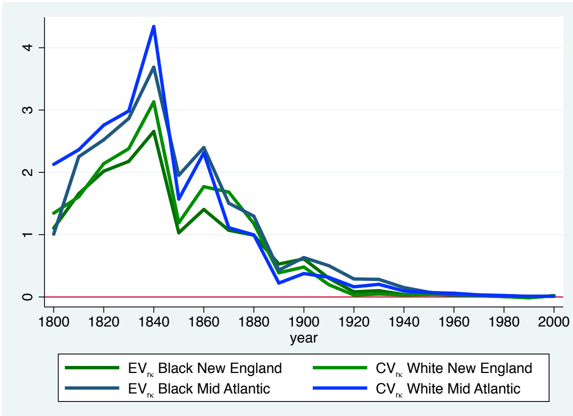
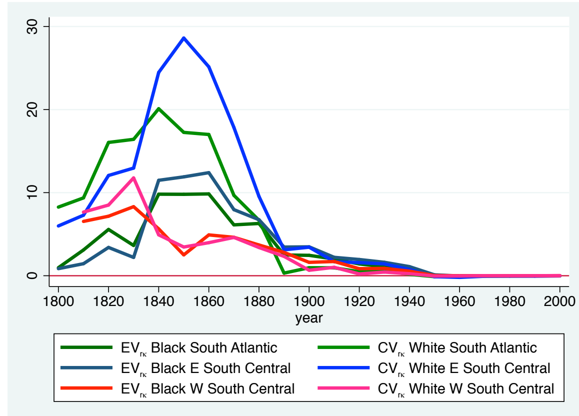


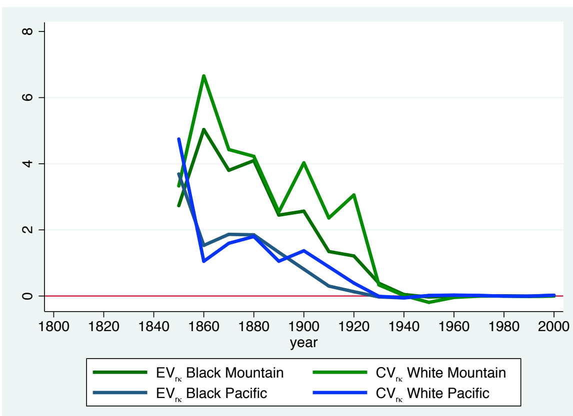
Figure 20: EV_{κ}^{b}, CV_{κ}^{w}, $EV_{r\kappa}^{b}$, $CV_{r\kappa}^{w}$



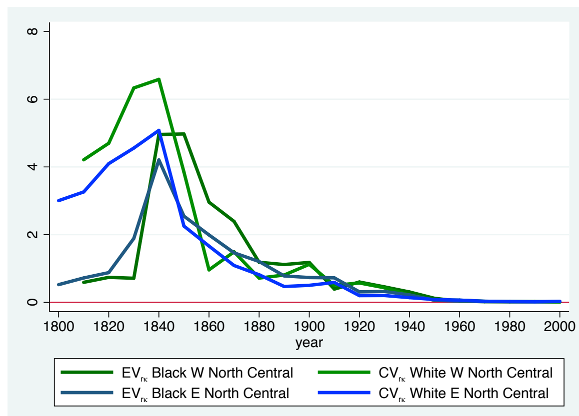
(a) New England and Mid Atlantic



(b) South Atlantic, ESC, WSC

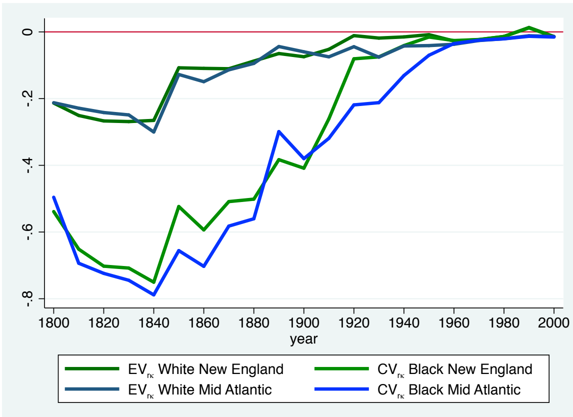


(c) Mountain and Pacific

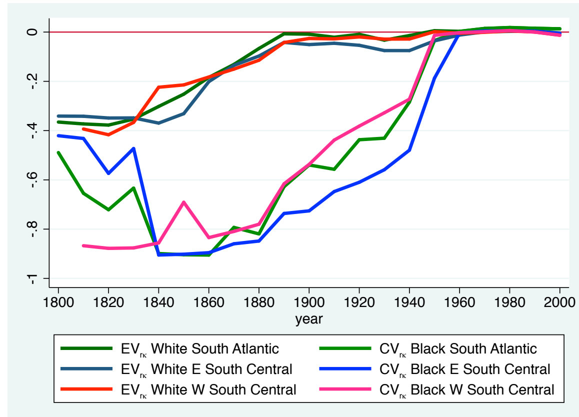


(d) WNC and ENC

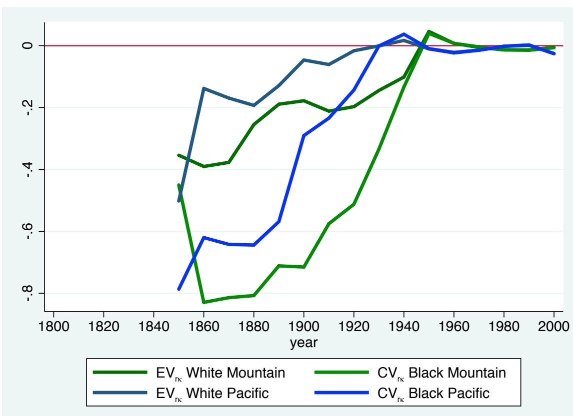
Figure 21: $EV^b_{r\kappa}$, $CV^w_{r\kappa}$



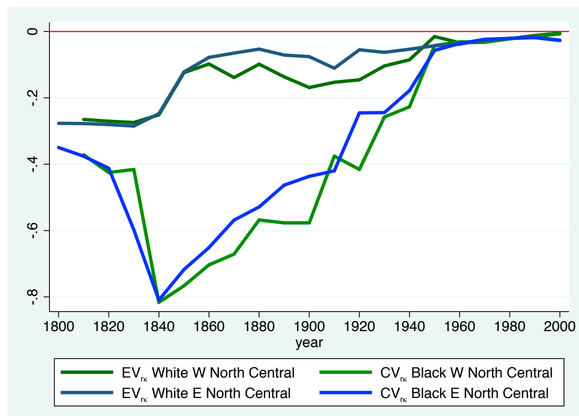
(a) New England and Mid Atlantic



(b) South Atlantic, ESC, WSC

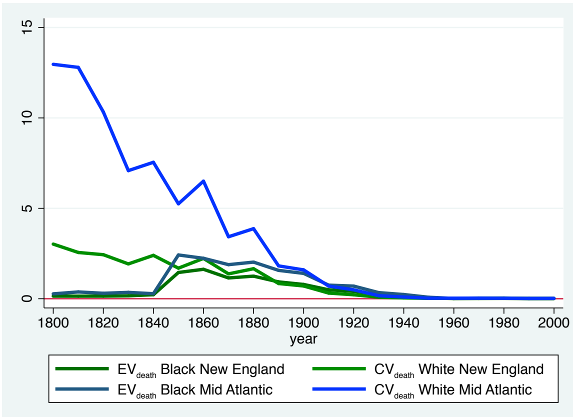


(c) Mountain and Pacific

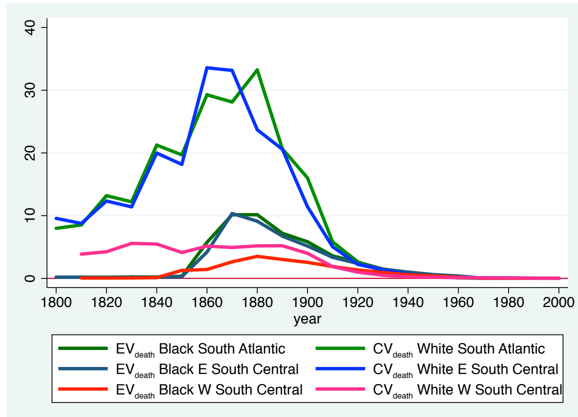


(d) WNC and ENC

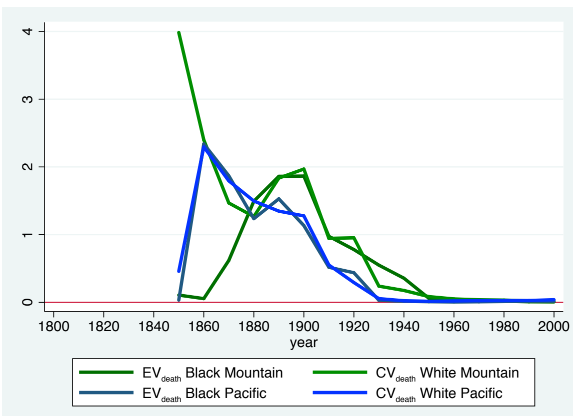
Figure 22: $EV^w_{r\kappa}$, $CV^b_{r\kappa}$



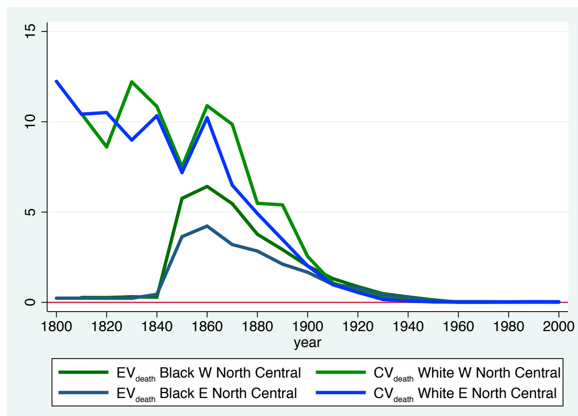
(a) New England and Mid Atlantic



(b) South Atlantic, ESC, WSC

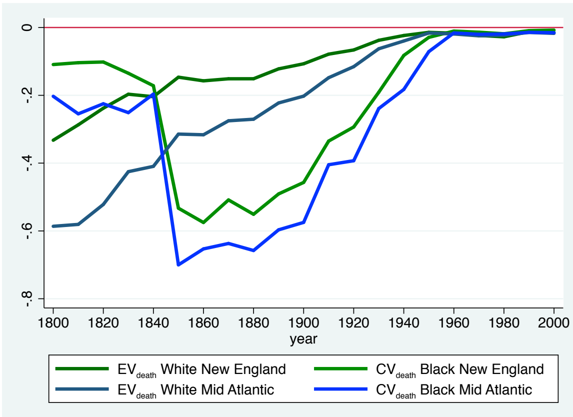


(c) Mountain and Pacific

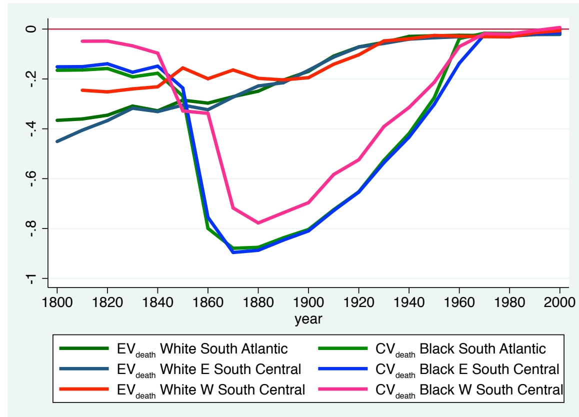


(d) WNC and ENC

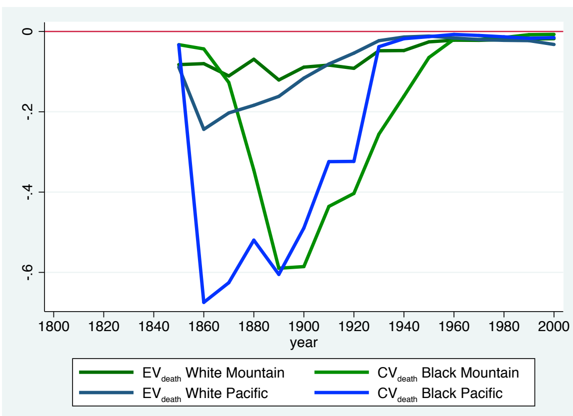
Figure 23: EV^b_{death}, CV^w_{death}



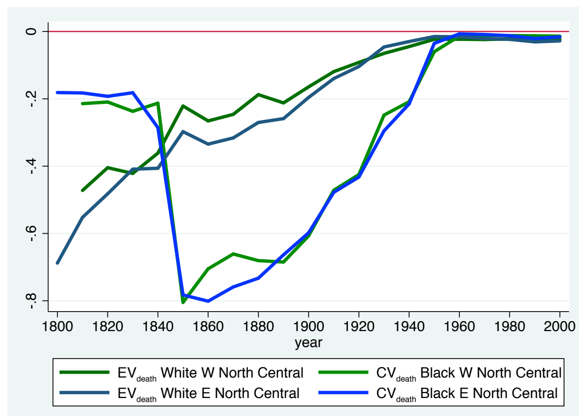
(a) New England and Mid Atlantic



(b) South Atlantic, ESC, WSC

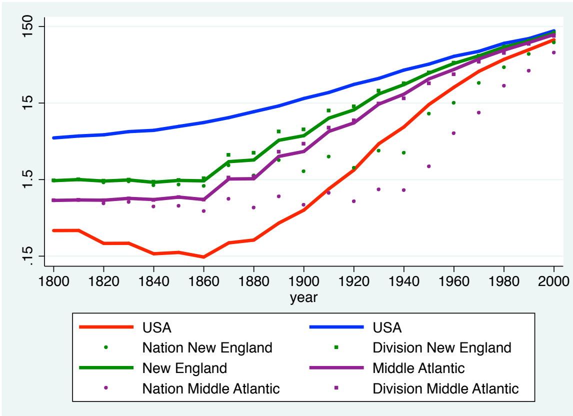


(c) Mountain and Pacific

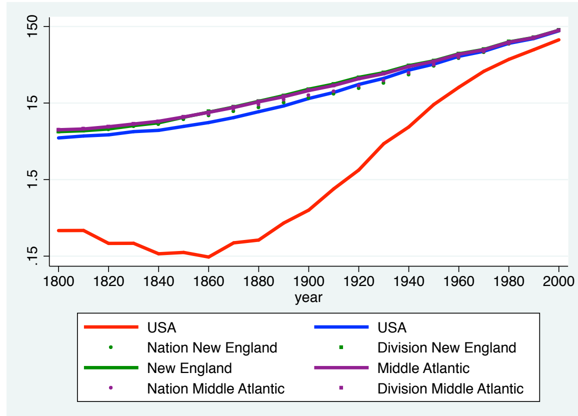


(d) WNC and ENC

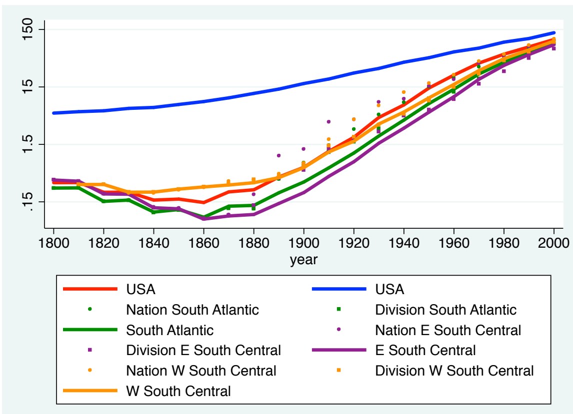
Figure 24: EV^w_{death}, CV^b_{death}



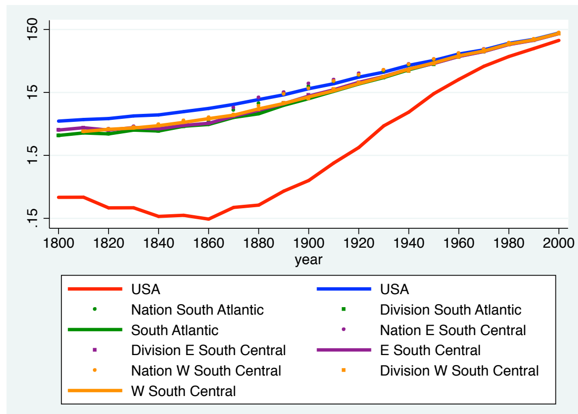
(a) Black



(b) White

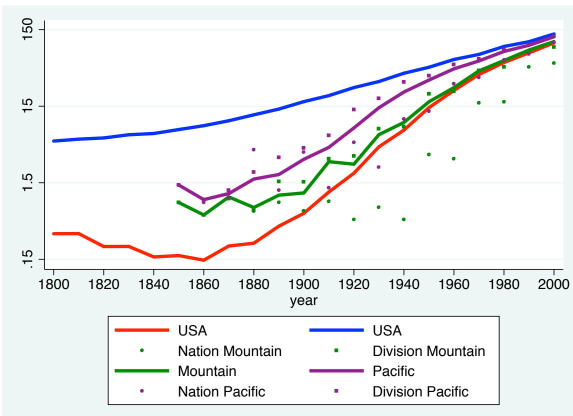


(c) Black

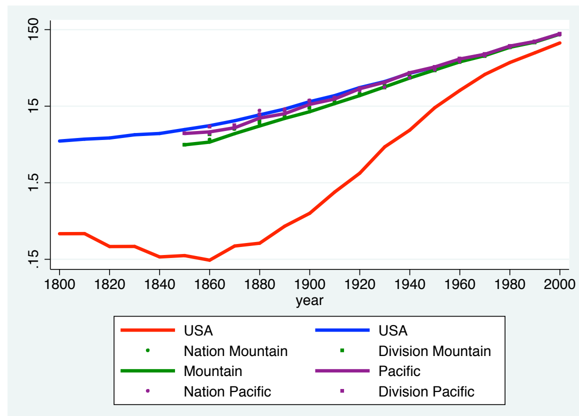


(d) White

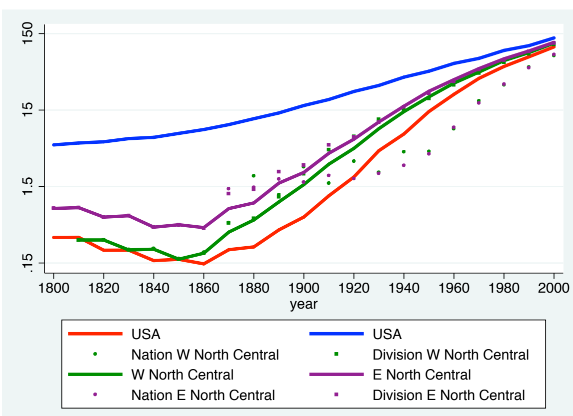
Figure 25: Cohort Black and White Human Capital



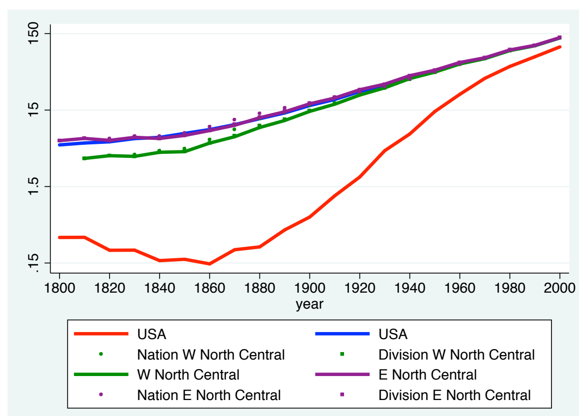
(a) Black



(b) White



(c) Black



(d) White

Figure 26: Cohort Black and White Human Capital

Table 1: Children Ever Born: By Census division and Race

Year	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
					white					
1800	7.46	8.53	7.44	8.79	-	-	-	-	10.2	7.91
1820	6.21	7.82	6.89	7.88	6.68	-	-	8.38	8.67	7.36
1840	5.12	6.16	6.27	6.85	6.28	-	-	7.40	7.01	6.31
1860	3.97	4.83	5.05	5.22	5.40	6.28	5.29	5.50	5.25	4.99
1880	3.42	4.12	5.04	4.99	5.70	4.30	4.15	4.40	4.16	4.36
1900	3.22	3.75	4.91	5.10	5.80	5.30	3.45	4.60	3.93	4.26
1920	2.52	2.76	3.64	3.83	4.09	3.66	2.50	3.28	2.88	3.12
1940	2.06	2.03	2.71	3.04	2.82	2.69	1.81	2.36	2.21	2.33
1950	1.93	1.83	2.29	2.60	2.34	2.49	1.83	2.22	2.04	2.09
1960	2.32	2.16	2.41	2.69	2.61	2.84	2.33	2.67	2.48	2.44
1970	2.89	2.66	2.70	2.82	2.98	3.24	2.85	3.20	3.05	2.90
1980	2.53	2.42	2.40	2.55	2.64	2.78	2.41	2.75	2.68	2.55
1990	1.74	1.79	1.77	1.94	2.01	2.08	1.76	2.06	1.97	1.88
2000	1.90	1.99	1.78	1.91	2.14	2.19	2.09	2.09	2.07	2.01
					black					
1820	4.71	4.84	6.35	6.06	3.45	-	-	7.42	7.06	6.08
1840	4.41	4.29	6.79	6.15	4.29	-	-	7.56	6.54	6.31
1860	3.39	3.16	6.41	5.90	4.96	5.52	4.52	6.24	5.21	5.90
1880	3.39	3.39	6.31	5.66	6.12	2.84	2.53	4.88	4.34	5.88
1900	2.57	3.56	6.35	5.99	6.54	1.77	3.23	3.82	3.73	6.00
1920	2.66	2.71	4.39	4.15	4.38	1.64	2.69	2.59	2.86	4.08
1940	2.00	1.88	3.16	2.98	2.87	2.57	2.43	1.87	1.91	2.78
1950	1.75	1.58	2.77	3.01	2.73	2.97	1.87	2.08	1.75	2.48
1960	2.26	2.04	3.20	3.74	3.46	3.42	2.36	2.66	2.38	2.95
1970	3.09	2.80	3.73	4.32	4.03	3.69	3.16	3.63	3.32	3.55
1980	2.92	2.76	3.26	3.80	3.58	3.16	2.86	3.34	3.16	3.22
1990	2.19	2.10	2.23	2.52	2.45	2.20	2.03	2.35	2.27	2.26
2000	1.92	2.26	2.14	2.22	2.36	2.33	1.98	2.46	2.16	2.20

Notes: Table reports our estimates of children ever born from 1800-1880 for whites and 1820-1880 for blacks using the procedure of Murphy, Simon and Tamura (2008). For 1890-1990 we report the values of children ever born to women 35-44 from various censuses. The 2000 value comes from the averaged children ever born to women 35-44 for 1998, 2000, 2002, 2004 CPS.

Table 2: Children Ever Born: By Census division and Race

division	Absolute Change from 1950 to 1970	Relative to National Change	Percentage Change from 1950	Relative to National Percentage Change
		white		
NE	0.96	1.19	49.4	1.29
MA	0.83	1.04	45.5	1.19
SA	0.40	0.50	17.5	0.46
ESC	0.23	0.28	8.8	0.23
WSC	0.65	0.81	27.6	0.72
Mtn.	0.75	0.94	30.2	0.79
Pac.	1.02	1.28	56.1	1.47
WNC	0.98	1.23	44.4	1.16
ENC	1.01	1.26	49.3	1.29
US	0.80		38.3	
		black		
NE	1.34	1.24	76.5	1.76
MA	1.22	1.13	77.1	1.77
SA	0.96	0.90	34.9	0.80
ESC	1.31	1.22	43.5	1.00
WSC	1.30	1.21	47.6	1.10
Mtn.	0.72	0.67	24.1	0.55
Pac.	1.30	1.21	69.5	1.60
WNC	1.55	1.44	74.6	1.72
ENC	1.57	1.46	89.4	2.06
US	1.08		43.4	

Notes: Table reports both absolute, proportionate and relative change in fertility during the Baby Boom, by race. In each relative case, we report the changes in comparison to the national change by race.

Table 3: Average Years of Schooling: By Census division and Race

Year	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
					white					
1850	4.72	4.47	2.54	2.55	1.63	-	2.45	3.17	4.42	3.76
1860	5.28	5.40	3.25	4.27	2.79	2.33	5.05	4.82	5.26	4.72
1870	6.89	6.09	4.63	4.86	4.24	3.26	5.49	6.03	6.06	5.75
1880	7.53	6.52	6.16	6.14	5.55	4.70	5.74	6.61	6.60	6.45
1890	8.09	7.15	6.57	6.71	6.74	6.30	6.51	7.11	7.20	7.05
1900	8.57	7.79	7.13	7.08	7.21	7.26	7.87	7.81	7.85	7.66
1910	9.24	8.64	7.78	7.65	7.87	8.33	9.53	8.78	8.75	8.49
1920	9.90	9.51	8.62	8.36	8.72	9.60	10.5	9.84	9.83	9.42
1930	11.6	11.5	10.6	9.52	10.2	11.6	12.5	11.0	11.4	11.1
1940	11.5	11.3	10.6	9.77	10.6	11.4	12.2	11.0	11.1	11.0
1950	11.9	11.6	11.3	10.8	11.3	11.9	12.3	11.8	11.5	11.6
1960	13.4	13.1	13.3	12.7	13.4	14.0	13.6	13.3	12.9	13.2
1970	14.9	14.7	15.0	13.8	14.5	14.9	15.3	14.4	14.2	14.6
1980	13.1	13.5	14.1	13.7	13.5	15.0	13.7	14.6	14.1	13.9
1990	13.1	13.4	14.1	13.9	13.5	14.6	13.5	14.3	14.0	13.8
2000	15.6	15.5	15.3	15.1	15.2	15.1	15.2	15.1	15.2	15.3
					black					
1850	3.92	2.87	0.09	0.05	0.53	-	0.07	0.88	2.36	0.25
1860	4.23	3.05	0.44	0.50	0.62	0.00	3.32	2.33	3.77	0.65
1870	4.80	4.05	1.32	1.69	1.03	0.50	3.38	3.23	4.21	1.59
1880	5.27	4.93	2.77	3.11	1.92	1.76	4.18	5.00	5.02	2.88
1890	6.15	5.50	3.78	4.05	3.31	5.76	5.77	6.33	5.85	3.92
1900	7.09	6.30	4.65	4.64	4.37	5.73	6.34	6.41	6.64	4.72
1910	8.19	7.53	5.39	5.49	5.39	6.94	9.23	7.89	7.49	5.57
1920	9.24	8.23	6.01	6.08	6.31	9.19	10.3	9.21	8.91	6.33
1930	9.84	9.53	6.85	6.46	7.03	9.37	11.4	9.85	10.2	7.25
1940	11.0	10.2	7.67	7.11	8.10	9.84	12.2	9.94	10.1	8.09
1950	11.2	10.8	9.64	9.33	9.91	11.4	11.8	10.7	10.8	9.95
1960	11.6	11.7	11.1	10.7	11.3	12.2	12.4	11.3	11.5	11.3
1970	13.6	13.5	13.0	12.3	12.5	14.3	14.1	12.9	13.0	13.0
1980	12.1	12.2	13.0	12.2	12.6	13.6	12.9	12.9	12.5	12.6
1990	12.2	12.3	13.3	12.6	12.8	13.7	12.8	13.3	12.7	12.9
2000	15.0	14.8	14.7	14.5	14.5	14.7	14.5	14.5	14.5	14.6

Notes: Table reports our estimates of years of schooling by cohort from 1850-2000 for whites and blacks using the procedure of Murphy, Simon and Tamura (2008).

Table 4: Average Years of Schooling: By Census division and Race

division	Absolute Change from 1950 to 1970	Relative to National Change	Percentage Change from 1950	Relative to National Percentage Change
		white		
NE	2.93	0.95	24.6	0.92
MA	3.07	1.00	26.4	0.99
SA	3.69	1.20	32.6	1.23
ESC	2.99	0.97	27.7	1.04
WSC	3.27	1.06	29.0	1.09
Mtn.	3.03	0.99	25.6	0.96
Pac.	3.04	0.99	24.8	0.93
WNC	2.69	0.88	22.9	0.86
ENC	2.69	0.87	23.4	0.88
US	3.07		26.6	
		black		
NE	2.44	0.80	21.9	0.71
MA	2.67	0.87	24.7	0.80
SA	3.32	1.08	34.4	1.12
ESC	2.97	0.97	31.8	1.03
WSC	2.61	0.85	26.4	0.86
Mtn.	2.87	0.94	25.2	0.82
Pac.	2.31	0.75	19.5	0.63
WNC	2.18	0.71	20.3	0.66
ENC	2.20	0.72	20.3	0.66
US	3.07		30.8	

Notes: Table reports both absolute, proportionate and relative change in fertility during the Baby Boom, by race. In each relative case, we report the changes in comparison to the national change by race.

Table 5: Pooled Regressions of Actual Observations on Model Solutions: National Preferences

	base	pre 1900	post 1890	pre 1960	post 1940
			white fertility		
β	0.6239***	0.3009***	0.6739***	0.5417***	0.8527***
	(0.0240)	(0.0510)	(0.0254)	(0.0307)	(0.0220)
α	1.4393***	4.0192***	0.7788***	2.0302***	0.2150***
	(0.1198)	(0.3258)	(0.0862)	(0.1685)	(0.0609)
N	891	342	549	636	304
$\bar{R}^2$	.6778	.6874	.7851	.6690	.8985
p	.0000	.0000	.0000	.0000	.0000
			white schooling		
β	0.3738***	0.2255***	0.3984***	0.2937***	0.2117***
	(0.0188)	(0.0235)	(0.0221)	(0.0207)	(0.0268)
α	6.1814***	3.6725***	7.4647***	5.2912***	11.0615***
	(0.2642)	(0.2235)	(0.2821)	(0.2670)	(0.3619)
N	789	240	549	534	304
$\bar{R}^2$	.5291	.1077	.4281	.3279	.1089
p	.0000	.0000	.0000	.0000	.0000
			black fertility		
β	0.1279***	-0.1233***	0.0873***	0.0669***	0.6972***
	(0.0185)	(0.0311)	(0.0164)	(0.0211)	(0.0382)
α	2.8620***	5.8133***	2.4523***	3.4042***	0.6559***
	(0.1467)	(0.2645)	(0.1068)	(0.1979)	(0.1106)
N	843	294	549	588	304
$\bar{R}^2$	.3128	.4121	.3300	.3190	.7046
p	.0000	.0000	.0000	.0000	.0000
			black schooling		
β	0.3305***	0.1809***	0.3177***	0.2305***	0.1894***
	(0.0178)	(0.0279)	(0.0162)	(0.0203)	(0.0213)
α	5.7013***	2.2146***	7.7037****	4.6848***	10.3526***
	(0.2397)	(0.2549)	(0.1963)	(0.2853)	(0.3056)
N	789	240	549	534	304
$\bar{R}^2$	.5818	.0668	.5123	.2471	.1717
p	.0000	.0000	.0000	.0000	.0000

Notes: Table reports results from pooled regressions with errors corrected for panel autocorrelation and Prais-Winsten heteroskedastic error correction. The final row, marked p, is the p-value on the null hypothesis that $\beta = 1$ and $\alpha = 0$.

Table 6: Pooled Regressions of Actual Observations on Model Solutions: divisional Preferences

	base	pre 1900	post 1890	pre 1960	post 1940
			white fertility		
β	0.7445***	0.5304***	0.6551***	0.6916***	0.8681***
	(0.0185)	(0.0437)	(0.0303)	(0.0242)	(0.0210)
α	0.8713***	2.5678***	0.8690***	1.2436***	0.2249***
	(0.0879)	(0.2768)	(0.0943)	(0.1282)	(0.0547)
N	891	342	549	636	304
$\bar{R}^2$	.7814	.7536	.8076	.7623	.9112
p	.0000	.0000	.0000	.0000	.0000
			white schooling		
β	0.4966***	0.3138***	0.4439***	0.4592***	0.2554***
	(0.0198)	(0.0302)	(0.0237)	(0.0248)	(0.0282)
α	5.0240***	3.3382***	6.8092***	4.1714***	10.3748***
	(0.2399)	(0.2182)	(0.3048)	(0.2303)	(0.3875)
N	789	240	549	534	304
$\bar{R}^2$	.6982	.4005	.5114	.5860	.1661
p	.0000	.0000	.0000	.0000	.0000
			black fertility		
β	0.2928***	0.0883**	0.2917***	0.2274***	0.6577***
	(0.0230)	(0.0405)	(0.0253)	(0.0272)	(0.0508)
α	2.2968***	4.2717***	1.8280***	2.7330***	0.8488***
	(0.1255)	(0.3007)	(0.1006)	(0.1707)	(0.1423)
N	843	294	549	588	304
$\bar{R}^2$	.4101	.4312	.4490	.4076	.5489
p	.0000	.0000	.0000	.0000	.0000
			black schooling		
β	0.3346***	0.2402***	0.2800***	0.2925***	0.1319***
	(0.0217)	(0.0252)	(0.0230)	(0.0222)	(0.0233)
α	5.4048***	1.7840***	7.7507***	4.1382***	11.1022***
	(0.2521)	(0.2273)	(0.2710)	(0.2558)	(0.3162)
N	789	240	549	534	304
$\bar{R}^2$	.6277	.2962	.5051	.4369	.1343
p	.0000	.0000	.0000	.0000	.0000

Notes: Table reports results from pooled regressions with errors corrected for panel autocorrelation and Prais-Winsten heteroskedastic error correction. The final row, marked p, is the p-value on the null hypothesis that $\beta = 1$ and $\alpha = 0$.

Table 7: Pooled Regressions of Actual Observations on Model Solutions: State Preferences

	base	pre 1900	post 1890	pre 1960	post 1940
			white fertility		
β	0.9975***	0.9954***	1.0007***	0.9973***	1.0064***
	(0.0018)	(0.0130)	(0.0014)	(0.0027)	(0.0065)
α	0.0012	0.0084	-0.0057	0.0016	-0.0184
	(0.0095)	(0.0812)	(0.0046)	(0.0159)	(0.0167)
N	891	342	549	636	304
$\bar{R}^2$	.9954	.9846	.9994	.9935	.9971
p	.0085	.3335	.0001	.0312	.0336
			white schooling		
β	1.0002***	1.0001***	1.0000***	1.0006***	1.0004***
	(0.0003)	(0.0005)	(0.0006)	(0.0005)	(0.0009)
α	-0.0068**	-0.0065***	-0.0039	-0.0092**	-0.0098
	(0.0030)	(0.0024)	(0.0075)	(0.0042)	(0.0130)
N	789	240	549	534	304
$\bar{R}^2$	.9999	.9999	.9998	.9999	.9998
p	.0003	.0000	.0476	.0073	.0005
			black fertility		
β	0.9854***	0.9515***	1.0077***	0.9833***	1.0020***
	(0.0121)	(0.0588)	(0.0048)	(0.0194)	(0.0057)
α	-0.0009	0.1231	-0.0405**	-0.0083	-0.0146
	(0.0516)	(0.3091)	(0.0172)	(0.0881)	(0.0172)
N	843	294	549	588	304
$\bar{R}^2$	.9472	.8927	.9875	.9368	.9878
p	.0128	.3157	.0250	.0570	.2439
			black schooling		
β	1.0007***	1.0028***	0.9998***	1.0009***	0.9992***
	(0.0006)	(0.0075)	(0.0004)	(0.0012)	(0.0012)
α	-0.0151***	-0.0194	-0.0056	-0.0161**	0.0030
	(0.0056)	(0.0243)	(0.0048)	(0.0079)	(0.0157)
N	789	240	549	534	304
$\bar{R}^2$	.9997	.9908	.9999	.9991	.9994
p	.0019	.6756	.0000	.0452	.0010

Notes: Table reports results from pooled regressions with errors corrected for panel autocorrelation and Prais-Winsten heteroskedastic error correction. The final row, marked p, is the p-value on the null hypothesis that $\beta = 1$ and $\alpha = 0$.

Table 8: Population Weighted Average Schooling Costs: κ^b, κ^w

					κ^b, κ^w					
Year	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
1800	110, 2.7	42, 2.8	4600, 4.8	1900, 3.8	-	-	-	-	280, 2.8	4000, 3.5
1810	87, 1.5	31, 1.5	3100, 3.2	1900, 3.9	1100, 2.3	-	-	200, 2.0	220, 2.2	2700, 2.2
1820	160, 1.5	38, 1.6	3200, 3.2	1600, 3.1	1100, 2.2	-	-	180, 1.8	210, 2.1	2600, 2.2
1830	100, 1.1	34, 1.2	2600, 3.3	1400, 3.0	1200, 2.4	-	-	170, 1.7	160, 1.6	2100, 1.9
1840	47, 0.9	50, 1.0	360, 1.4	750, 1.3	100, 2.4	-	-	46, 0.9	17, 0.7	430, 1.0
1850	35, 1.3	4.6, 1.4	49, 1.3	600, 1.1	210, 2.0	710, 3.6	1300, 3.6	3.6, 0.9	2.0, 0.6	230, 1.2
1860	29, 1.2	5.2, 1.2	6.4, 1.0	9.7, 0.7	9.6, 1.0	630, 1.4	2.5, 0.8	2.1, 0.6	1.2, 0.6	7.9, 0.9
1870	26, 1.1	3.7, 1.3	2.1, 0.7	1.6, 0.7	2.9, 0.7	160, 1.3	6.9, 1.1	1.9, 0.6	1.2, 0.7	2.3, 0.9
1880	2.6, 1.2	2.9, 1.4	1.0, 0.6	1.0, 0.5	1.4, 0.5	12, 0.8	7.5, 1.1	1.7, 0.6	1.3, 0.8	1.2, 0.9
1890	1.9, 1.1	1.6, 1.2	0.6, 0.5	0.6, 0.4	0.7, 0.3	2.6, 0.3	2.8, 1.0	0.8, 0.5	1.0, 0.6	0.7, 0.7
1900	2.5, 1.1	2.0, 1.3	0.6, 0.6	0.6, 0.5	0.6, 0.3	3.7, 0.4	3.3, 1.1	1.4, 0.5	1.3, 0.8	0.7, 0.8
1910	2.3, 1.3	2.8, 1.5	0.8, 0.7	0.7, 0.6	0.7, 0.4	4.4, 0.7	3.2, 1.3	1.4, 0.7	2.1, 1.0	0.9, 1.0
1920	1.7, 1.4	2.3, 1.7	0.9, 0.8	0.9, 0.7	0.8, 0.5	3.4, 0.6	1.7, 1.4	1.7, 0.8	1.6, 1.1	1.0, 1.1
1930	1.7, 1.2	3.0, 1.6	1.1, 0.8	1.1, 0.7	1.0, 0.7	2.0, 0.7	1.3, 1.5	2.2, 0.9	2.2, 1.2	1.3, 1.1
1940	2.1, 1.7	3.1, 2.2	1.2, 1.1	1.2, 0.8	1.2, 0.9	1.9, 0.9	1.4, 1.9	2.3, 1.2	2.4, 1.6	1.5, 1.5
1950	2.4, 1.8	3.6, 2.4	1.3, 1.3	1.0, 1.0	1.1, 1.1	1.2, 1.0	2.2, 1.9	1.9, 1.3	2.6, 1.7	1.7, 1.7
1960	1.6, 1.2	2.3, 1.6	1.1, 1.0	0.7, 0.8	0.8, 0.8	0.9, 0.7	1.4, 1.1	1.3, 0.8	1.6, 1.1	1.3, 1.1
1970	0.9, 0.7	1.2, 1.0	0.7, 0.7	0.5, 0.7	0.6, 0.6	0.6, 0.5	0.8, 0.7	0.7, 0.6	0.8, 0.7	0.8, 0.8
1980	1.0, 1.0	1.3, 1.2	0.8, 0.9	0.6, 0.8	0.7, 0.8	0.7, 0.6	1.0, 1.0	0.7, 0.7	0.9 0.9	0.9, 0.9
1990	1.5, 1.8	1.9, 1.9	1.3, 1.5	1.0, 1.2	1.1, 1.3	1.1, 1.1	1.5, 1.7	1.2, 1.1	1.4, 1.4	1.4, 1.5
2000	1.5, 1.3	1.4, 1.4	1.2, 1.4	1.1, 1.2	1.1, 1.0	1.0, 0.9	1.4, 1.1	1.0, 1.0	1.3, 1.2	1.2, 1.2

Notes: Table reports our estimates of the schooling access costs, κ^i, where $i = b, w$, averages are weighted by black and white populations, respectively.

Table 9: Welfare Cost of Discrimination and the Value of Civil Rights: Black Equivalent Variation, no DC

Years	(β, ν)	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
all	nation	0.1226	0.2066	1.3146	1.4379	0.6266	0.1669	0.0221	0.3839	0.1494	0.8551
all	division	0.1300	0.1416	1.4195	1.7729	0.6758	0.0984	0.0210	0.4065	0.0917	0.9421
all	state	0.1429	0.1397	1.7031	2.5213	0.8436	0.1030	0.0145	0.4271	0.0995	1.1954
pre 1870	nation	1.2758	1.1550	7.0713	9.7180	4.9984	2.7755	0.8991	3.0765	1.9523	7.1394
pre 1870	division	1.6650	2.5017	6.8828	9.5448	4.8080	4.0885	1.8424	3.6503	2.0466	7.0403
pre 1870	state	1.7254	2.4773	6.9181	9.8000	4.8897	4.2673	1.9302	3.6438	2.4450	7.1354
1870-1890	nation	0.2633	0.1414	2.9227	1.3351	2.8434	0.8904	0.3715	0.6928	0.1327	2.1921
1870-1890	division	0.6592	0.8534	3.3282	2.2916	2.8066	2.2913	1.0928	1.2275	0.9009	2.7089
1870-1890	state	0.8356	1.0052	4.7797	5.7990	3.5332	2.9727	1.5636	1.4606	1.1023	4.5205
1900-1950	nation	0.2506	0.7612	0.4772	0.5346	0.4341	1.3150	0.1281	0.6272	0.6248	0.5167
1900-1950	division	0.1307	0.2434	0.7574	1.0821	0.5962	0.6075	0.1220	0.4535	0.2419	0.7022
1900-1950	state	0.1523	0.2202	1.1829	1.7146	0.8760	0.5846	0.0265	0.4580	0.2492	1.0594
pre 1960	nation	0.4438	0.7515	2.4539	2.2599	1.2594	1.2790	0.1402	0.9180	0.6182	1.9175
pre 1960	division	0.4929	0.5313	2.6498	2.7733	1.3555	0.7591	0.1619	0.9755	0.3573	2.1155
pre 1960	state	0.5439	0.5224	3.1786	3.9591	1.6999	0.7984	0.0847	1.0261	0.3945	2.6915
1960-2000	nation	0.0165	0.0336	-0.0094	-0.0134	0.0035	-0.0001	0.0115	0.0211	0.0283	0.0083
1960-2000	division	0.0101	0.0179	-0.0103	0.0066	0.0066	-0.0008	0.0083	0.0199	0.0231	0.0068
1960-2000	state	0.0104	0.0182	-0.0118	-0.0174	0.0004	-0.0015	0.0082	0.0202	0.0233	0.0030

Notes: Table reports our estimates of the welfare cost of discrimination in the cost of schooling, as well as the value of Civil Rights. All values are weighted by black population.

Table 10: Welfare Cost of Discrimination and the Value of Civil Rights: White Compensating Variation, no DC

Years	(β, ν)	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
all	nation	0.1930	0.6261	3.5196	6.0831	0.7963	0.2899	0.0635	0.7570	0.2838	2.5244
all	division	0.1513	0.1372	2.8049	4.7337	0.6119	0.0642	0.0387	0.4642	0.0897	1.9235
all	state	0.1533	0.1288	2.5950	4.2682	0.6449	0.1504	0.0197	0.3733	0.0900	1.7719
pre 1870	nation	1.9778	3.1219	20.012	33.970	5.6204	7.3694	1.9254	4.1406	3.1396	20.974
pre 1870	division	2.0060	2.6954	16.787	23.733	4.9166	7.5965	1.8356	3.4420	2.8536	16.421
pre 1870	state	1.9494	2.6624	15.780	22.779	5.0269	5.5466	1.7335	3.4948	2.8562	15.601
1870-1890	nation	1.0812	1.5003	9.3711	16.154	5.0016	3.6551	1.7011	0.9933	0.7195	9.8229
1870-1890	division	0.9752	0.7210	6.1891	11.686	3.1550	2.9532	1.4126	0.9623	0.6804	6.7706
1870-1890	state	1.0121	0.7172	5.0068	9.2800	3.2230	3.1152	1.3511	0.9474	0.7465	5.5572
1900-1950	nation	0.2804	2.1053	0.3384	0.5292	0.2919	3.2427	0.3486	1.5402	1.0290	0.6086
1900-1950	division	0.0904	0.1739	0.3664	1.4553	0.3250	0.8982	0.2893	0.7583	0.1841	0.5922
1900-1950	state	0.1057	0.1481	0.4874	1.4296	0.3940	1.0222	0.0791	0.4274	0.1846	0.6315
pre 1960	nation	0.7121	2.1623	6.5625	9.5401	1.6010	3.2830	0.3991	1.7212	1.0628	5.6487
pre 1960	division	0.5749	0.4843	5.2384	7.4199	1.2293	1.0857	0.3327	1.1012	0.3100	4.3321
pre 1960	state	0.5798	0.4596	4.8548	6.7262	1.3016	1.2109	0.1277	0.8822	0.3168	4.0030
1960-2000	nation	0.0215	0.1384	-0.0166	-0.0207	0.0040	-0.1595	0.0333	0.1022	0.0825	0.0340
1960-2000	division	0.0114	0.0269	-0.0232	-0.0094	0.0040	-0.0892	0.0123	0.0316	0.0328	0.0037
1960-2000	state	0.0123	0.0238	-0.0314	-0.0718	-0.0018	-0.0088	0.0101	0.0277	0.0314	-0.0065

Notes: Table reports our estimates of the welfare cost of discrimination in the cost of schooling, as well as the value of Civil Rights. The values are relative to black wealth. All values are weighted by black population.

Table 11: Welfare Cost of Discrimination and the Value of Civil Rights: White Equivalent Variation, no DC

Years	(β, ν)	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
all	nation	-0.0438	-0.0587	-0.0191	-0.0574	-0.0172	-0.0442	-0.0144	-0.0708	-0.0488	-0.0429
all	division	-0.0443	-0.0545	-0.0166	-0.0528	-0.0153	-0.0428	-0.0153	-0.0727	-0.0482	-0.0415
all	state	-0.0446	-0.0538	-0.0163	-0.0532	-0.0154	-0.0423	-0.0151	-0.0702	-0.0486	-0.0411
pre 1870	nation	-0.1943	-0.1987	-0.3240	-0.3513	-0.2251	-0.3883	-0.2220	-0.1399	-0.1540	-0.2251
pre 1870	division	-0.1981	-0.2008	-0.3030	-0.3081	-0.2169	-0.3774	-0.1998	-0.1287	-0.1505	-0.2168
pre 1870	state	-0.1962	-0.2002	-0.2984	-0.3077	-0.2183	-0.3769	-0.2079	-0.1303	-0.1502	-0.2156
1870-1890	nation	-0.0847	-0.0768	-0.0770	-0.0918	-0.1146	-0.2421	-0.1503	-0.1245	-0.0605	-0.0876
1870-1890	division	-0.0843	-0.0800	-0.0636	-0.0856	-0.0891	-0.2269	-0.1474	-0.1247	-0.0638	-0.0857
1870-1890	state	-0.0853	-0.0797	-0.0596	-0.0856	-0.0871	-0.2365	-0.1554	-0.1249	-0.0635	-0.0855
1900-1950	nation	-0.0264	-0.0699	-0.0127	-0.0549	-0.0202	-0.1145	-0.0059	-0.1078	-0.0658	-0.0561
1900-1950	division	-0.0264	-0.0566	-0.0111	-0.0556	-0.0192	-0.1122	-0.0099	-0.1140	-0.0621	-0.0531
1900-1950	state	-0.0264	-0.0551	-0.0120	-0.0563	-0.0197	-0.1089	-0.0101	-0.1077	-0.0636	-0.0524
pre 1960	nation	-0.0699	-0.0889	-0.0704	-0.1078	-0.0380	-0.1288	-0.0186	-0.1121	-0.0730	-0.0792
pre 1960	division	-0.0706	-0.0804	-0.0640	-0.1005	-0.0340	-0.1252	-0.0218	-0.1166	-0.0705	-0.0757
pre 1960	state	-0.0704	-0.0792	-0.0633	-0.1008	-0.0343	-0.1231	-0.0227	-0.1118	-0.0715	-0.0751
1960-2000	nation	-0.0114	-0.0208	0.0134	-0.0023	-0.0035	-0.0075	-0.0129	-0.0215	-0.0239	-0.0111
1960-2000	division	-0.0117	-0.0221	0.0135	-0.0006	-0.0030	-0.0072	-0.0129	-0.0204	-0.0253	-0.0113
1960-2000	state	-0.0125	-0.0220	0.0135	-0.0011	-0.0031	-0.0074	-0.0123	-0.0206	-0.0252	-0.0113

Notes: Table reports our estimates of the welfare cost of discrimination in the cost of schooling, as well as the value of Civil Rights. All values are weighted by white population.

Table 12: Welfare Cost of Discrimination and the Value of Civil Rights: Black Compensating Variation, no DC.

Years	(β, ν)	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
all	nation	-0.1291	-0.1936	-0.1188	-0.2448	-0.1019	-0.0575	-0.0478	-0.1946	-0.1640	-0.1487
all	division	-0.1303	-0.1906	-0.1312	-0.2921	-0.1235	-0.0907	-0.0433	-0.2068	-0.1691	-0.1581
all	state	-0.1628	-0.1842	-0.1705	-0.3132	-0.1401	-0.1076	-0.0352	-0.2116	-0.1787	-0.1696
pre 1870	nation	-0.5282	-0.5034	-0.7804	-0.7888	-0.8235	-0.5235	-0.4891	-0.5486	-0.5699	-0.6051
pre 1870	division	-0.5745	-0.7051	-0.7712	-0.7750	-0.7956	-0.6791	-0.6143	-0.6763	-0.5944	-0.6814
pre 1870	state	-0.6339	-0.7033	-0.7773	-0.7707	-0.8041	-0.6884	-0.6521	-0.7145	-0.6753	-0.7084
1870-1890	nation	-0.1719	-0.1177	-0.4862	-0.5054	-0.6272	-0.4432	-0.2370	-0.2992	-0.1248	-0.2537
1870-1890	division	-0.3181	-0.4352	-0.4951	-0.5011	-0.5668	-0.6042	-0.4999	-0.4804	-0.4356	-0.4534
1870-1890	state	-0.4579	-0.4627	-0.7354	-0.8072	-0.7080	-0.7556	-0.6044	-0.5933	-0.5134	-0.5704
1900-1950	nation	-0.1274	-0.3224	-0.1878	-0.3717	-0.1751	-0.1345	-0.1209	-0.3465	-0.3003	-0.2625
1900-1950	division	-0.0887	-0.2244	-0.2351	-0.4839	-0.2410	-0.2417	-0.3201	-0.2375	-0.2423	-0.2413
1900-1950	state	-0.1254	-0.2015	-0.3314	-0.5049	-0.2844	-0.2922	-0.0928	-0.3009	-0.1773	-0.2495
pre 1960	nation	-0.2152	-0.3142	-0.3239	-0.4607	-0.2485	-0.1665	-0.1331	-0.3446	-0.2931	-0.2976
pre 1960	division	-0.2249	-0.3253	-0.3567	-0.5325	-0.2970	-0.2791	-0.1276	-0.3635	-0.3097	-0.3221
pre 1960	state	-0.2836	-0.3135	-0.4607	-0.5999	-0.3500	-0.3386	-0.0971	-0.3717	-0.3282	-0.3496
1960-2000	nation	-0.0220	-0.0425	0.0113	-0.0087	-0.0055	-0.0104	-0.0160	-0.0158	-0.0314	-0.0177
1960-2000	division	-0.0127	-0.0218	0.0118	-0.0291	-0.0093	-0.0091	-0.0119	-0.0201	-0.0247	-0.0137
1960-2000	state	-0.0126	-0.0220	0.0135	0.0006	-0.0019	-0.0077	-0.0122	-0.0209	-0.0252	-0.0111

Notes: Table reports our estimates of the welfare cost of discrimination in the cost of schooling, as well as the value of Civil Rights. All values are weighted by white population.

Table 13: Sub-Utility Gains from Equal Educational Opportunity Schooling Differences, no DC

Year	variable	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
all	$(\tau_\kappa^b/\tau^b)^\mu$	1.024	1.017	1.118	1.114	1.048	1.004	1.002	1.026	1.012	1.072
all	$(\overline{h}/h^b)^{\rho-\rho_\kappa}$	1.103	1.084	2.953	3.357	1.932	1.056	1.005	1.425	1.055	2.254
all	$(\overline{h}/h^b)^{\rho-\rho_\kappa}(\tau_\kappa^b/\tau^b)^\mu$	1.162	1.118	3.803	4.310	2.173	1.070	1.008	1.534	1.074	2.760
pre 1870	$(\tau_\kappa^b/\tau^b)^\mu$	1.349	1.302	1.778	1.757	1.483	1.962	1.243	1.336	1.266	1.711
pre 1870	$(\overline{h}/h^b)^{\rho-\rho_\kappa}$	2.403	2.929	8.607	10.03	5.779	4.339	2.630	5.689	3.491	8.328
pre 1870	$(\overline{h}/h^b)^{\rho-\rho_\kappa}(\tau_\kappa^b/\tau^b)^\mu$	3.387	3.837	14.36	17.20	8.711	8.571	3.318	7.481	4.418	13.83
1870-1890	$(\tau_\kappa^b/\tau^b)^\mu$	1.075	1.070	1.128	1.121	1.156	1.194	1.101	1.074	1.068	1.126
1870-1890	$(\overline{h}/h^b)^{\rho-\rho_\kappa}$	1.727	1.846	7.189	7.208	5.404	3.397	2.195	2.814	2.206	6.415
1870-1890	$(\overline{h}/h^b)^{\rho-\rho_\kappa}(\tau_\kappa^b/\tau^b)^\mu$	1.939	1.982	8.230	8.145	6.301	4.205	2.487	3.053	2.360	7.319
1900-1950	$(\tau_\kappa^b/\tau^b)^\mu$	1.015	1.018	1.040	1.045	1.041	1.045	1.007	1.018	1.017	1.037
1900-1950	$(\overline{h}/h^b)^{\rho-\rho_\kappa}$	1.073	1.095	2.236	2.351	1.918	1.238	1.018	1.211	1.095	1.973
1900-1950	$(\overline{h}/h^b)^{\rho-\rho_\kappa}(\tau_\kappa^b/\tau^b)^\mu$	1.090	1.116	2.356	2.482	2.024	1.301	1.028	1.238	1.114	2.073
pre 1960	$(\tau_\kappa^b/\tau^b)^\mu$	1.086	1.053	1.226	1.182	1.100	1.059	1.011	1.066	1.029	1.165
pre 1960	$(\overline{h}/h^b)^{\rho-\rho_\kappa}$	1.415	1.350	4.633	4.692	2.880	1.431	1.064	2.050	1.270	3.828
pre 1960	$(\overline{h}/h^b)^{\rho-\rho_\kappa}(\tau_\kappa^b/\tau^b)^\mu$	1.641	1.474	6.222	6.187	3.369	1.564	1.087	2.320	1.329	4.969
1960-2000	$(\tau_\kappa^b/\tau^b)^\mu$	1.004	1.005	0.991	0.995	0.997	0.996	1.001	0.999	1.008	0.999
1960-2000	$(\overline{h}/h^b)^{\rho-\rho_\kappa}$	1.000	1.000	1.000	0.999	1.000	1.000	1.000	1.000	1.000	1.000
1960-2000	$(\overline{h}/h^b)^{\rho-\rho_\kappa}(\tau_\kappa^b/\tau^b)^\mu$	1.004	1.005	0.991	0.994	0.996	0.996	1.001	0.999	1.008	0.999

Table 14: Welfare Cost of Differential Mortality: Black Equivalent Variation

Years	(β, ν)	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
all	nation	0.1635	0.2915	1.1826	0.7989	0.5362	0.0788	0.0407	0.5727	0.2430	0.7197
all	division	0.1040	0.1497	1.3969	1.5256	0.5973	0.0887	0.0206	0.6123	0.1406	0.8991
all	state	0.1227	0.1456	1.7889	2.2576	0.7729	0.0939	0.0238	0.7262	0.1505	1.1930
pre 1870	nation	0.6612	1.2121	1.4583	1.1759	1.4064	0.0833	0.8563	2.3716	1.9039	1.3863
pre 1870	division	0.5017	1.0116	1.4768	1.3228	1.2344	0.0637	1.6860	4.2374	2.1289	1.4454
pre 1870	state	0.5995	1.0389	1.3460	1.4866	0.9608	0.0727	1.9136	4.2591	2.7351	1.3947
1870-1890	nation	0.5860	1.3620	6.0514	2.3898	2.5510	0.4258	0.5658	2.7704	2.5494	4.0154
1870-1890	division	0.8582	1.6747	6.6999	5.0692	2.1436	1.1271	0.9911	3.1306	2.4179	5.0345
1870-1890	state	1.0996	1.8056	9.0009	8.5228	3.0979	1.6753	1.5147	3.8607	2.6443	7.2586
1900-1950	nation	0.5679	1.0443	1.2671	0.8467	0.6506	0.4448	0.2341	0.8041	0.9190	0.9804
1900-1950	division	0.2433	0.3962	1.7493	1.6758	0.9240	0.5270	0.0543	0.5419	0.3820	1.3047
1900-1950	state	0.2744	0.3593	2.3190	2.2818	1.1888	0.5356	0.0767	0.7326	0.3937	1.7150
pre 1960	nation	0.5879	1.0882	2.2067	1.2336	1.0608	0.4428	0.2479	1.3887	1.1010	1.5938
pre 1960	division	0.3797	0.5664	2.6155	2.3445	1.1724	0.5794	0.0926	1.4961	0.6246	1.9996
pre 1960	state	0.4534	0.5501	3.3516	3.4870	1.5172	0.6355	0.1314	0.9985	0.6741	2.6606
1960-2000	nation	0.0233	0.0385	0.0273	0.0314	0.0197	0.0241	0.0220	0.0185	0.0213	0.0268
1960-2000	division	0.0129	0.0173	0.0221	0.0797	0.0311	0.0150	0.0141	0.0119	0.0156	0.0266
1960-2000	state	0.0134	0.0172	0.0259	0.0869	0.0399	0.0125	0.0141	0.0108	0.0151	0.0296

Notes: Table reports our estimates of the welfare cost of differential mortality. All values are weighted by black population.

Table 15: Welfare Cost of Differential Mortality: White Compensating Variation

Years	(β, ν)	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
all	nation	0.3707	1.0678	6.8634	6.4648	1.1254	0.8961	0.0958	1.5581	0.47247	3.9493
all	division	0.1985	0.3338	6.1677	6.7749	1.5401	0.2030	0.0464	1.2398	0.2359	3.6821
all	state	0.1990	0.3393	6.0570	7.1562	1.1124	0.1032	0.0378	1.1954	0.2258	3.6407
pre 1870	nation	2.9045	10.222	20.946	20.525	5.5930	1.6073	2.2769	12.926	9.9923	18.669
pre 1870	division	2.4993	8.1181	18.797	22.074	5.4445	1.9390	2.1545	10.443	9.5723	17.648
pre 1870	state	2.2995	8.3153	17.777	21.864	4.8905	2.9280	1.9563	9.9210	9.3168	16.944
1870-1890	nation	2.1434	8.5201	33.330	27.190	5.2866	2.5519	2.4058	5.9656	5.7571	24.239
1870-1890	division	1.1191	2.7046	27.692	22.883	6.7464	2.1409	1.6347	6.5766	5.0047	20.540
1870-1890	state	1.2679	2.9327	27.012	25.010	5.1290	1.6613	1.4705	6.5474	4.7395	20.583
1900-1950	nation	0.7731	2.8771	3.2828	1.2703	1.0754	4.9636	0.4602	1.4853	1.4178	2.1476
1900-1950	division	0.1554	0.2751	3.6534	3.0633	1.8506	0.6612	0.1780	0.6963	0.3036	2.5153
1900-1950	state	0.1750	0.2626	3.9182	3.4043	1.1412	0.4958	0.0792	0.6369	0.2843	2.5574
pre 1960	nation	1.3674	4.1154	12.897	10.091	2.2250	4.7480	0.5302	3.7077	2.0793	8.8470
pre 1960	division	0.7311	1.3005	11.574	10.534	3.0466	0.7927	0.2342	3.0169	1.0196	8.2535
pre 1960	state	0.7283	1.3300	11.372	11.165	2.1850	0.6008	0.1328	2.9115	0.9703	8.1730
1960-2000	nation	0.0414	0.1001	0.0565	0.0618	0.0426	0.3178	0.0569	0.0981	0.0601	0.0668
1960-2000	division	0.0225	0.0269	0.0691	0.1380	0.0568	0.1144	0.0295	0.0328	0.0334	0.0581
1960-2000	state	0.0241	0.0247	0.0615	0.0783	0.0562	0.0284	0.0293	0.0299	0.0335	0.0478

Notes: Table reports our estimates of the welfare cost of differential mortality. The values are relative to black wealth. All values are weighted by black population.

Table 16: Welfare Cost of Differential Mortality: White Equivalent Variation

Years	(β, ν)	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
all	nation	-0.0760	-0.1133	-0.0748	-0.0872	-0.0460	-0.0455	-0.0351	-0.0837	-0.0858	-0.0789
all	division	-0.0629	-0.0962	-0.0701	-0.0904	-0.0549	-0.0425	-0.0302	-0.0729	-0.0820	-0.0725
all	state	-0.0616	-0.0951	-0.0646	-0.0865	-0.0492	-0.0324	-0.0289	-0.0714	-0.0818	-0.0700
pre 1870	nation	-0.2331	-0.4234	-0.3447	-0.2980	-0.1799	-0.0714	-0.2417	-0.3062	-0.3426	-0.3385
pre 1870	division	-0.2123	-0.4007	-0.3234	-0.3340	-0.1987	-0.0731	-0.2123	-0.2756	-0.3560	-0.3304
pre 1870	state	-0.2053	-0.3977	-0.3202	-0.3322	-0.1966	-0.0810	-0.2140	-0.2744	-0.3549	-0.3273
1870-1890	nation	-0.1844	-0.3138	-0.2424	-0.2100	-0.1552	-0.1369	-0.2020	-0.2378	-0.2859	-0.2547
1870-1890	division	-0.1447	-0.2525	-0.2529	-0.2468	-0.2263	-0.1292	-0.1821	-0.2201	-0.2776	-0.2390
1870-1890	state	-0.1399	-0.2528	-0.2368	-0.2350	-0.1941	-0.1037	-0.1757	-0.2113	-0.2781	-0.2327
1900-1950	nation	-0.0694	-0.1147	-0.0800	-0.0802	-0.0687	-0.0853	-0.0484	-0.0983	-0.0925	-0.0889
1900-1950	division	-0.0496	-0.0865	-0.0777	-0.0790	-0.0851	-0.0808	-0.0337	-0.0808	-0.0768	-0.0755
1900-1950	state	-0.0494	-0.0845	-0.0634	-0.0724	-0.0745	-0.0574	-0.0316	-0.0803	-0.0758	-0.0710
pre 1960	nation	-0.1217	-0.1899	-0.1444	-0.1373	-0.0823	-0.0900	-0.0615	-0.1325	-0.1506	-0.1419
pre 1960	division	-0.0983	-0.1571	-0.1412	-0.1486	-0.1049	-0.0852	-0.0463	-0.1145	-0.1389	-0.1287
pre 1960	state	-0.0960	-0.1553	-0.1283	-0.1418	-0.0922	-0.0619	-0.0439	-0.1123	-0.1382	-0.1241
1960-2000	nation	-0.0193	-0.0174	-0.0297	-0.0324	-0.0221	-0.0263	-0.0253	-0.0256	-0.0192	-0.0233
1960-2000	division	-0.0190	-0.0200	-0.0240	-0.0268	-0.0220	-0.0240	-0.0242	-0.0233	-0.0236	-0.0229
1960-2000	state	-0.0189	-0.0197	-0.0234	-0.0259	-0.0208	-0.0197	-0.0233	-0.0226	-0.0240	-0.0223

Notes: Table reports our estimates of the welfare cost of differential mortality. All values are weighted by white population.

Table 17: Welfare Cost of Differential Mortality: Black Compensating Variation

Years	(β, ν)	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
all	nation	-0.1759	-0.3002	-0.1822	-0.2609	-0.1431	-0.1016	-0.0832	-0.2235	-0.2454	-0.2111
all	division	-0.1230	-0.2220	-0.1977	-0.3287	-0.1874	-0.0810	-0.0446	-0.2077	-0.2072	-0.1882
all	state	-0.1601	-0.2067	-0.2233	-0.3161	-0.1855	-0.0928	-0.0505	-0.2236	-0.2133	-0.1942
pre 1870	nation	-0.2770	-0.4959	-0.3248	-0.3256	-0.3065	-0.0499	-0.4066	-0.4901	-0.5215	-0.4128
pre 1870	division	-0.2405	-0.4524	-0.3308	-0.3326	-0.2954	-0.0358	-0.5120	-0.6339	-0.5506	-0.4066
pre 1870	state	-0.3029	-0.4436	-0.3210	-0.3364	-0.2776	-0.0395	-0.5517	-0.6483	-0.6136	-0.4253
1870-1890	nation	-0.3218	-0.5656	-0.7444	-0.6783	-0.6715	-0.2509	-0.3335	-0.5158	-0.6345	-0.5766
1870-1890	division	-0.3708	-0.6342	-0.7520	-0.7827	-0.6453	-0.3259	-0.4688	-0.5915	-0.6680	-0.6290
1870-1890	state	-0.5157	-0.6279	-0.8611	-0.8734	-0.7467	-0.4484	-0.5834	-0.6787	-0.7123	-0.6929
1900-1950	nation	-0.2965	-0.4918	-0.3747	-0.4491	-0.2920	-0.2864	-0.2356	-0.3579	-0.4148	-0.3872
1900-1950	division	-0.1597	-0.3143	-0.4382	-0.5692	-0.4097	-0.2269	-0.0964	-0.3015	-0.3081	-0.3204
1900-1950	state	-0.2080	-0.2783	-0.5147	-0.5449	-0.4064	-0.2633	-0.1126	-0.3198	-0.3061	-0.3263
pre 1960	nation	-0.2969	-0.5043	-0.4224	-0.4703	-0.3349	-0.2810	-0.2445	-0.3929	-0.4645	-0.4202
pre 1960	division	-0.2117	-0.3854	-0.4688	-0.5698	-0.4320	-0.2343	-0.1276	-0.3689	-0.3957	-0.3788
pre 1960	state	-0.2792	-0.3580	-0.5371	-0.5702	-0.4399	-0.2784	-0.1512	-0.4003	-0.4081	-0.3954
1960-2000	nation	-0.0254	-0.0443	-0.0267	-0.0318	-0.0169	-0.0239	-0.0231	-0.0216	-0.0203	-0.0266
1960-2000	division	-0.0129	-0.0172	-0.0222	-0.0649	-0.0264	-0.0146	-0.0137	-0.0154	-0.0135	-0.0200
1960-2000	state	-0.0120	-0.0170	-0.0201	-0.0380	-0.0180	-0.0125	-0.0130	-0.0130	-0.0132	-0.0167

Notes: Table reports our estimates of the welfare cost of differential mortality. All values are weighted by white population.

Table 18: Value of Medical Advances Since 1970

New England	μ^b_{1970}	μ^w_{1970}	*East South Central*	μ^b_{1970}	μ^w_{1970}	*Pacific*	μ^b_{1970}	μ^w_{1970}
Connecticut	1.29%	1.26%	Alabama	0.74%	0.54%	Alaska	0.55%	0.34%
Maine	0.33	0.25	Kentucky	1.81	1.21	California	0.89	3.06
Massachusetts	2.47	1.78	Mississippi	1.07	1.11	Hawaii	0.85	0.38
New Hampshire	0.18	0.30	Tennessee	1.26	0.75	Oregon	0.96	1.11
Rhode Island	1.74	1.72				Washington	0.75	1.42
Vermont	0.45	0.23						
			West South Central			*West North Central*		
Middle Atlantic			Arkansas	0.84	0.55	Iowa	0.38	0.66
New Jersey	2.12	1.76	Louisiana	2.04	1.12	Kansas	0.61	2.38
New York	3.00	2.10	Oklahoma	1.24	0.73	Minnesota	2.55	2.63
Pennsylvania	2.17	1.33	Texas	0.62	1.26	Missouri	3.79	1.46
						Nebraska	4.50	1.88
South Atlantic			*Mountain*			North Dakota	0.93	0.22
Delaware	1.21	1.07	Arizona	2.39	1.08	South Dakota	1.72	0.51
D.C.	2.61	1.34	Colorado	6.11	1.77			
Florida	0.96	1.51	Idaho	2.36	0.69	*East North Central*		
Georgia	0.81	1.15	Montana	1.14	0.54	Illinois	2.58	3.23
Maryland	1.27	0.89	Nevada	2.41	0.67	Indiana	4.53	2.44
North Carolina	0.79	0.89	New Mexico	0.88	0.57	Michigan	2.52	6.33
South Carolina	2.21	0.48	Utah	1.93	3.74	Ohio	3.69	2.90
Virginia	1.96	2.36	Wyoming	2.51	0.51	Wisconsin	1.94	3.07
West Virginia	1.13	0.41						

Table 19: Value of Medical Advances Since 1940

New England	μ^b_{1940}	μ^w_{1940}	*East South Central*	μ^b_{1940}	μ^w_{1940}	*Pacific*	μ^b_{1940}	μ^w_{1940}
Connecticut	5.29%	4.31%	Alabama	3.31%	1.69%	Alaska*	0.93%	0.07%
Maine	1.74	1.27	Kentucky	6.25	2.91	California	4.35	6.93
Massachusetts	9.26	5.53	Mississippi	3.12	2.27	Hawaii*	1.61	0.36
New Hampshire	1.85	1.36	Tennessee	4.55	2.11	Oregon	4.23	2.90
Rhode Island	5.61	5.38				Washington	3.21	3.50
Vermont	1.73	1.16						
			West South Central			*West North Central*		
Middle Atlantic			Arkansas	2.97	1.47	Iowa	3.05	1.74
New Jersey	8.87	5.65	Louisiana	6.08	2.88	Kansas	3.35	5.20
New York	13.0	6.75	Oklahoma	4.15	2.20	Minnesota	10.1	5.93
Pennsylvania	9.45	4.64	Texas	20.6	4.97	Missouri	14.2	3.62
						Nebraska	16.8	4.89
South Atlantic			*Mountain*			North Dakota	5.23	1.68
Delaware	5.01	3.77	Arizona	9.62	3.91	South Dakota	5.87	2.15
D.C.	10.5	4.20	Colorado	16.7	4.94			
Florida	4.16	3.62	Idaho	7.56	2.18	*East North Central*		
Georgia	4.56	2.74	Montana	2.94	1.39	Illinois	10.8	7.22
Maryland	5.39	3.18	Nevada	6.13	1.67	Indiana	14.5	5.57
North Carolina	3.70	2.26	New Mexico	3.66	2.69	Michigan	9.97	11.5
South Carolina	7.22	1.50	Utah	6.72	8.41	Ohio	12.8	6.41
Virginia	6.99	5.37	Wyoming	6.47	2.04	Wisconsin	8.65	6.55
West Virginia	4.08	1.36						

Table 20: Value of Medical Advances Since 1900

New England	μ^b_{1900}	μ^w_{1900}	*East South Central*	μ^b_{1900}	μ^w_{1900}	*Pacific*	μ^b_{1900}	μ^w_{1900}
Connecticut	18.7%	9.50%	Alabama	9.97%	3.47%	Alaska*	0.93%	0.07%
Maine	4.96	3.25	Kentucky	18.9	5.84	California	13.3	12.5
Massachusetts	24.5	12.0	Mississippi	7.18	4.10	Hawaii*	1.61	0.36
New Hampshire	6.42	3.42	Tennessee	13.7	4.16	Oregon	14.0	5.89
Rhode Island	17.3	11.4				Washington	10.7	6.81
Vermont	4.48	2.77						
			West South Central			*West North Central*		
Middle Atlantic			Arkansas	7.96	3.02	Iowa	10.2	3.59
New Jersey	29.1	11.5	Louisiana	16.5	6.27	Kansas	11.4	10.0
New York	36.7	13.7	Oklahoma	13.4	5.69	Minnesota	27.6	10.8
Pennsylvania	32.8	10.1	Texas	41.8	10.8	Missouri	33.9	7.62
						Nebraska	39.8	10.8
South Atlantic			*Mountain*			North Dakota	14.4	5.27
Delaware	23.4	8.10	Arizona	32.5	10.5	South Dakota	13.6	5.90
D.C.	27.3	7.60	Colorado	33.9	9.79			
Florida	13.0	6.99	Idaho	17.1	5.27	*East North Central*		
Georgia	16.1	5.42	Montana	5.70	2.96	Illinois	30.0	13.1
Maryland	27.1	7.19	Nevada	13.3	3.44	Indiana	31.7	9.97
North Carolina	11.6	4.55	New Mexico	8.47	6.22	Michigan	28.9	18.4
South Carolina	23.1	3.34	Utah	19.8	14.9	Ohio	32.1	11.6
Virginia	11.7	9.48	Wyoming	9.86	5.45	Wisconsin	24.1	11.6
West Virginia	10.9	3.33						

Table 21: Value of Medical Advances Since 1850

New England	μ^b_{1850}	μ^w_{1850}	*East South Central*	μ^b_{1850}	μ^w_{1850}	*Pacific*	μ^b_{1850}	μ^w_{1850}
Connecticut	28.3%	13.5%	Alabama	23.9%	6.12%	Alaska*	0.93%	0.07%
Maine	9.87	5.84	Kentucky	39.8	10.3	California	24.5	21.0
Massachusetts	35.8	18.1	Mississippi	14.9	6.82	Hawaii*	1.61	0.36
New Hampshire	11.0	5.62	Tennessee	34.0	7.35	Oregon	21.4	9.93
Rhode Island	23.4	15.6				Washington	19.0	11.2
Vermont	8.70	4.86						
			West South Central			*West North Central*		
Middle Atlantic			Arkansas	19.9	5.16	Iowa	20.7	6.44
New Jersey	42.6	15.3	Louisiana	41.1	11.5	Kansas	19.0	15.9
New York	53.3	17.7	Oklahoma	30.6	12.4	Minnesota	46.6	18.4
Pennsylvania	51.0	14.4	Texas	68.5	18.3	Missouri	56.1	13.6
						Nebraska	52.8	14.7
South Atlantic			*Mountain*			North Dakota	14.0	4.66
Delaware	36.6	11.6	Arizona	39.5	11.7	South Dakota	12.9	5.92
D.C.	35.8	8.76	Colorado	60.7	17.3			
Florida	33.3	11.5	Idaho	24.8	6.46	*East North Central*		
Georgia	45.3	9.51	Montana	9.18	5.46	Illinois	46.3	20.5
Maryland	42.6	10.8	Nevada	24.0	6.20	Indiana	46.6	15.3
North Carolina	31.4	8.24	New Mexico	14.7	9.38	Michigan	45.5	27.6
South Carolina	50.0	5.90	Utah	38.9	25.0	Ohio	49.9	17.6
Virginia	44.5	15.0	Wyoming	11.1	5.40	Wisconsin	36.5	17.5
West Virginia	22.8	6.37						

Table 22: Regressions: Real Output Per Worker (standard error)

variable	lny	lny	lny	lny	lny	lny
unweighted						
lnh	0.858	0.869	0.563	0.752	0.770	0.596
	(0.029)	(0.028)	(0.040)	(0.033)	(0.032)	(0.056)
gold	-	1.157	0.965	-	1.024	0.831
	-	(0.061)	(0.054)	-	(0.081)	(0.062)
silver	-	0.849	0.772	-	1.150	1.104
	-	(0.058)	(0.037)	-	(0.083)	(0.044)
constant	7.046	7.022	7.057	7.479	7.411	7.574
	(0.090)	(0.085)	(0.070)	(0.106)	(0.104)	(0.086)
imputed data	yes	yes	yes	no	no	no
year dummies	no	no	yes	no	no	no
N	943	943	943	794	794	794
$\overline{R}^2$	.9869	.9881	.9945	.9926	.9933	.9958
weighted						
lnh	0.913	0.912	0.732	0.892	0.893	0.735
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
gold	-	0.410	-0.023	-	0.559	0.279
	-	(0.000)	(0.000)	-	(0.000)	(0.000)
silver	-	1.160	1.161	-	1.288	1.191
	-	(0.000)	(0.000)	-	(0.000)	(0.000)
constant	6.875	6.895	6.894	6.952	6.963	7.209
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
imputed data	yes	yes	yes	no	no	no
year dummies	no	no	yes	no	no	no
N	943	943	943	794	794	794
$\overline{R}^2$	.9953	.9956	.9979	.9964	.9965	.9976

Table 23: Regressions: Permanent Income (standard error)

variable	lny_b	lny_b	lny_b	lny_b	lny_b	lny_b
lnH_b	0.356	0.439	0.182	0.273	0.363	0.170
	(0.055)	(0.037)	(0.011)	(0.000)	(0.000)	(0.000)
constant	8.737	8.572	8.413	8.984	9.011	8.435
	(0.202)	(0.124)	(0.040)	(0.000)	(0.000)	(0.000)
2010 dummy	no	-0.657	no	no	-0.624	no
		(0.140)			(0.000)	
2000 dummy	no	-0.171	no	no	-0.184	no
		(0.126)			(0.000)	
1990 dummy	no	-0.200	no	no	-0.189	no
		(0.110)			(0.000)	
year dummies	no	no	yes	no	no	yes
weighted	no	no	no	yes	yes	yes
N	516	516	516	516	516	516
$\overline{R}^2$	.9888	.9906	.9933	.9860	.9923	.9988

variable	lny_w	lny_w	lny_w	lny_w	lny_w	lny_w
lnH_w	0.629	0.902	0.596	0.499	0.870	0.811
	(0.162)	(0.099)	(0.040)	(0.000)	(0.000)	(0.000)
constant	7.718	6.844	7.564	8.262	6.968	6.898
	(0.202)	(0.374)	(0.115)	(0.000)	(0.000)	(0.000)
2010 dummy	no	-0.860	no	no	-0.816	no
		(0.197)			(0.000)	
2000 dummy	no	-0.357	no	no	-0.308	no
		(0.178)			(0.000)	
1990 dummy	no	-0.195	no	no	-0.168	no
		(0.145)			(0.000)	
year dummies	no	no	yes	no	no	yes
weighted	no	no	no	yes	yes	yes
N	553	553	553	553	553	553
$\overline{R}^2$	.9731	.9934	.9994	.9572	.9943	.9998

Table 24: Regressions: Black and White Earnings (standard error)

variable	lny_b	lny_b	lny_b	lny_b	lny_b	lny_b
lnH_b	0.404	0.440	0.187	0.338	0.386	0.179
	(0.061)	(0.058)	(0.017)	(0.000)	(0.000)	(0.000)
constant	8.593	8.506	8.622	8.819	8.710	8.551
	(0.224)	(0.205)	(0.041)	(0.000)	(0.000)	(0.000)
2010 dummy	no	-0.221	no	no	-0.238	no
		(0.163)			(0.000)	
year dummies	no	no	yes	no	no	yes
weighted	no	no	no	yes	yes	yes
N	388	388	388	388	388	388
$\overline{R}^2$	.9856	.9850	.9965	.9779	.9809	.9992
variable	lny_w	lny_w	lny_w	lny_w	lny_w	lny_w
lnH_w	0.842	0.979	0.682	0.774	0.954	1.073
	(0.179)	(0.169)	(0.075)	(0.000)	(0.000)	(0.000)
constant	6.901	6.399	7.254	7.206	6.523	5.912
	(0.739)	(0.681)	(0.249)	(0.000)	(0.000)	(0.000)
2010 dummy	no	-0.292	no	no	-0.281	no
		(0.179)			(0.000)	
year dummies	no	no	yes	no	no	yes
weighted	no	no	no	yes	yes	yes
N	404	404	404	404	404	404
$\overline{R}^2$	.9861	.9894	.9995	.9802	.9868	.9997

Table 25: Regressions: Growth Rate of Real Output (standard error)

variable	g_y	g_y	g_y	g_y	g_y	g_y	g_y
g_H	0.215	0.301	0.743	0.201	0.664	1.217	1.199
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.124)	(0.108)
gold	-	-0.037	-	-0.036	-0.028	-	- 0.008
	-	(0.000)	-	(0.000)	(0.000)	-	(0.002)
silver	-	-0.005	-	-0.007	-0.010	-	-0.000
	-	(0.000)	-	(0.000)	(0.000)	-	(0.000)
constant	0.012	0.012	-0.006	0.012	-0.009	-0.004	-0.003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
weighted	yes	yes	yes	yes	yes	no	no
division	yes	no	no	yes	yes	no	no
year	no	no	yes	no	yes	no	no
N	892	892	892	892	892	51	51
$\overline{R}^2$	.0981	.0891	.5491	.1018	.5659	.6613	.7576
g_H	1.113	1.109	1.317	1.184	1.188	1.116	
	(0.150)	(0.137)	(0.218)	(0.110)	(0.181)	(0.140)	
gold	-	-0.006	-	-0.008	-	-0.006	
	-	(0.002)	-	(0.001)	-	(0.001)	
silver	-	-0.000	-	-0.000	-	0.001	
	-	(0.002)	-	(0.003)	-	(0.002)	
constant	-0.005	-0.004	-0.006	-0.003	-0.010	-0.004	
	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)	(0.003)	
weighted	no	no	yes	yes	yes	yes	
division	yes	yes	no	no	yes	yes	
year	no	no	no	no	no	no	
N	51	51	51	51	51	51	
$\overline{R}^2$	.7792	.8264	.4264	.8627	.8683	.9261	

Table 26: Regressions: Growth Rate of Real Output (No Imputed Data) (standard error)

variable	g_y	g_y	g_y	g_y	g_y	g_y	g_y
g_H	0.153	0.290	0.817	0.135	0.912	0.484	0.486
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.192)	(0.153)
gold	-	-0.046	-	-0.047	-0.036	-	- 0.012
	-	(0.000)	-	(0.000)	(0.000)	-	(0.003)
silver	-	-0.033	-	-0.033	-0.026	-	-0.011
	-	(0.000)	-	(0.000)	(0.000)	-	(0.002)
constant	0.016	0.012	0.030	0.014	0.026	0.006	0.007
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.003)
weighted	yes	yes	yes	yes	yes	no	no
division	yes	no	no	yes	yes	no	no
year	no	no	yes	no	yes	no	no
N	743	743	743	743	743	51	51
$\overline{R}^2$	.1226	.0954	.5795	.1071	.5851	.0967	.4634
g_H	0.454	0.452	0.724	0.490	0.530	0.323	
	(0.280)	(0.229)	(0.256)	(0.140)	(0.330)	(0.253)	
gold	-	-0.009	-	-0.013	-	-0.006	
	-	(0.004)	-	(0.001)	-	(0.002)	
silver	-	-0.010	-	-0.012	-	-0.012	
	-	(0.003)	-	(0.003)	-	(0.003)	
constant	0.002	0.004	0.001	0.007	-0.005	0.004	
	(0.005)	(0.004)	(0.005)	(0.003)	(0.006)	(0.005)	
weighted	no	no	yes	yes	yes	yes	
division	yes	yes	no	no	yes	yes	
year	no	no	no	no	no	no	
N	51	51	51	51	51	51	
$\overline{R}^2$	.3820	.6070	.1400	.7609	.7722	.8768	

Table 27: Regressions: Growth Rate of Black & White Permanent Income (standard error)

variable	g_y	g_y	g_y	g_y	g_y	g_y
black permanent income						
g_H	0.390	0.358	0.111	0.063	0.201	0.212
	(0.000)	(0.000)	(0.000)	(0.000)	(0.066)	(0.107)
2010 dummy	-0.042	-0.043	-	-	-	-
	(0.000)	(0.000)	-	-	-	-
constant	-0.002	-0.002	0.054	0.056	0.010	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.004)
weighted	yes	yes	yes	yes	yes	yes
division	no	yes	no	yes	no	yes
year	no	no	yes	yes	no	no
N	465	465	465	465	51	51
$\overline{R}^2$	.5181	.5217	.8384	.8400	.1568	.6920
white permanent income						
g_H	-0.614	-0.651	0.520	0.368	0.483	0.356
	(0.000)	(0.000)	(0.000)	(0.000)	(0.200)	(0.261)
2010 dummy	-0.056	-0.056	-	-	-	-
	(0.000)	(0.000)	-	-	-	-
constant	0.027	0.023	0.022	0.024	0.006	0.003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.006)
weighted	yes	yes	yes	yes	yes	yes
division	no	yes	no	yes	no	yes
year	no	no	yes	yes	no	no
N	502	502	502	502	51	51
$\overline{R}^2$	.7332	.7420	.9622	.9651	.1060	.5131

Table 28: Regressions: Growth Rate of Black & White State Income (standard error)

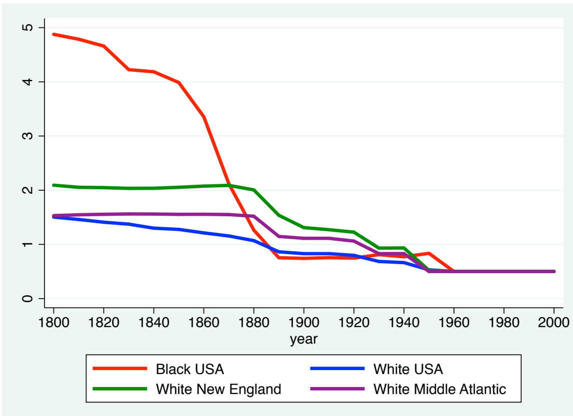
variable	g_y	g_y	g_y	g_y	g_y	g_y
black state income						
g_H	0.737	0.893	0.232	0.263	0.261	0.072
	(0.000)	(0.000)	(0.000)	(0.000)	(0.066)	(0.130)
constant	-0.009	-0.013	0.051	0.050	0.013	0.015
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.004)
weighted	yes	yes	yes	yes	yes	yes
division	no	yes	no	yes	no	yes
year	no	no	yes	yes	no	no
N	288	268	268	268	51	51
$\overline{R}^2$	.2131	.2436	.8441	.8447	.2433	.5024
white state income						
g_H	1.258	1.393	1.036	1.290	0.812	0.710
	(0.001)	(0.001)	(0.000)	(0.000)	(0.179)	(0.212)
constant	-0.004	-0.011	0.013	0.005	0.005	0.004
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.004)
weighted	yes	yes	yes	yes	yes	yes
division	no	yes	no	yes	no	yes
year	no	no	yes	yes	no	no
N	302	302	302	302	51	51
$\overline{R}^2$	.1518	.1643	.9398	.9457	.2958	.7793

Table 29: Relative Black Human Capital

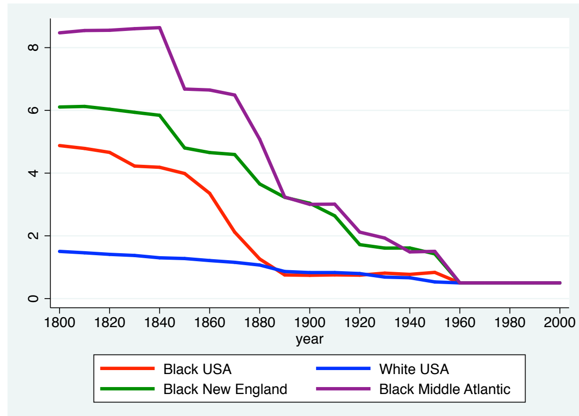
Years	NE	MA	SA	ESC	WSC	Mtn.	Pac.	WNC	ENC	US
1800	0.2159	0.1192	0.0821	0.0940	-	-	-	-	0.1316	0.0877
1820	0.1880	0.1062	0.0461	0.0578	-	-	-	-	0.0947	0.0533
1840	0.1547	0.0938	0.0253	0.0326	0.0480	-	-	0.0538	0.0694	0.0330
1860	0.1194	0.0734	0.0167	0.0167	0.0383	-	-	0.0371	0.0513	0.0223
1880	0.1691	0.1002	0.0139	0.0124	0.0382	0.0640	0.1665	0.0454	0.0774	0.0223
1900	0.2397	0.1616	0.0233	0.0177	0.0408	0.0818	0.2133	0.1104	0.1262	0.0357
1920	0.3668	0.2655	0.0458	0.0362	0.0749	0.1442	0.2892	0.19802	0.2225	0.0687
1930	0.5105	0.3999	0.0713	0.0599	0.1226	0.2713	0.4062	0.3010	0.3161	0.1101
1940	0.5559	0.4319	0.0977	0.0837	0.1541	0.2774	0.5157	0.3771	0.3994	0.1528
1950	0.6872	0.5852	0.1530	0.1253	0.2204	0.4038	0.6660	0.4877	0.5300	0.2456
1960	0.7415	0.6318	0.2127	0.1755	0.2883	0.4571	0.7410	0.5680	0.5956	0.3121
1970	0.8234	0.7590	0.3433	0.2921	0.4106	0.5982	0.8153	0.6756	0.7206	0.4729
1980	0.8518	0.7878	0.4586	0.4022	0.5205	0.6614	0.8493	0.7418	0.7632	0.5895
1990	0.8996	0.8638	0.5859	0.5399	0.6346	0.7835	0.8932	0.8118	0.8427	0.7145
2000	0.9197	0.8797	0.6667	0.6312	0.7211	0.8083	0.9175	0.8529	0.8651	0.7697
2010	0.9455	0.9231	0.7528	0.7293	0.7971	0.8790	0.9385	0.8974	0.9113	0.8352
2020	0.9552	0.9342	0.8092	0.7916	0.8482	0.8913	0.9521	0.9202	0.9269	0.8686

Notes: Table reports our estimates of black parental human capital compared with white parental human capital

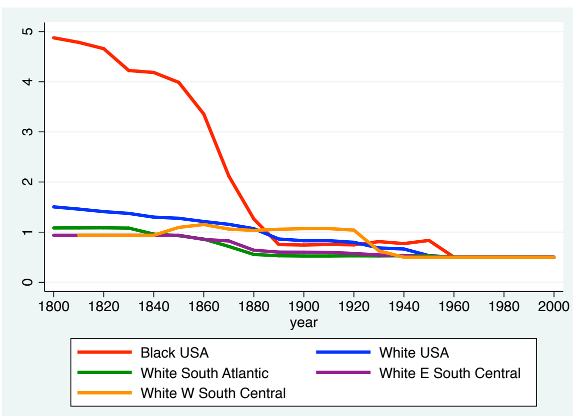
8 Appendix



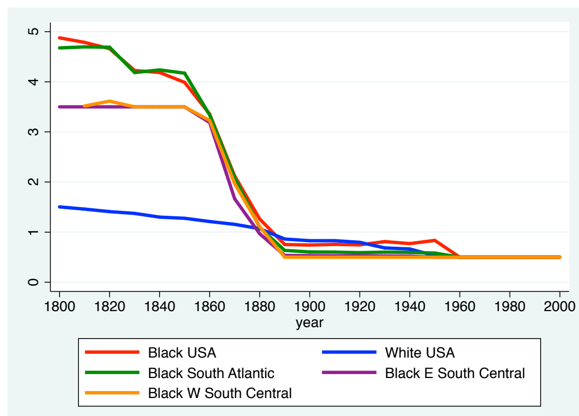
(a) Black



(b) White

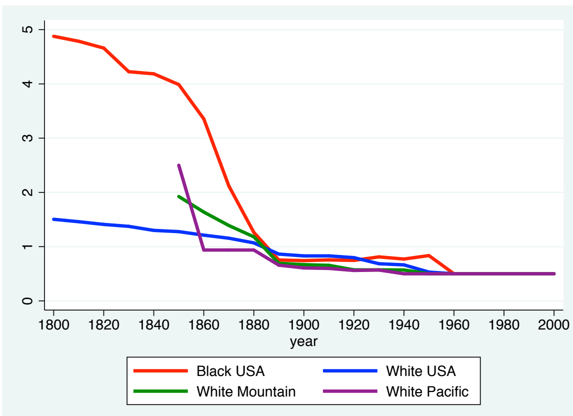


(c) Black

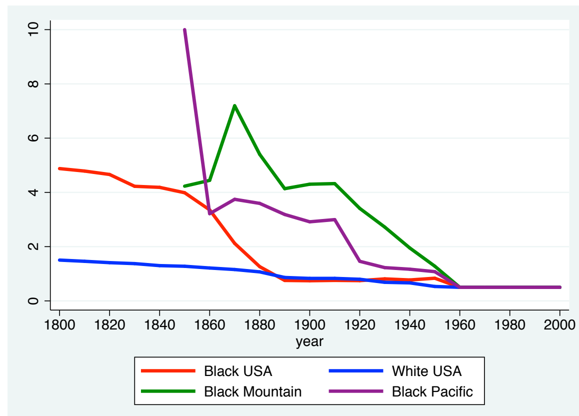


(d) White

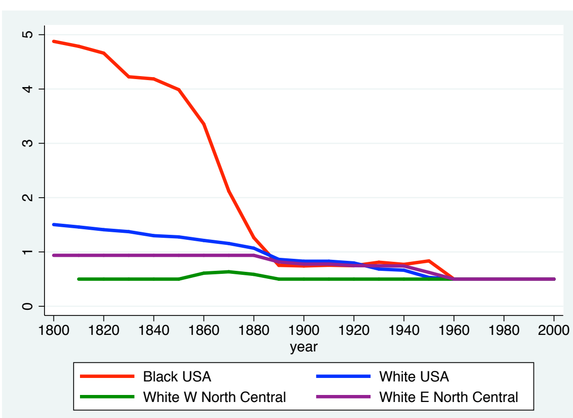
Figure 27: Black and White ν



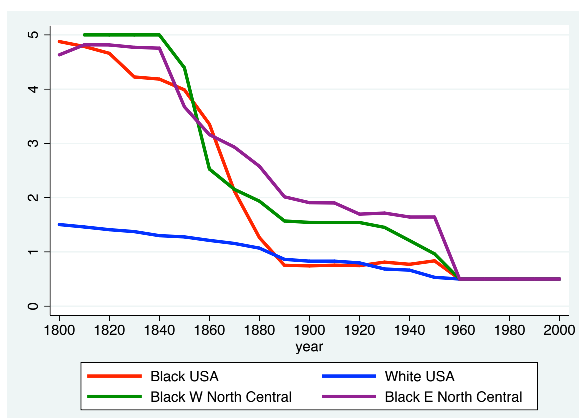
(a) Black



(b) White

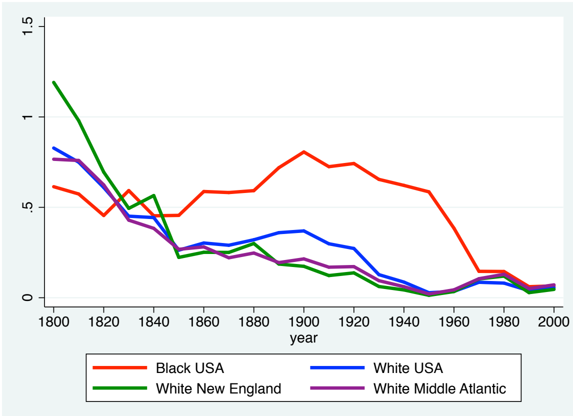


(c) Black

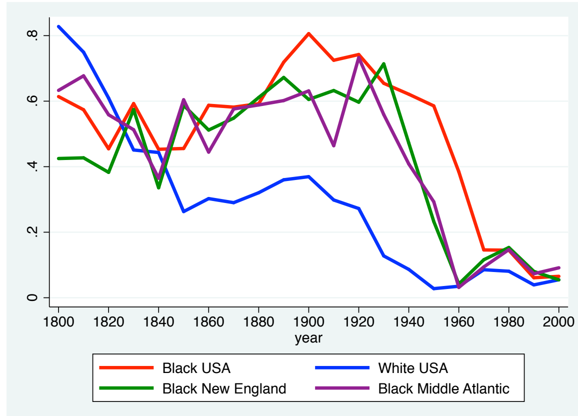


(d) White

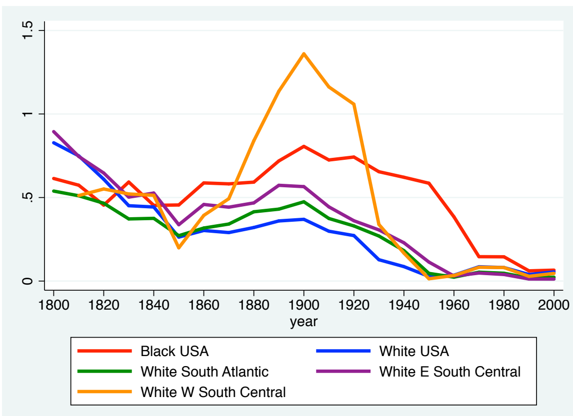
Figure 28: Cohort Black and White ν



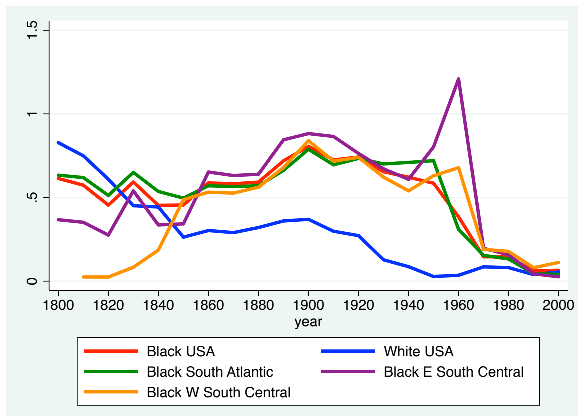
(a) Black



(b) White

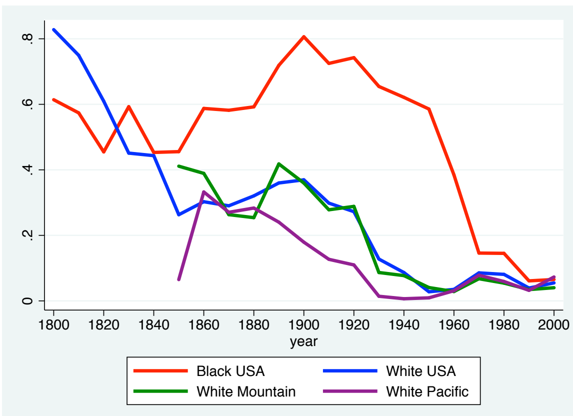


(c) Black

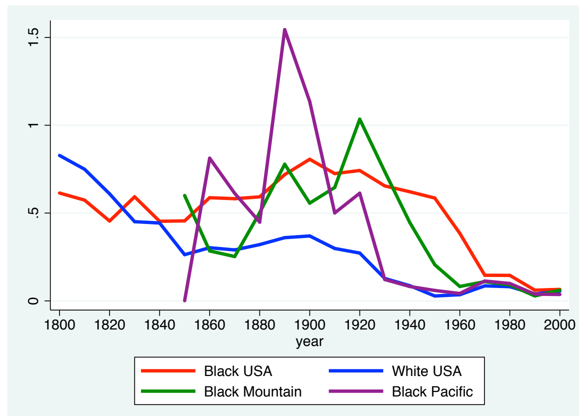


(d) White

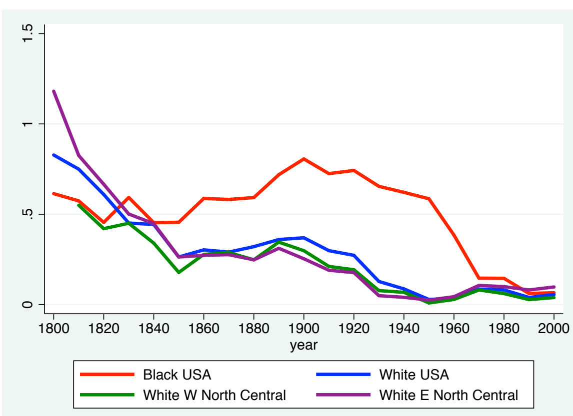
Figure 29: Black and White β



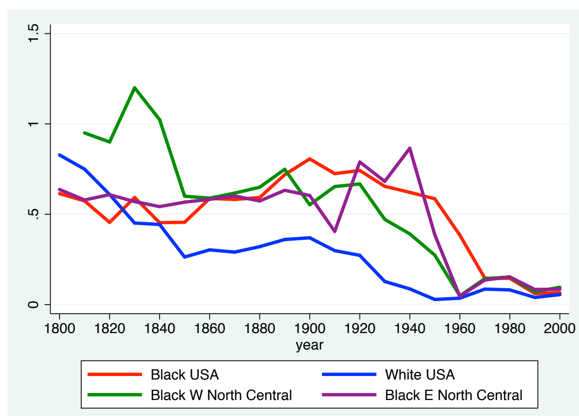
(a) Black



(b) White



(c) Black



(d) White

Figure 30: Cohort Black and White β

Table 30: Pooled Regressions of Actual Density on Model Price of Space

	white	black
β	0.9991***	1.0000***
	(0.0005)	(0.0003)
α	-0.0132	-0.0158**
	(0.0124)	(0.0073)
N	947	947
$\bar{R}^2$	.9989	.9994
p	.0112	.0002

Notes: Table reports results from pooled regressions with errors corrected for panel autocorrelation and Prais-Winsten heteroskedastic error correction. The final row, marked p, is the p-value on the null hypothesis that $\beta = 1$ and $\alpha = 0$.