Race and Economic Well-Being in the United States

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Abstract

We construct a measure of consumption-equivalent welfare for Black and White Americans. Our statistic incorporates life expectancy, consumption, leisure, and inequality, with mortality rates playing a key role quantitatively. According to our estimates, welfare for Black Americans was 49% of that for White Americans in 1984 and rose to 67% by 2019. Going back further in time (albeit with more limited data), the gap was even larger, with Black welfare equal to just 30% of White welfare in 1940. On the one hand, there has been remarkable progress for Black Americans: the level of their consumption-equivalent welfare increased by a factor of 30 between 1940 and 2019, when aggregate consumption per person rose a more modest 5-fold. On the other hand, despite this remarkable progress, the welfare gap in 2019 remains disconcertingly large. Mortality from COVID-19 has temporarily reversed a decade of progress, lowering Black welfare by 14% and Latinx welfare by 21% while reducing White welfare by 8%.

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1. Introduction

An enormous literature has documented large and persistent differences in economic outcomes by race in the United States. Chetty, Hendren, Jones and Porter (2020) find persistent disparities in income and earnings between Black and White Americans in recent decades. Case and Deaton (2015, 2017) emphasize the recent decline in life expectancy for White men, in particular those with less then average education. Chetty, Stepner, Abraham, Lin, Scuderi, Turner, Bergeron and Cutler (2016) find rising differences in life expectancy by income over time.

We follow Jones and Klenow (2016) in combining many factors at once into a single, utility-based welfare metric. Rather than study a panel of countries, however, we focus on race within the United States. We incorporate micro data on consumption, mortality, leisure, inequality in consumption and inequality in leisure to estimate consumption-equivalent welfare by race in recent decades. In a related paper, Falcettoni and Nygaard (2020) look across U.S. states and embed education in a novel way, but do not concentrate on patterns by race.

Our main sample is currently 1984 through 2019. We rely on U.S. Consumer Expenditure Surveys for data on consumption and the U.S. Current Population Surveys for data on hours worked and hence leisure. We use the U.S. Center for Disease Control's (CDC) Life Tables for data on survival rates.

We find a stunningly large welfare difference even at the end of our sample: consumption-equivalent welfare for Black Americans was only 67% of the level for White Americans in 2019. The gap was even larger in 1984, so Black Americans did show considerable progress in rising from 49% to 67% of White welfare over our sample. The largest contributor to both the remaining gap and the progress made has been life expectancy, though convergence in consumption in recent decades has also been important. Of lesser importance were changes in mean leisure and in within-group inequality in consumption and leisure.

With less detailed data we can go back several decades before 1984. In particular, we can use Census data on income to impute consumption in decennial

Census years from 1940 through 2010. Reassuringly, this cruder measure of welfare tracks our more detailed measure in 1990, 2000, and 2010. We estimate that Black welfare was only 30% of White welfare in 1940, but grew notably in the 1950s and 1960s due to rising life expectancy for Black relative to White persons.

The rest of the paper is organized as follows. In section 2 we lay out our consumption-equivalent welfare framework. We devote section 3 to the datasets we use and the basic patterns for life expectancy, consumption, leisure, and inequality. In section 4 we briefly discuss how we calibrate the utility function in order to convert the ingredients into consumption-equivalent terms. Section 5 presents our welfare results from 1984–2019. In section 6 we report findings with Census data going back to 1940. Section 7 discusses some possible extensions to be pursued, such as adjusting for unemployment, incarceration, and morbidity. For now we report a single adjustment, namely putting deaths from COVID-19 in 2020 into the equivalent loss in consumption for a year. Section 8 concludes.

2. Expected Utility Framework

Our formulation of lifetime expected utility for an individual of race i is

$$U_i = \mathbb{E} \sum_{a=0}^{100} \beta^a S_{ia} u(c_{ia}, \ell_{ia}).$$

Here a indexes age, $0 < \beta \leq 1$ is the discount factor, S_{ia} is the probability a person survives from birth to age a, c is consumption, and ℓ is leisure. While it is common and most natural to think of applying this equation over time for an individual, we instead apply it to summarize the consumption, leisure, and mortality rates in a cross-section of people at a point in time. This is analogous to how life expectancy is measured by demographers: it is a summary of the cross-section of mortality rates that prevail in a given year. In this sense, our utility function has the following interpretation: consider an individual alive in some year, and suppose that individual lived his or her entire life traveling through the cross-section of consumption, leisure, and mortality rates that prevail in that year. Expected utility would be U_i. In our benchmark calculations that follow, we assume $\beta = 1$, so the only discounting across ages/people in the cross-section occurs because of mortality.

To implement our consumption-equivalent welfare calculation, let $U_i(\lambda)$ denote expected lifetime utility for an individual of race i if consumption is multiplied by a factor λ at each age:

$$U_i(\lambda) = \mathbb{E} \sum_{a=0}^{100} S_{ia} u(\lambda c_{ia}, \ell_{ia}).$$

By what factor λ must we adjust the consumption of all White Americans to make them indifferent between living in the conditions prevailing for Black Americans and their own? That consumption adjustment must satisfy:

$$U_W(\lambda) = U_B(1). \tag{1}$$

Denoting the sampling weight of an individual j of race i and age a as w_{ia}^j, and the number of individuals of the same race and age as N_{ia}, we replace the expectation operator with the estimate provided by the sample mean:

$$U_i(\lambda) = \sum_{a=0}^{100} S_{ia} \sum_{j=1}^{N_{ia}} w_{ia}^j u(\lambda c_{ia}^j, \ell_{ia}^j).$$

We assume that flow utility takes the following form:

$$u(c, \ell) = \overline{u} + \log(c) + v(\ell).$$

And flow utility from leisure ℓ features a constant Frisch elasticity:

$$v(\ell) = -\frac{\theta \epsilon}{1+\epsilon}(1-\ell)^{\frac{1+\epsilon}{\epsilon}}.$$

Here $\epsilon > 0$ is the Frisch (compensated) elasticity of labor supply, and $\theta > 0$ is a weighting parameter. Average flow utility for an individual of race i and age a can therefore be expressed as:

$$u_{ia} \equiv \sum_{j=1}^{N_{ia}} w_{ia}^j u(c_{ia}^j, \ell_{ia}^j).$$

Solving for the scaling constant in equation (1), we obtain:

$$\log(\lambda) = \frac{1}{\sum_{a=0}^{100} S_{Wa}} \times \sum_{a=0}^{100} \left[u_{Ba}(S_{Ba} - S_{Wa}) + S_{Wa}(u_{Ba} - u_{Wa}) \right].$$

This equation tells us that White Americans would need to have lower consumption to have the same utility as Black Americans to the extent that the latter have lower life expectancy as well as lower flow utility. To ease notation, define survival rates normalized by White life expectancy as:

$$s_{Ba} \equiv \frac{S_{Ba}}{\sum_{a=0}^{100} S_{Wa}} \quad \text{and} \quad \Delta s_{Ba} \equiv \frac{S_{Ba} - S_{Wa}}{\sum_{a=0}^{100} S_{Wa}}.$$

Further denote average lifetime utility from consumption and leisure as:

$$\mathbb{E} \log(c_i) \equiv \sum_{a=0}^{100} s_{ia} \sum_{j=1}^{N_{ia}} w_{ia}^j \log(c_{ia}^j) \quad \text{and} \quad \mathbb{E} v(\ell_i) \equiv \sum_{a=0}^{100} s_{ia} \sum_{j=1}^{N_{ia}} w_{ia}^j v(\ell_{ia}^j).$$

Finally, denote average lifetime consumption and leisure as:

$$\bar{c}_i \equiv \sum_{a=0}^{100} s_{ia} \sum_{j=1}^{N_{ia}} w_{ia}^j c_{ia}^j \quad \text{and} \quad \bar{\ell}_i \equiv \sum_{a=0}^{100} s_{ia} \sum_{j=1}^{N_{ia}} w_{ia}^j \ell_{ia}^j.$$

With this additive separability, we obtain the following decomposition of consumption-equivalent welfare:

$$
\begin{aligned}
\log(\lambda) = & \sum_{a=0}^{100} \Delta s_{Ba} u_{Ba} && \text{Life expectancy} \\
& + \log(\bar{c}_B) - \log(\bar{c}_W) && \text{Consumption} \\
& + v(\bar{\ell}_B) - v(\bar{\ell}_W) && \text{Leisure} \\
& + \mathbb{E}\log(c_B) - \log(\bar{c}_B) - [\mathbb{E}\log(c_W) - \log(\bar{c}_W)] && \text{Consumption inequality} \\
& + \mathbb{E}v(\ell_B) - v(\bar{\ell}_B) - [\mathbb{E}v(\ell_W) - v(\bar{\ell}_W)] && \text{Leisure inequality} \qquad (2)
\end{aligned}
$$

Our equation for λ simplifies into an even more intuitive form under a few conditions. Suppose (i) consumption is constant across ages, (ii) consumption is lognormally distributed with variance σ^2, and (iii) leisure is same for all individuals within each race. Under these assumptions, our expression for λ becomes

$$
\begin{aligned}
\log \lambda^{simple} = & \frac{e_B - e_W}{e_W}\left(\bar{u} + \log \bar{c}_B + v(\bar{\ell}_B) - \frac{1}{2}\sigma_B^2\right) && \text{Life expectancy} \\
& + \log\left(\bar{c}_B\right) - \log\left(\bar{c}_W\right) && \text{Consumption} \\
& + v\left(\bar{\ell}_B\right) - v\left(\bar{\ell}_W\right) && \text{Leisure} \\
& + \frac{1}{2}(\sigma_B^2 - \sigma_W^2) && \text{Consumption inequality}
\end{aligned}
$$

This equation makes two pieces of intuition clearer. First, the percentage difference in life expectancy ($e_i \equiv \sum_a S_{ia}$) between the two groups matters for consumption-equivalent welfare, where the difference is weighted by the average flow utility of one of the groups. Second, with log utility and lognormal shocks, the variance of consumption in the cross-section reduces welfare by the usual factor of 1/2. This formula also conveys that a 1% difference in life expectancy is approximately equal to a $\bar{u}$ percent difference in consumption in a year for which we normalize $\bar{c} = 1$ and in which the $v(\ell)$ and σ^2 terms are small.

3. Datasets

Our consumption-equivalent welfare calculation requires micro data on survival rates, consumption, and leisure. We draw on three main sources: the U.S. Centers for Disease Control and Prevention (CDC), the U.S. Department of Labor's Consumer Expenditure Survey (CEX) and the U.S. Census Bureau's Current Population Survey (CPS).

Racial definitions

In all of the data sources we use, we follow the 1977 Office of Management and Budget (OMB) standards for the collection of data on race and ethnicity. Those standards define four racial groups (White, Black, Native American, and Asian or Pacific Islander) and treat Latin origin as ethnicity, which is distinct from race.

In 1997 the OMB revised its standards to allow respondents to report two or more racial groups. From 1997 on, therefore, we treat multiple race observations as fractional and divide each observation's sampling weight by the number of groups reported for that observation. Because Latin origin is inconsistently reported over time in some of our data sources and because the CDC only started publishing Life Tables by Latin origin in 2006, our definition of Black and White Americans includes Americans of Latin origin. For the period in which non-Latinx Black and non-Latinx White Americans are consistently classified, however, we will report additional results for those sub-groups.

Survival rates

Our data on survival rates comes directly from the CDC's Life Tables, which are available for the Black and White population since 1890.[1] The 1950 and 1960 (but not 1940) Life Tables were originally for "nonwhite" Americans rather than Black Americans. In 1970 Life Tables are published for both "nonwhite" Americans and

[1] https://www.cdc.gov/nchs/products/life_tables.htm

Black Americans, so we adjust the survival rates in 1950 and 1960 to make them more comparable.

Starting in 2018, the CDC stopped publishing Life Tables for Black and White Americans irrespective of Latin origin. Therefore, for 2018 and 2019 we calculate survival rates using individual death records from the mortality data files of the CDC's National Vital Statistics System (NVSS).[2] Each record contains information on the deceased's gender, race, and age. We then use the CDC's bridged race population estimates to determine the population at risk by gender, race and age in 2018 and 2019.[3]

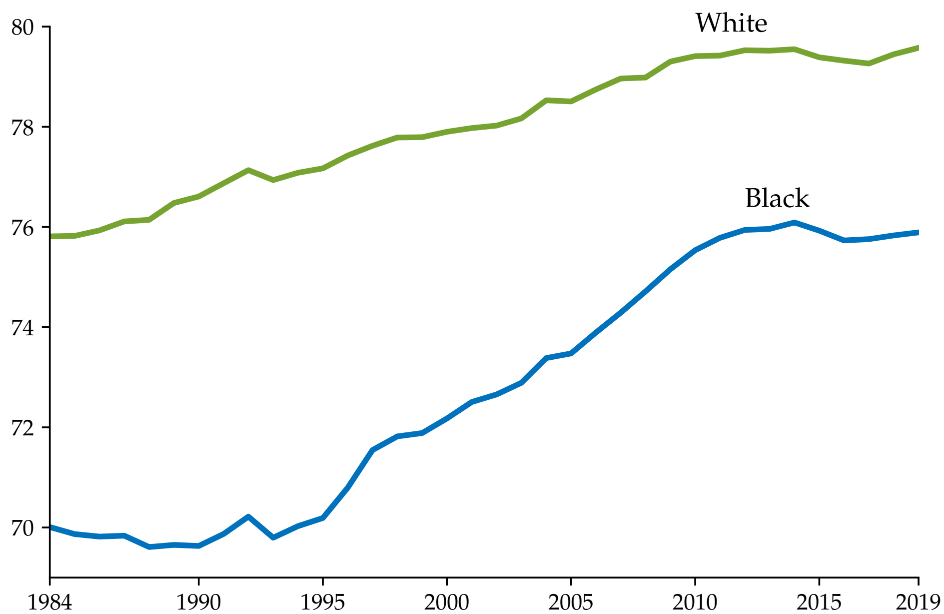
Figure 1 plots life expectancy at birth for Black and White Americans from 1984 to 2019. Black Americans had about 6 fewer years of life expectancy in 1984, and around 3.5 fewer years in 2019. Lifespans actually diverged from 1984 to the the mid-1990s, before converging sharply through the early 2010s. Life expectancy has leveled-off or fallen for both White and Black Americans in the last decade. Case and Deaton (2015, 2017) attribute this stagnation to "deaths of despair" (suicide, opiod overdoses, and alcohol-related chronic illnesses).

Consumption

Our consumption data comes from the CEX interview samples. For each year from 1984 to 2019, a rotating panel of about 20,000 households are interviewed about their expenditures on hundreds of items for up to four quarters. Expenditures are recorded at the household level, but the survey contains the race, age, gender, and educational attainment of each household member.

[2] https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm#Mortality_Multiple
[3] https://wonder.cdc.gov/Bridged-Race-v2019.HTML

Figure 1: Life expectancy at birth by race



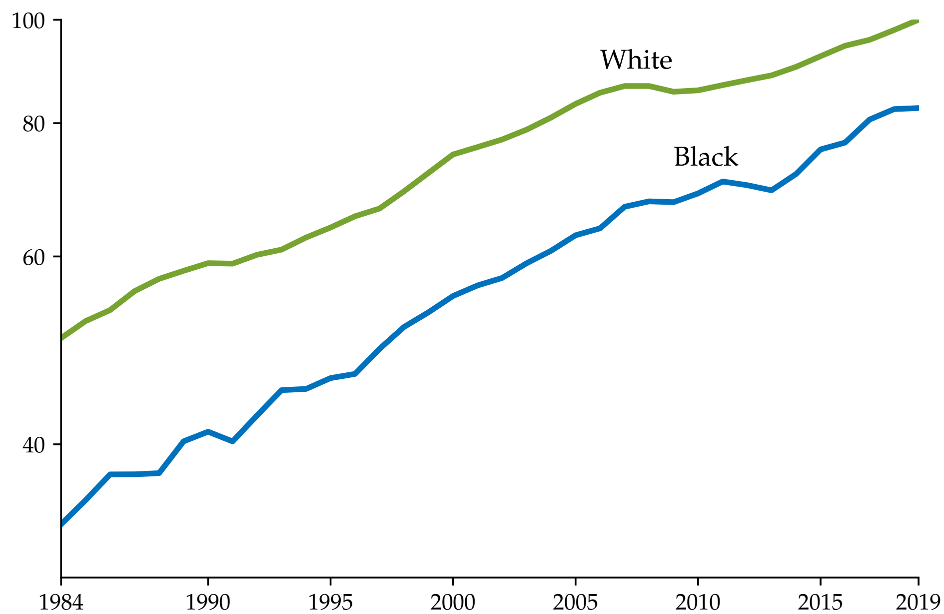
Note: Author calculations using data from the CDC.

Our measure of household expenditures includes housing (rent paid by renters and self-reported rental equivalence for homeowners), but excludes durables since such purchases do not necessarily reflect their associated service flows. To arrive at a measure of individual consumption, we divide household spending on nondurable goods and services evenly among household members.

As is well-known, consumption expenditures from the CEX do not aggregate to personal consumption expenditures in the National Income and Product Accounts (NIPA). See Aguiar and Bils (2015) for example. We therefore re-scale individual consumption in the CEX such that it aggregates to NIPA nondurable personal consumption expenditures per capita in each year from 1984 to 2019.

Figure 2 plots consumption per capita for Black and White Americans when White consumption is normalized to 100 in 2019. Consumption per person was about 33% lower for Black Americans in 1984, but only 16% lower in 2019.

Figure 2: Consumption per capita by race



Note: Author calculations using data from the U.S. Consumer Expenditure Surveys (CEX). Consumption for White Americans is normalized to 100 in 2019. Log scale.

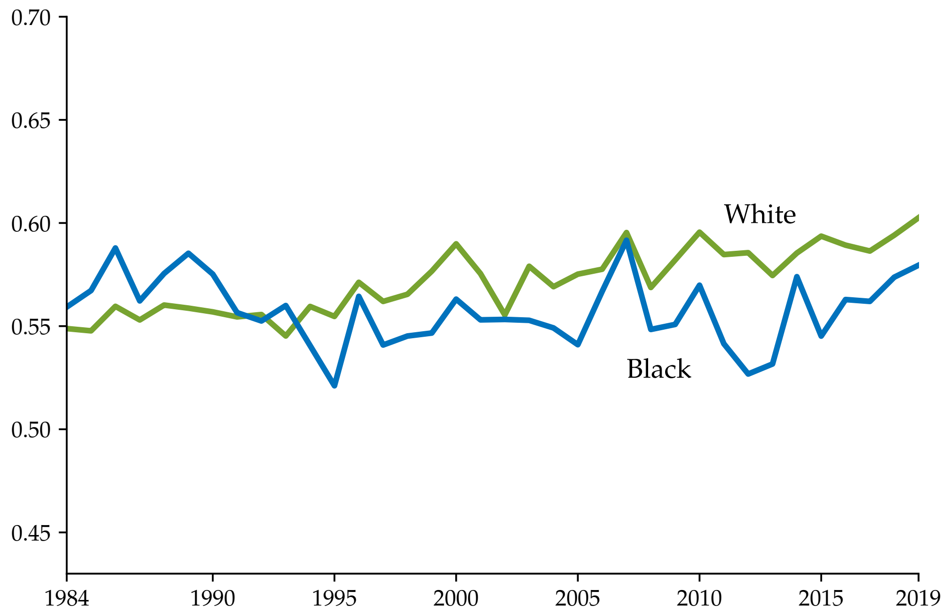
Figure 3 displays the standard deviation of log consumption across individuals within a group by year. Dispersion is choppy, especially for Black Americans due to their modest sample sizes. There is no clear pattern, but within-race dispersion is if anything lower for Black Americans. The standard deviations hover around 0.6. If consumption is lognormally distributed, then such inequality would lower consumption-equivalent welfare by 18% for each group.[4]

Leisure

Our data on leisure comes from the CPS for each year from 1984 to 2019. It is calculated as the fraction of total waking hours that are not spent on market work

[4]In the case of additively separable utility from consumption and lognormally distributed consumption, the loss in consumption-equivalent welfare from behind-the-veil inequality is the coefficient of relative risk aversion times the variance of log consumption divided by two. In our baseline case of log utility this is the variance divided by two.

Figure 3: Standard deviation of log consumption by race



Note: Author calculations using data from the U.S. Consumer Expenditure Surveys (CEX).

over the year. That is,

$$\ell = \frac{5,840 - \text{hours worked in the year}}{5,840}$$

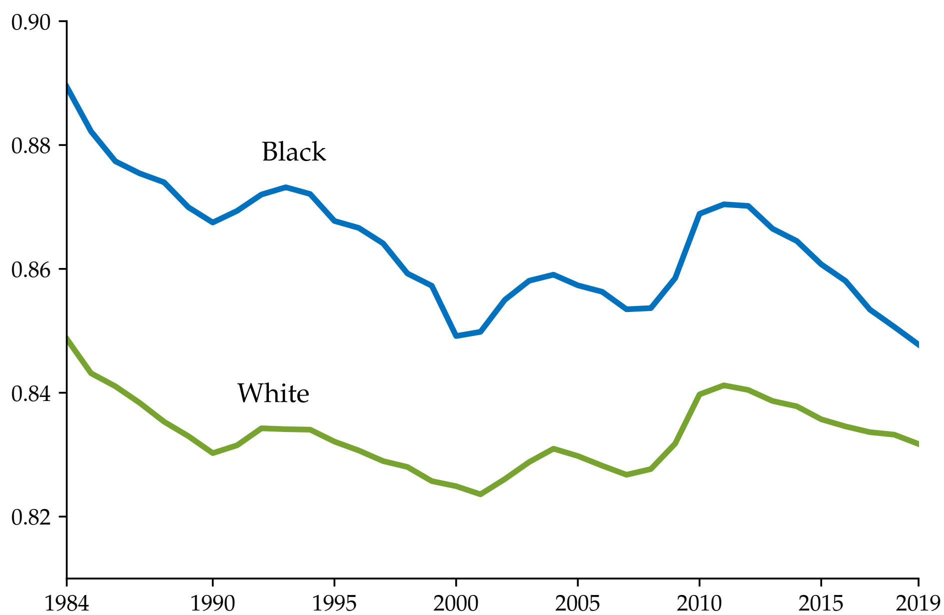
We obtain 5,840 total hours available as the product of 16 hours per day and 365 days.[5] In a rough attempt to account for the division of non-market work, we divide hours worked per year equally among individuals between 25 and 64 years old within each household. For household members outside of this age range, we make no adjustment. The resulting split in leisure time between men and women is similar to that found in Aguiar and Hurst (2007), who carefully delineate leisure from home production work in time-use surveys.

Figure 4 shows that leisure is about four percentage points higher for Black Americans than for White Americans in 1984, but only around two percentage

[5] We use 366 days for leap years and assume 8 hours a day of sleep.

points higher in 2019. There are sizable fluctuations in between, with leisure rising notably for both groups in the wake of 2009 Great Recession (and more modestly after the milder recession in the early 1990s). In our extensions below, we consider the possibility that unemployment yields less utility than other non-work time. This may matter for our comparisons given that unemployment rates are uniformly higher in the CPS for Black Americans over our sample. Incarceration rates are also higher for Black men than for other groups, so we will also explore the effect of treating incarceration as providing lower flow utility.

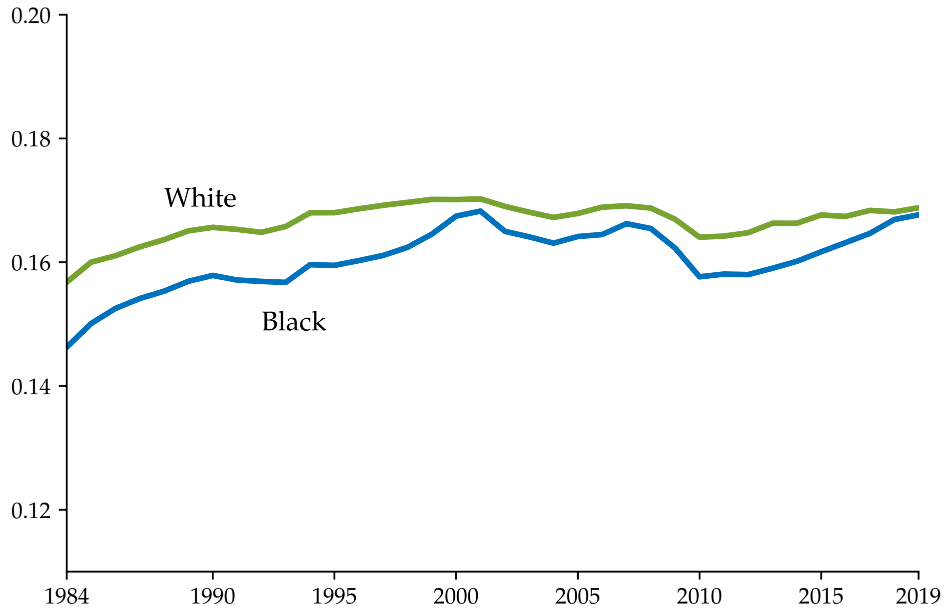
Figure 4: Leisure by race



Note: Author calculations using data from the U.S. Current Population Survey.

Figure 5 compares the standard deviation of leisure across individuals over time. Just as for consumption, unequal leisure lowers average utility from leisure due to diminishing marginal utility. Leisure inequality is similar across racial groups, especially at the end of the sample.

Figure 5: Standard deviation of leisure by race



Note: Author calculations using data from the U.S. Current Population Survey.

4. Calibration

We follow Jones and Klenow (2016) in our strategy for setting the key parameter values. The five parameters to be calibrated are: the growth rate of consumption g, the discount factor β, the Frisch elasticity ϵ, the utility weight on leisure θ, and the intercept in flow utility $\overline{u}$.

We abstract from growth and discounting by setting $g = 0$ and $\beta = 1$. Note that there is still discounting due to survival probabilities. We will check robustness to a growth rate of 2% per year and a discount factor of $\beta = 0.99$.

We consider a Frisch elasticity of 1.0 for our benchmark calibration, which implies that the disutility from working rises with the square of the number of hours worked. This is a compromise between Hall (2009), who advocates for a Frisch elasticity of 1.7, and Chetty, Guren, Manoli and Weber (2012), who recommend a value closer to 0.5.

We use the first-order condition for the labor-leisure choice to calibrate the weight on leisure in the utility function. The static first order condition is $u_\ell/u_c = w(1-\tau)$, where w is the real wage and τ is the marginal tax rate on labor income. With log utility from consumption and a constant Frisch elasticity, this implies $\theta = w(1-\tau)(1-\ell)^{-1/\epsilon}/c$. We use the value of $\theta = 14.2$ estimated by Jones and Klenow (2016) to fit this first order condition for the average U.S. worker in 2006.

The intercept in flow utility, $\overline{u}$, is critical for valuing differences in mortality. The U.S. Environmental Protection Agency (2020) recommends \$7.4 million for the value of remaining life in 2006 dollars for those age 25 to 55. Hall, Jones and Klenow (2020) use this figure when valuing lives at risk from COVID-19. Matching this number leads to $\overline{u} = 6.23$ when consumption per capita is normalized to 1.0 in 2019. This means that $\overline{u}$ has a natural interpretation for our utility function: one year of life is worth $\overline{u} = 6.23$ years of consumption in 2019.[6]

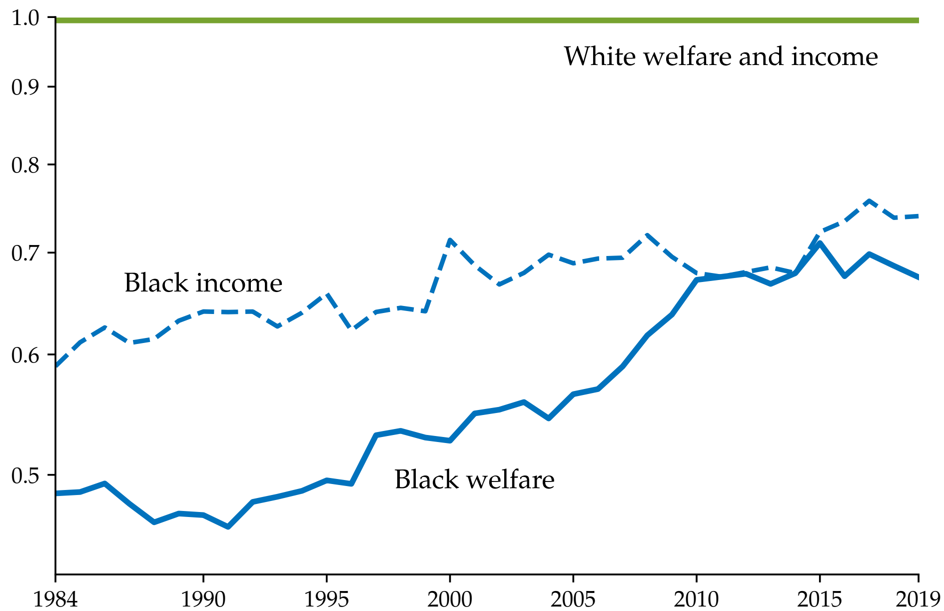
5. Welfare

We combine our ingredients into a single measure of consumption-equivalent welfare as laid out in Section 2. Figure 6 plots Black versus White welfare from 1984 through 2019. The initial level in 1984 is surprisingly low at 49%. It rises to around 67% from the mid-1990s to the early 2010s. The gap between Black and White Americans remains disappointingly wide.

Figure 6 also plots income for Black relative to White Americans in the CPS for comparison. Income includes wage, salary, business income, and farm income, but excludes all taxes and transfers. Black relative income was notably higher than Black relative welfare until the 2010s. This drives home the contribution of life expectancy to gaps in living standards.

[6]An individual with constant consumption by age is indifferent between a 1 percent change in life expectancy and a 6.23 percentage point (log point) change in lifetime consumption. But since we scale both life expectancy and lifetime consumption by total years of life, this yields the interpretation in the main text. Note that this statement incorporates our normalization of per capita consumption in 2019 to the value 1.0 and assumes the other terms in utility are small.

Figure 6: Consumption-Equivalent Welfare, Black vs. White Americans



Note: The figure shows the consumption-equivalent welfare for Black relative to White Americans from 1984 to 2019, computed according to equation (2). For comparison, we also show the corresponding relative income level. The income series is from the CPS and includes wage, salary, business income, and farm income, and excludes all taxes and transfers.

Table 1 and Figure 7 decompose the drivers of the overall welfare differences using the expression in equation (2). The biggest contributor is life expectancy, followed by consumption. Leisure, inequality in consumption, and inequality in leisure contribute surprisingly little to both levels and trends.

Table 1: Welfare gap decomposition

	λ	$\log(\lambda)$	LE	c	$\sigma(c)$	ℓ	$\sigma(\ell)$
2019	0.67	-0.39	-0.28	-0.17	0.02	0.03	0.00
2000	0.53	-0.64	-0.42	-0.27	0.01	0.04	0.01
1984	0.49	-0.72	-0.41	-0.38	-0.01	0.05	0.03

Note: λ is the ratio of consumption-equivalent welfare for Black vs. White Americans. LE denotes the contribution of Life Expectancy, c average consumption, $\sigma(c)$ the standard deviation of consumption, ℓ average leisure, and $\sigma(\ell)$ the standard deviation of leisure.

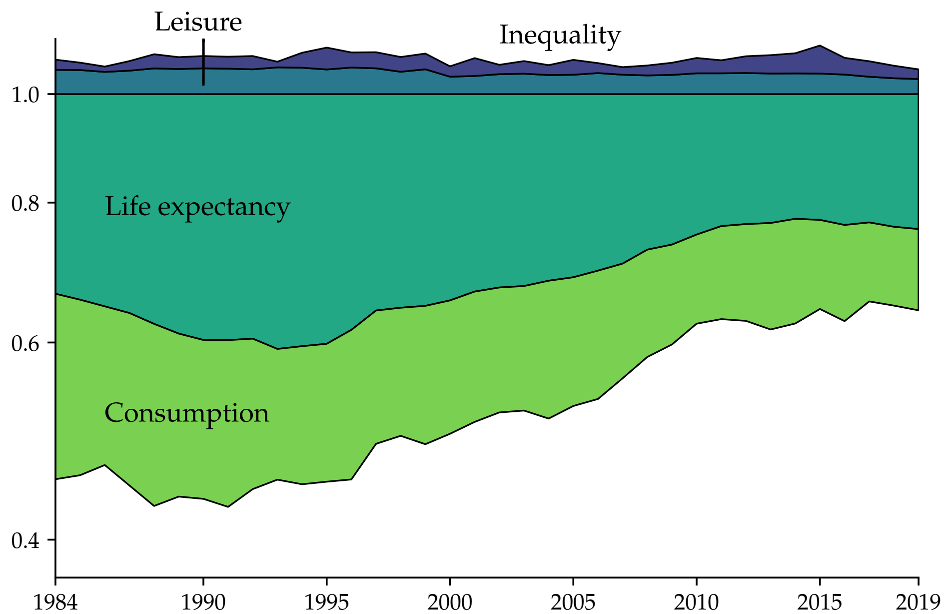
We next examine growth rates in consumption-equivalent welfare in Table 2. For this calculation, we apply equation (2) over time rather than across groups. From 1984 to 2019, Black consumption-equivalent welfare grew 3.4% per year, faster than their income growth of 2.3% per year. For White Americans, welfare also rose more quickly than income (2.4% vs. 1.6% per year).

Table 2: Welfare growth between 1984 and 2019

	Welfare	Income	LE	c	$\sigma(c)$	ℓ	$\sigma(\ell)$
Black	3.44	2.29	1.25	2.51	-0.03	-0.17	-0.13
White	2.42	1.63	0.79	1.91	-0.10	-0.12	-0.06
Gap	1.02	0.66	0.46	0.61	0.07	-0.05	-0.07

Note: Welfare growth is growth in consumption-equivalent welfare. LE denotes the contribution of changes in Life Expectancy, c average consumption, $\sigma(c)$ the standard deviation of consumption, ℓ average leisure, and $\sigma(\ell)$ the standard deviation of leisure.

Figure 7: Relative Welfare Decomposition

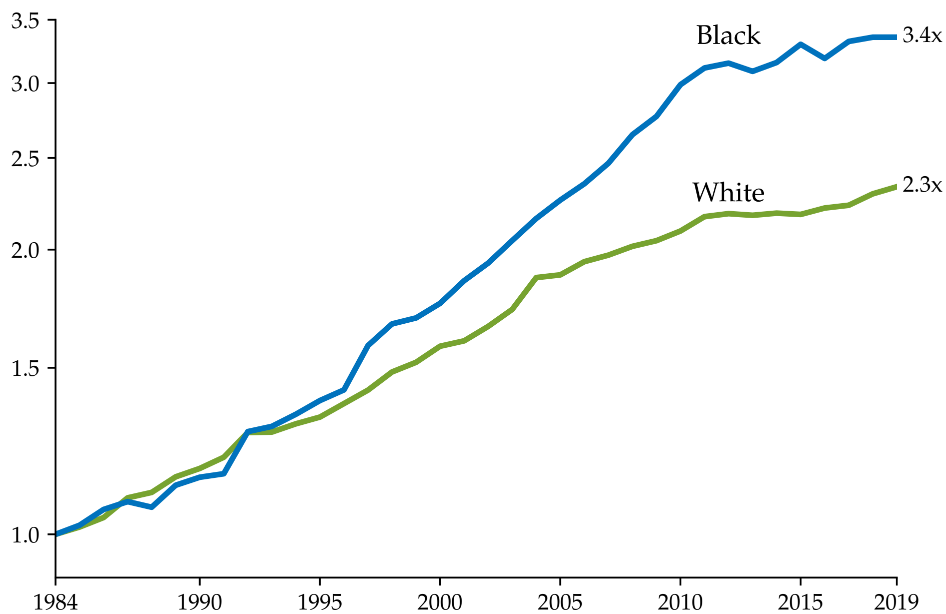


Note: The figure shows the decomposition of consumption-equivalent welfare for Black relative to White Americans from 1984 to 2019, computed according to equation (2). Author calculations using data from the CDC's NVSS and the Department of Labor's CPS and CEX Surveys.

Table 2 also decomposes the contributions to growth rates. From 1984 to 2019 the biggest contributor was consumption growth at 2.5% for Black Americans and 1.9% for White Americans. Life expectancy was the next most important at 1.25% per year for Black Americans and 0.8% for White Americans. Though dwarfed by other factors, rising inequality of consumption and leisure together subtracted 16 basis points a year from growth for both groups. Falling leisure lowered growth 17 basis points a year for Black Americans and 12 basis points a year for White Americans.

Figure 8 shows that consumption-equivalent welfare grew by a factor of 3.4 for Black Americans from 1984 to 2019, and by a factor of 2.3 for White Americans.

Figure 8: Cumulative welfare growth by race



Note: Author calculations using a combination of data from the CDC's NVSS and the Department of Labor's CPS and CEX Surveys.

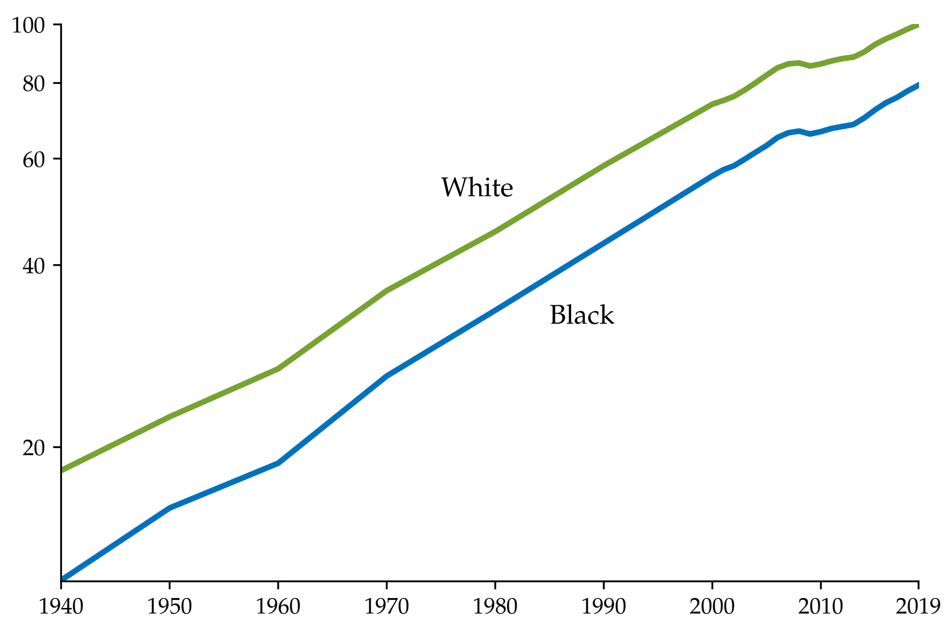
6. Census Data back to 1940

We can extend our welfare calculations back in time to 1940 using the decennial Census data for 1940, 1950, ..., 2000 and the American Community Survey annually for 2000 to 2019. An advantage of the Census data is the large sample sizes relative to the CEX. For example, even in 1940 using our 1% sample, the Census sample contains 1.3 million individuals versus only 31,000 in 1984 in the CEX. The main limitation of the Census is that it has no data on consumption. We therefore impute consumption from Census income data.

We use the CEX to create a procedure for imputing nondurable consumption from income. More precisely, we regress CEX nondurable consumption on CEX wage and salary income, controlling for race, age, and gender. All variables are in percentage deviations from their annual average. We then infer consumption from income in the Census using the same variables and the coefficients estimated off the CEX data. We re-scale the resulting aggregate imputed nondurable consumption expenditures such that they match real nondurable personal consumption expenditures per capita from NIPA. This scaling deals with the downward trend in CEX aggregate consumption relative to NIPA aggregate consumption. Importantly, this re-scaling preserves the CEX consumption to income ratios observed for each race in our imputed consumption to income ratios. More details are available in Appendix A.

Figure 9 shows average nondurable consumption for Black and White Americans based on this procedure. While the lines look remarkably parallel, there is some catch-up: the average gap in imputed nondurable consumption between Black and White Americans is 34% in 1940, 28% in 1970, and 21% in 2019.

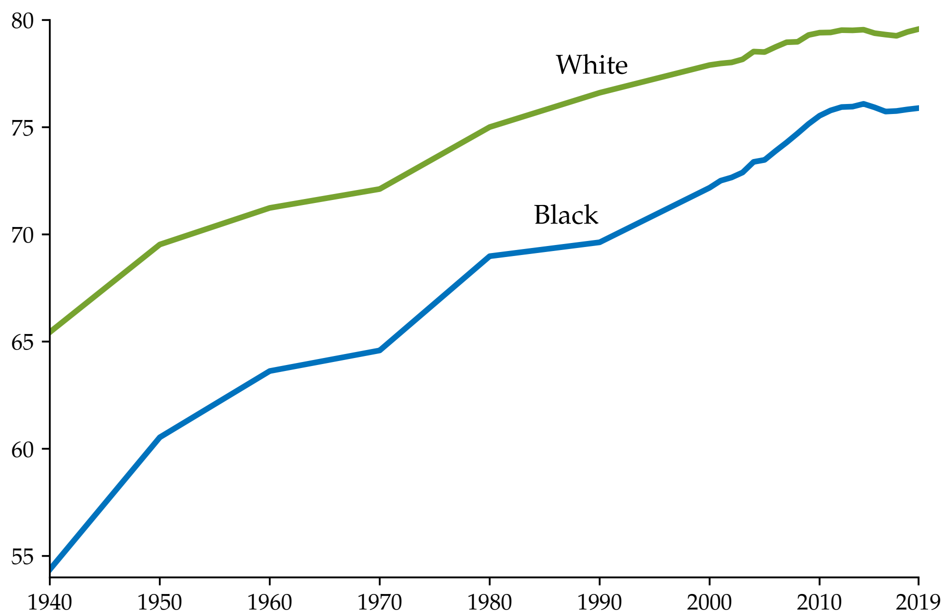
Figure 9: Imputed consumption per capita by race since 1940



Note: Author calculations using data from the CEX, and U.S. censuses and ACS. Consumption for White Americans is normalized to 100 in 2019. While the lines look remarkably parallel, there is some catch-up: the average gap in imputed nondurable consumption between Black and White Americans is 34% in 1940, 28% in 1970, and 21% in 2019.

Figure 10 plots the levels of life expectancy at birth that we calculate from the survival rates in the CDC Life Tables in each decade back to 1940.[7] There is substantial catch-up in life expectancy over the past 80 years: the life expectancy shortfall between Black and White Americans is 11 years (17%) in 1940, 7.5 years (10.5%) in 1970, and just 3.5 years (4.5%) in 2019.

Figure 10: Life expectancy at birth (in years) by race since 1940



Note: Author calculations using CDC data. The life expectancy shortfall between Black and White Americans is 11 years (17%) in 1940, 7.5 years (10.5%) in 1970, and just 3.5 years (4.5%) in 2019.

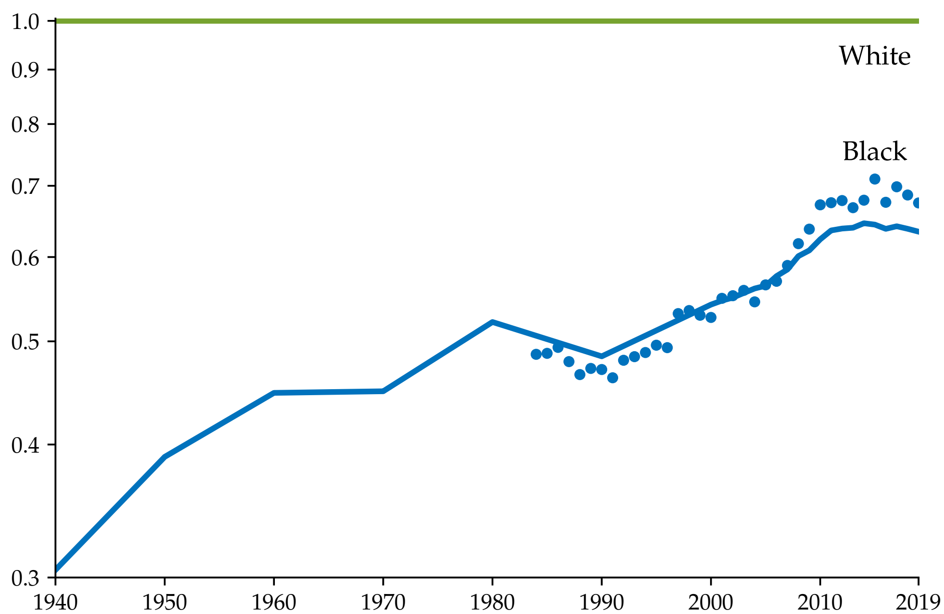
We observe hours worked in the Census/ACS, so we can incorporate leisure along with lifespan and consumption. Specifically, the two variables we use to construct our measure of leisure are "usual hours worked per week" and "weeks worked last year". However, in pre-1980 censuses, the definition of these variables changes to "weeks worked last week" and an intervalled version of "weeks

[7] The 1950 and 1960 Life Tables report data for "nonwhite" rather than Black Americans. In 1970, however, data for both "nonwhite" and Black Americans are observed and we use that overlap to adjust the 1950 and 1960 survival rates to make them more comparable. More precisely, we multiply the "nonwhite" survival rates in 1950 and 1960 by the ratio of Black to "nonwhite" survival rates in 1970 at each age.

worked last year". Since those definitions are also available in 1980 and 1990, we use those two years to adjust average leisure computed from the pre-1980 years. We omit the inequality terms, however, because it is more difficult to impute consumption inequality by race than to impute mean consumption by race, and the inequality terms were small in our CEX and CPS calculations for 1984–2019.

Figure 11 shows our decadal welfare calculations based on Census/ACS data. For comparison, the circles show our earlier CEX-based welfare measure; the fact that the two results are relatively close in overlapping years provides some reassurance in studying our Census-based welfare measure back to 1940.

Figure 11: Relative Welfare for Black Americans, 1940 – 2019 (White = 1)

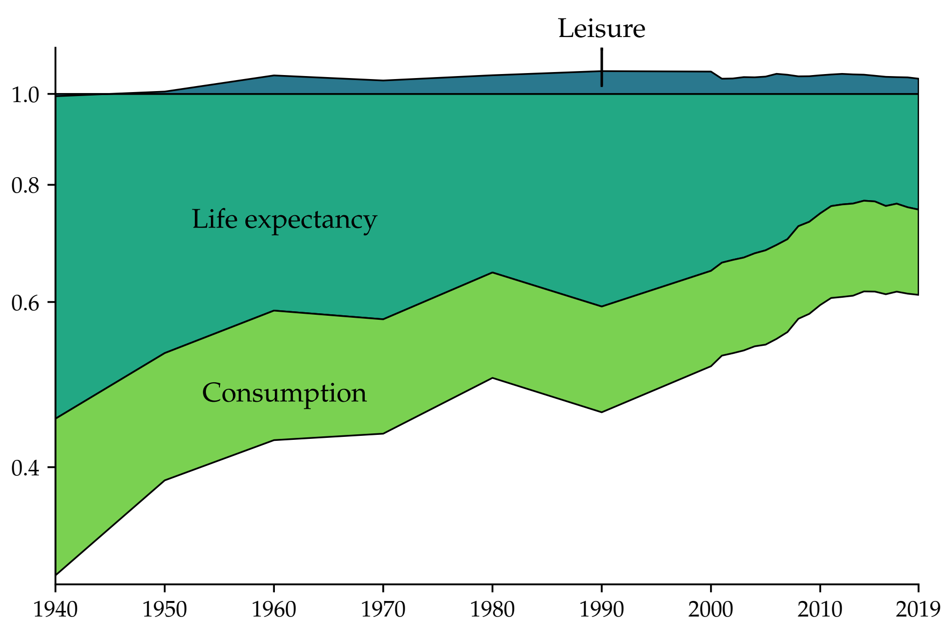


Note: Author calculations using data from the CDC's NVSS, and the U.S. censuses and ACS. Circles display the previous CEX/CPS results from 1984 onward for comparison; they include the inequality terms that are omitted from the Census/ACS calculation.

The key finding revealed by Figure 11 is the stunningly low level of Black welfare historically. In 1940, Black consumption-equivalent welfare was just 30.5% of that of White Americans. Recall that relative consumption in 1940 was around 66%, so the 11-year shortfall in life expectancy in 1940 played a large role. The welfare measure rose to 45% in 1960 and 52% in 1980 and reaches 64% in 2019.

Figure 12 plots the components of relative welfare over time. Differences in mortality rates far and away play the largest role, both in the levels of welfare and in the partial catch-up that has occurred over the past 80 years. Recall that the life expectancy gap fell from 17% (11 years) in 1940 to 4.5% (3.5 years) in 2019. Given that each percentage point difference in life expectancy translates into approximately a 6 percentage point difference in consumption-equivalent welfare, this this explains the enormous role played by mortality differences. Consumption is the other important contributor, with about 10 percentage points of the closing of the welfare gap due to gains in nondurable consumption for Black Americans relative to White Americans. Leisure plays a minor role.

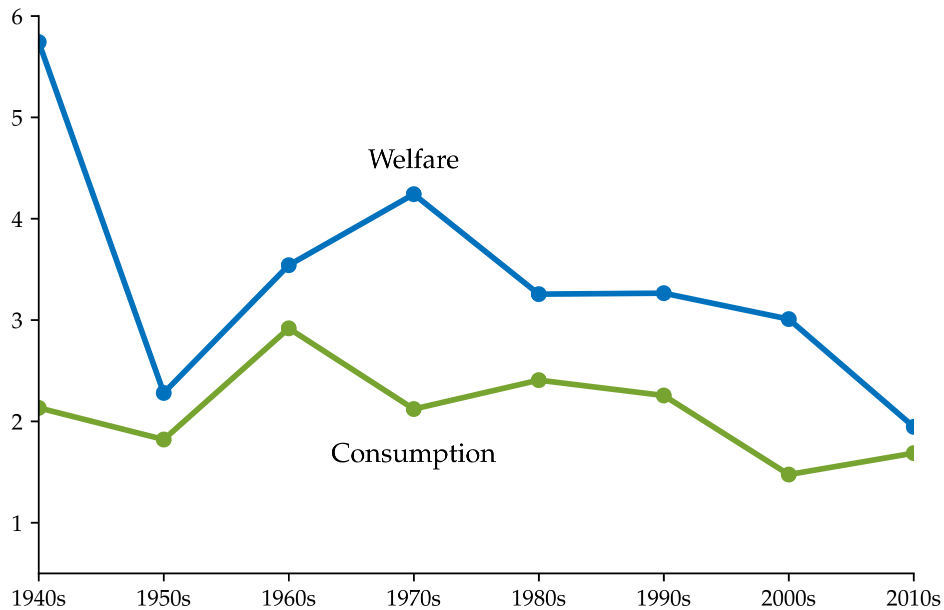
Figure 12: Decomposing Relative Welfare, 1940 – 2019



Note: Author calculations using data from the CDC's NVSS, and the U.S. censuses and ACS. The graph shows the components of consumption-equivalent welfare for Black Americans, where that for White Americans is normalized to 1.

Figure 13 provides a different perspective on the past 80 years by computing the average annual growth rate of consumption-equivalent welfare for people of all races over time. To begin, the green line in the figure shows the growth rate of nondurable consumption per person, which averages 2.1% per year over the entire sample. In contrast, the rise in life expectancy means that consumption-equivalent welfare was growing much faster. For the entire period, the average growth rate in welfare was 3.4% per year for all races.

Figure 13: Welfare and consumption growth since 1940



Note: Author calculations using data from the CDC's NVSS, and the U.S. censuses and ACS. Average annual growth rates by decade for consumption-equivalent welfare and consumption per capita for people of all races.

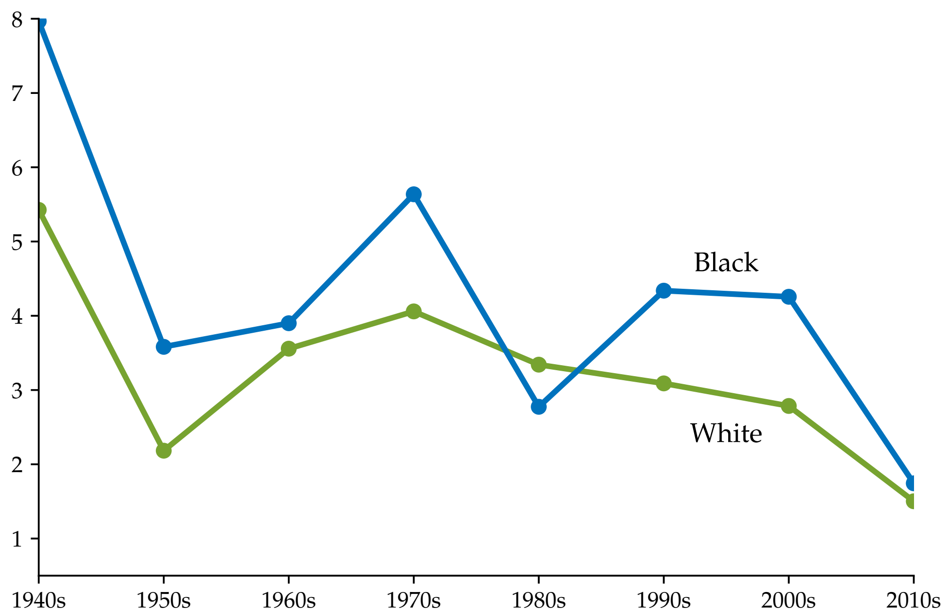
Another key fact that emerges from the figure is the appreciable slowdown in the growth rate of consumption-equivalent welfare. Between 1940 and 1980, welfare growth averaged 4.5% per year versus just 2.9% per year since 1980. (Consumption growth fell more modestly from 2.3% to 2.0% over the same intervals.) Table 3 provides more detail, noting that this slowdown is also a feature of welfare growth for Black and White Americans separately. Welfare growth by decade for Black and White Americans is displayed in Figure 14.

Table 3: Average Annual Growth Rates (percent), 1940 – 2019

Period	—— Welfare —— (consumption-equivalent) Black	White	All races	Consumption (All races)
1940–2019	4.5	3.3	3.4	2.1
1940–1980	5.4	3.8	4.0	2.3
1980–2019	3.3	2.7	2.6	2.0

Note: Author calculations using data from the CDC's NVSS, and the U.S. censuses and ACS.

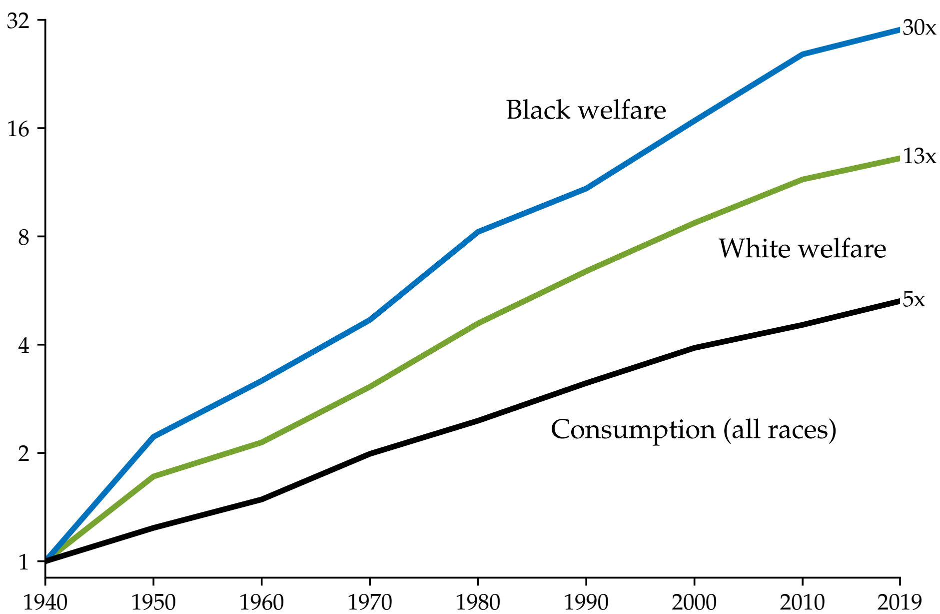
Figure 14: Welfare growth by race since 1940



Note: Author calculations using data from the CDC's NVSS, and the U.S. censuses and ACS. Average annual growth rates by decade for consumption-equivalent welfare.

Figure 15 shows the cumulative increase in consumption-equivalent welfare. Between 1940 and 2019, nondurable consumption per person increased by a factor of 5. In contrast, consumption-equivalent welfare increased by a factor of 13, both for White Americans and for the overall population. Most remarkable of all is the factor of 30 increase in consumption-equivalent welfare for Black Americans between 1940 and 2019. It is a sign of just how low welfare was in 1940 that even this rapid growth — which averaged 4.5% per year — could still leave Black welfare at only 64% of White welfare in 2019.

Figure 15: Cumulative welfare and consumption growth by race since 1940



Note: Author calculations using data from the CDC's NVSS, and the U.S. censuses and ACS. Despite the slowdown in growth, the cumulative increase in living standards is huge!
30x for blacks versus 13x for whites vs 5x for consumption.

7. Extensions

We can try to quantify the effect of several additional factors on consumption-equivalent welfare. Doing so is inherently more speculative and difficult, so we did not incorporate them into our baseline estimates. But each of them could be quite important.

First, we will analyze COVID-19 mortality since 2020, which is notably higher for Black Americans than for White Americans. Second, we will look at incarceration rates, which are several percentage points higher for Black men than for White men, and rose over our sample. Third, we will consider treating unemployment as equivalent to working. Fourth, in a future revision we could confront morbidity differences in the form of activity limitations reported in national health surveys by the CDC.

7.1. COVID-19

Some of the convergence in life expectancy by race has been interrupted, at least temporarily, by COVID-19. Table 4 reports information gleaned from the CDC on deaths from COVID-19 by race and age. We follow the CDC's reporting practices and present results for Black non-Latinx, White non-Latinx, and Latinx. Over 1.5 in a thousand Black non-Latinx have died from COVID-19, versus about 1.3 in a thousand White non-Latinx. Black victims have been younger at around 72 years old on average, compared to 80 years old for Whites. This outweighs the lower life expectancy of Black Americans so that Black victims lost 15.5 years of remaining life whereas White victims lost 10.9 years on average.[8]

[8] Both of these figures may be too high because of comorbidities facing COVID-19 victims.

Table 4: COVID-19 welfare statistics

	Deaths per thousand	Age of victims	Years of life lost per victim	Group welfare loss (%)
Black non-Latinx	1.51	71.6	15.5	14.2
White non-Latinx	1.31	79.8	10.9	7.7
Latinx	1.24	69.2	19.9	21.1

Note: As of January 30, 2021, the CDC reports a total of 421,378 COVID-19 deaths.

Table 4 indicates that the American Latinx population has lost even more life years from COVID-19 despite having fewer deaths per thousand. The lower age of Latinx victims (closer to 69 years) combines with their higher remaining life expectancy to imply almost 20 years of lost life years per victim. The implication is that life expectancy has temporarily fallen 3.3 years for Latinx, compared to 2.2 years for Black Americans and 1.1 years for White Americans.

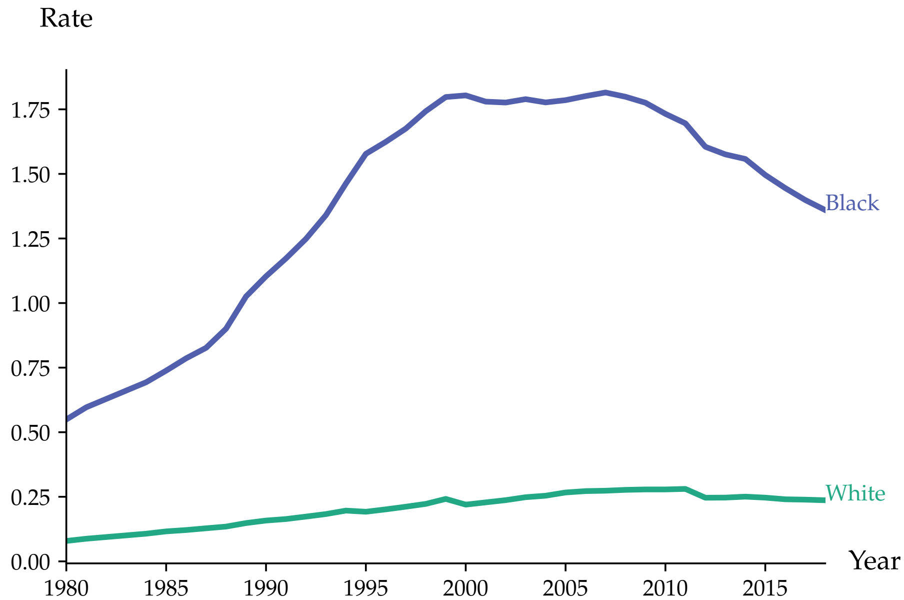
Given a 1% drop in life expectancy is tantamount to a roughly 6% drop in consumption, COVID-19 mortality translates to 21% lower consumption-equivalent welfare for the U.S. Latinx population. The comparable figure for Black non-Latinx Americans is a 14% drop in consumption-equivalent welfare, and for White non-Latinx Americans a less than (but still sizable) 8% drop. COVID-19 reversed, at least temporarily, about 10 years of convergence in Black versus White welfare.

As stark as they are, these calculations are arguably conservative in many ways, such as not taking into account morbidity effects of COVID-19.

7.2. Incarceration

Figure 16 shows that Black Americans have a higher incarceration rate than White Americans. The incarceration gap grows for much of our sample period. If flow utility is much lower while incarcerated, incarceration will subtract from both the level and and growth rate of welfare for Black versus White Americans.

Figure 16: Incarceration rates for Black and White Americans



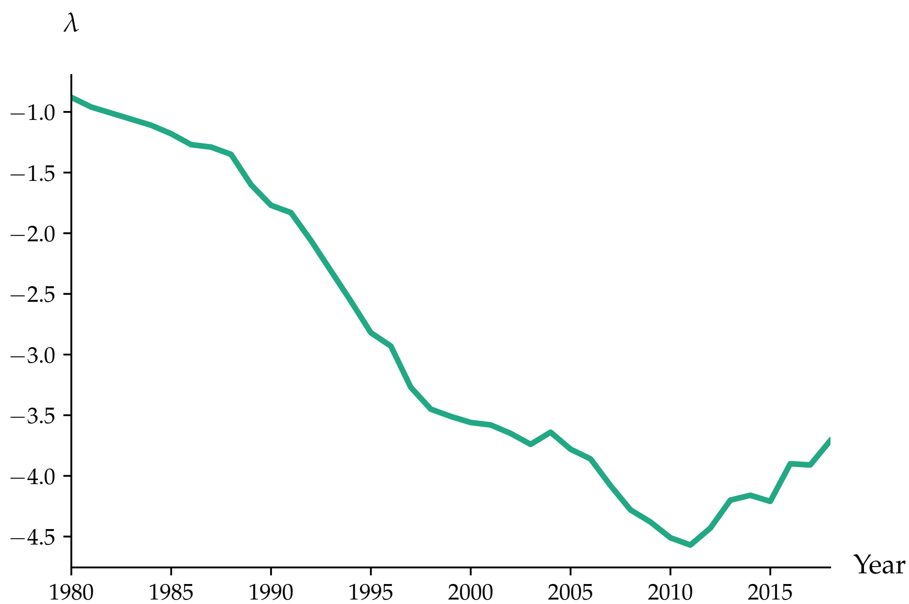
Note: Incarceration rates (displayed in percentage points) are calculated from the National Prisoner Statistics Program of the Bureau of Justice Statistics.

To illustrate the potential impact of incarceration on welfare, we arbitrarily assume flow utility for the incarcerated population is equal to 10% of the average flow utility for a non-incarcerated individual of the same age with a high school education or less. As shown in Figure 17, under this assumption incarceration lowers consumption-equivalent welfare by 4.5% for Black versus White Americans at its trough in 2011. The loss rose from 1.5% in the early 1980s, coinciding with the rise in incarceration of Black Americans.

7.3. Unemployment

In our baseline calculations we treated unemployment as leisure. Needless to say, this may be a bad assumption, and could mean our estimates overstate the relative welfare of Black Americans given the their higher unemployment rates.

Figure 17: Impact of incarceration on Black vs. White welfare

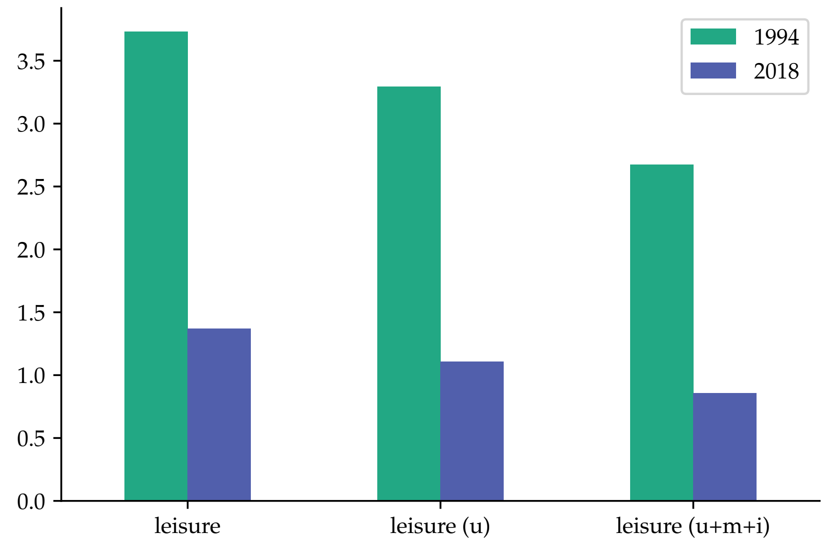


Note: The effect on relative welfare is calculated by setting flow utility of incarcerated individuals to 10% of the average flow utility of individuals with high school education or less, and using incarceration rates by race in each year.

Surveys by Krueger, Mueller, Davis and Şahin (2011) shed light on how flow utility varies with employment status. They find that the same leisure activities yield less enjoyment when a person is unemployed compared to when they are employed. They also find that those unemployed had similar hours worked in their previous jobs as employed individuals.

Considering these facts, we perform an adjustment where unemployed individuals have their hours worked set to full-time hours. This adjustment ensures leisure hours are no longer greater for unemployed individuals. We also consider the effect of setting hours worked to full-time hours for marginally attached workers and workers who are involuntary working part-time. As illustrated in Figure 18 each successive adjustment reduces the difference in leisure time between Black and White Americans in both 1994 (the beginning of data on marginally attached workers) and 2018.

Figure 18: Unemployment adjustment to leisure



Note: We make two successive adjustments to our leisure calculation on top of our baseline setting. The leftmost set of columns calculates the difference in leisure between Black and White Americans with no adjustment. Our first adjustment (middle columns) sets hours worked for unemployed individuals to full-time hours at the year-race level. Our second adjustment (rightmost columns) sets hours worked to full-time hours for unemployed, marginally attached, and involuntary part-time individuals.

How does the unemployment adjustment to leisure impact relative welfare? Table 5 displays relative welfare of Black versus White Americans in three cases: our baseline specification, with the incarceration adjustment, and with both the incarceration and unemployment adjustments. The unemployment adjustment to leisure has a smaller impact on welfare compared to the incarceration adjustment. For example, in 2018 the incarceration adjustment reduces relative welfare by 3.8% while the unemployment adjustment reduces relative welfare by 0.7%.

Table 5: Relative welfare (λ) after adjustments

	Baseline	Incarceration	Unemployment
1984	46.7	45.6	—
1994	48.5	45.8	44.9
2018	70.0	66.2	65.5

Note: The leftmost columns represents relative welfare of Black versus White Americans with no adjustments, the middle column represents relative welfare with the incarceration adjustment, and the rightmost column represents relative welfare with both the incarceration and unemployment adjustments.

8. Conclusion

We construct consumption-equivalent welfare for Black and White Americans. Our statistic incorporates mortality, consumption, leisure, and inequality in consumption and leisure, with mortality rates playing a key role quantitatively. According to our estimates, welfare for Black Americans was 49% of that for White Americans in 1984 and rose to 67% by 2019. Going back further in time, the gap was even larger, with Black welfare equal to just 30% of White welfare in 1940. On the one hand, there has been remarkable progress for Black Americans: the level of their consumption-equivalent welfare increased by a factor of 30 between 1940 and 2019, when aggregate consumption per person rose a more modest 5-fold. On the other hand, despite this remarkable progress, the welfare gap in 2019 remains disconcertingly large. Mortality from COVID-19 has temporarily reversed a decade of progress, lowering Black welfare by 14% and Latinx welfare by 21% while reducing White welfare by 8%.

A Appendix

A1. Survival rates

For years 1984 to 1989 and 1991 to 1996, the CDC's life tables only report survival rates up to age 85. To approximate survival rates for ages above 85, we use the fact that mortality rates increase exponentially with age after age 30, which was first documented by Gompertz (1825). More precisely, we use reported mortality rates from age 65 to 85 to estimate the coefficients α and β of the following function by race and gender:

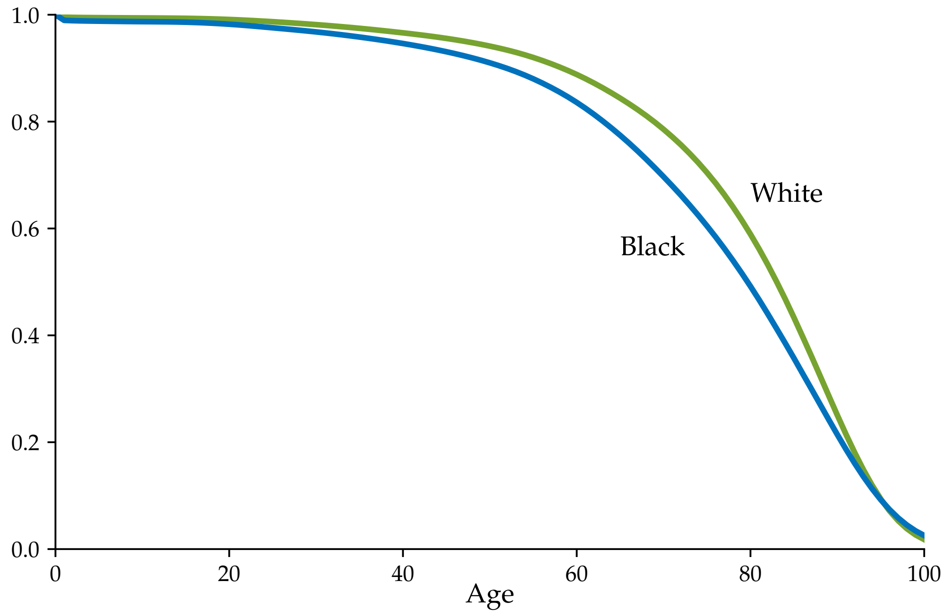
$$m(a) = \alpha e^{\beta a}$$

where $m(a)$ is the mortality rate at age a. We can then calculate survival rates up to age 100 using the available survival rate at age 85 and the approximated mortality rates after age 85.

Since the 2018 and 2019 life tables do not report survival rates for Black and White Americans irrespective of Latin origin, we follow the CDC's methodology for producing life tables from death records and population estimates to make sure that our racial groups are consistent throughout our sample.[9] Death records are obtained from the CDC's NVSS and in particular, we omit foreign residents. We then count death occurrences by year, age, race, gender and education. In fact, starting in 1989, the NVSS started reporting the deceased's educational attainment. However, the coverage of the educational attainment records was relatively poor until 1994. We then use the CDC's bridged race population estimates in 2018 and 2019 to determine the population at risk by year, age, race and gender. The CDC bridged race population estimates, however, do not provide breakdowns by education. We therefore use the sampling weights of the 2018 and 2019 American Community Surveys (ACS) to approximate the educational attainment distribution within each race, gender and 5-year age group cell.

[9] https://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_03.pdf

Figure 19: Survival age profile in 2019

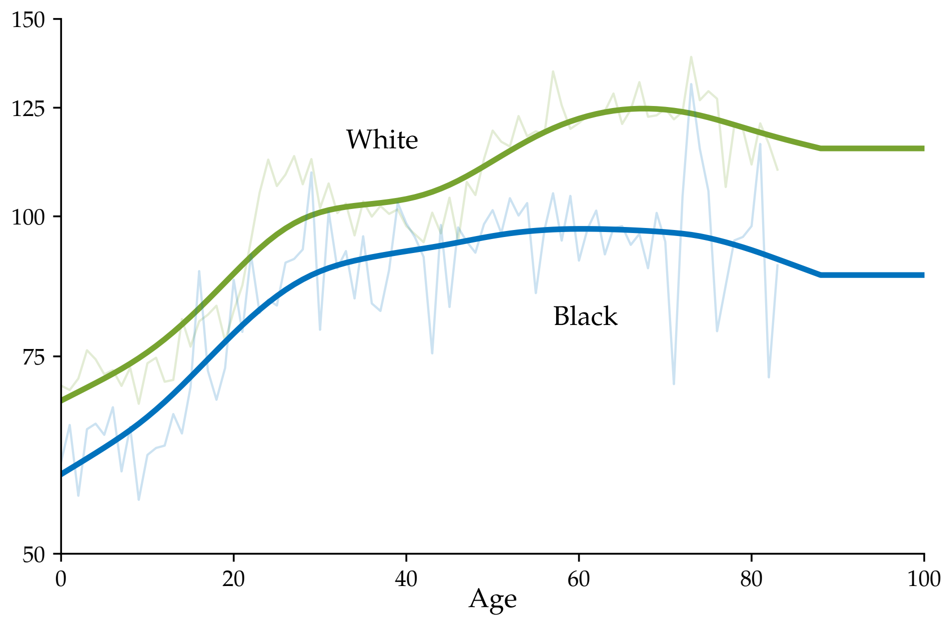


Note: Author calculations using data from the CDC.

A2. Consumption

To obtain our consumption measure, we closely follow the work of Aguiar and Bils (2015). In fact, our consumption aggregate corresponds to the sum of the nondurable consumption categories reported in their work, with three exceptions. First, we do not constrain our sample to 4-interview households and complete income reporters. Instead, we use the CEX's full sample and multiply a household's consumption by the inverse of the fraction of interviews in which it participated. However, to ensure that the standard deviation of consumption for below 4-interview households is not artificially high, we slightly adjust their consumption. In fact, we re-scale it such that within each race, gender and education group, its standard deviation is equal to that of 4-interview households. Then, we impose a lower bound on consumption equal to $2,000 in 2012 USD in each year. Third, we also re-scale consumption expenditures such that they aggregate to the nondurable NIPA real personal consumption expenditures per capita. To do so, we first divide consumption equally among each household member. Finally, since the CEX's sample size is relatively small, we smooth the the age profile of consumption within each year using a HP-filter with a penalty term of 1,600.

Figure 20: Consumption age profile by race in 2019

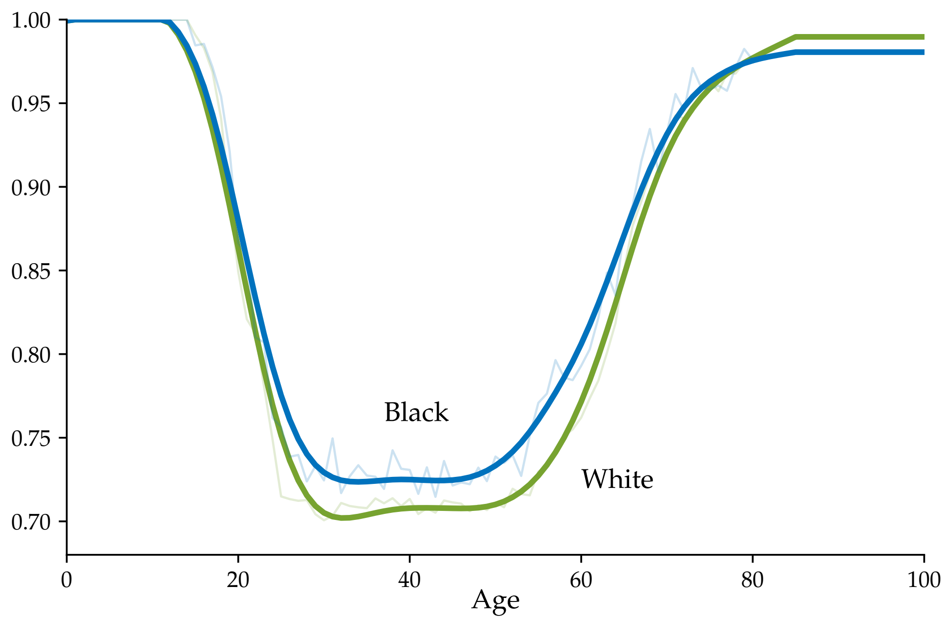


Note: Author calculations using data from the U.S. Consumer Expenditure Surveys (CEX). The age profile of consumption is HP-filtered with a smoothing parameter of 1,600 and kept constant for all ages above the last available age in the CEX data. Consumption for White Americans is normalized to 100 in 2019.

A3. Leisure

To calculate leisure, we use information on usual hours worked per week and weeks worked per year from the CPS to obtain an estimate of hours worked per year. Then, assuming that a maximum of 16 hours per day and 365 days per year are available for work, we obtain leisure as the fraction of hours that are not spent in market work. To also account for non-market work discrepancies between genders, we divide hours worked per year equally among individuals between 25 and 64 years old within each household. The resulting split in leisure time between men and women is similar to that found in Aguiar and Hurst (2007). As for consumption, since the CPS' sample size is still somewhat small, we smooth the the age profile of leisure within each year using a HP-filter with a penalty term of 100.

Figure 21: Leisure age profile by race in 2019



Note: Author calculations using data from the U.S. Current Population Survey. The age profile of leisure is HP-filtered with a smoothing parameter of 100 and kept constant for all ages above the last available age in the CPS data.

A4. Calibrating the intercept in the flow utility: $\overline{u}$

This section describes how to calibrate $\overline{u}$ when we are using only part of consumption (such as non-durables). Consider an extreme version of this, where we observe Starbucks coffee purchases c_{sb} and are using this to proxy for consumption. In particular, suppose

$$c = \mu c_{sb}$$

That is, true consumption is a "markup" μ over measured Starbucks consumption.

Suppose utility is

$$\begin{aligned} V &= \sum_a \beta^a S(a) u(c_a, \ell_a) \\ &= \sum_a S(a)\beta^a(\overline{u}_0 + \log c_a) + v(\ell_a) \\ &= \sum_a S(a)\beta^a(\overline{u}_0 + \log \mu + \log c_{sb,a} + v(\ell_a) \\ &= \sum_a S(a)\beta^a(\overline{u} + \log c_{sb,a} + v(\ell_a) \end{aligned}$$

where $\overline{u} \equiv \overline{u}_0 + \log \mu$.

The VSL=\$7.4m $= V/muc$ in the model where $muc = 1/c$ denotes the marginal utility of all consumption. rearranging

$$\begin{aligned} V &= 7.4m \cdot muc \\ &= \frac{7.4m}{c} \\ &= \frac{7.4m}{\mu c_{sb}} \end{aligned}$$

That is, we have to use "true" consumption to convert the VSL into utils, so that V has the units (when log utility) of "years of consumption".

Now, we can combine these two sets of equations for V and solve for $\overline{u}$:

$$\overline{u} = \frac{7.4m/c2006 - \sum_a \beta^a S(a) \log c_{sb,a} + v(\ell_a)}{\sum_a \beta^a S(a)}$$

We use a value of c2006 of \$25,288, which is nominal per capita NIPA consumption exenditures (PCE) net of medical care.

A5. Consumption imputation

To impute consumption from the CEX to the U.S. censuses and ACS, we regress nondurable consumption on wage and salary income, controlling for race, gender and age in the CEX, where all variables are in percentage deviation from their annual average. Nondurable consumption and wage and salary income are both calculated at the household level and then evenly divided by the number of household members. Importantly, we do not re-scale our consumption and income measures for aggregation purposes to ensure that the CEX consumption to income ratios are preserved by the imputation. Finally, we restrict the CEX estimation sample to complete income reporters.

We then use the estimated coefficients of this regression to impute consumption in the Census from wage and salary income as well as race, gender and age. All Census imputation variables are constructed as they are in the CEX. Finally, we re-scale imputed nondurable consumption in the Census such that it aggregates to real nondurable personal consumption expenditures per capita from NIPA.

Figure 22 plots per capita nondurable consumption by race from 1990 to 2019 in the CEX (solid lines) and its imputed analog in the Census (dotted lines), where consumption is normalized to 100 for White Americans in 2019.

A6. Welfare by Education

In Table 6 we report life expectancy for Black and White Americans by gender and education in 2018. The race gap in longevity is larger among men (4.4 years) than among women (2.7 years). For the education breakdown, we report life expectancy at age 30 since educational attainment is most likely not realized for everyone below that age. Black Americans have 1.7 to 2.1 lower years life expectancy at age 30, even within education groups.

Figure 22: Consumption imputation

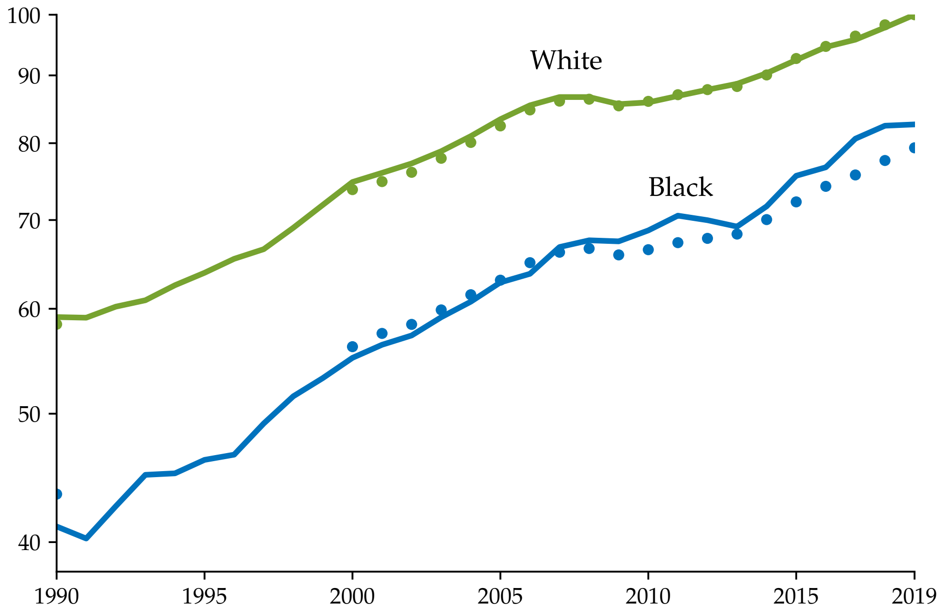


Table 6: Life expectancy by race, gender and education in 2019

	At birth		At 30 years old		
	Males	Females	High school –	Some college	Bachelor's degree +
Black	72.9	79.6	46.3	49.2	53.6
White	77.5	82.4	48.6	50.6	55.5

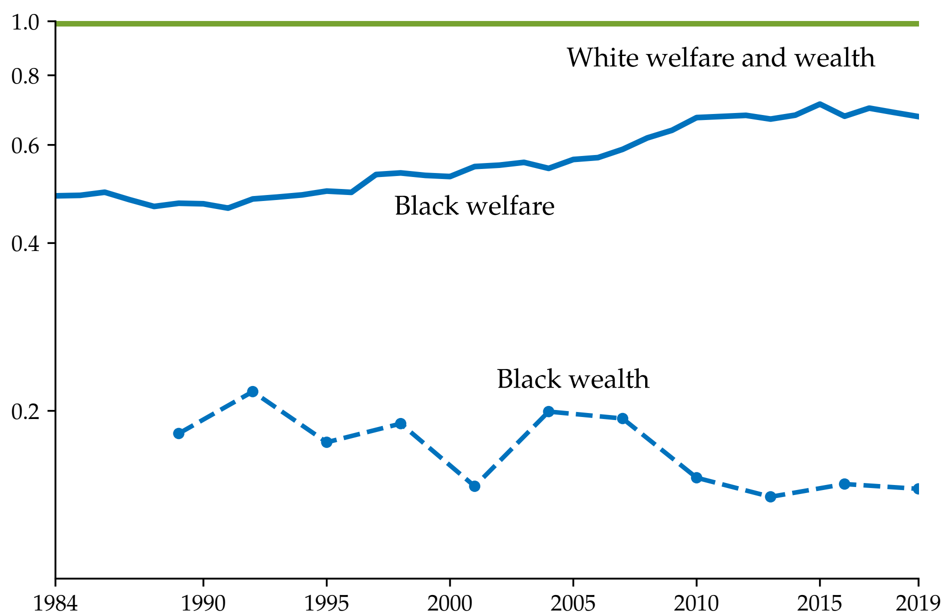
Table 7: Welfare gap by race and education

	High school –	Some college	Bachelor's degree +
Black welfare	0.23	0.36	0.67
Black income	0.30	0.52	0.88
	51.6 %	25.9 %	22.5 %
White welfare	0.30	0.46	1.00
White income	0.35	0.53	1.00
	44.7 %	22.3 %	33.0 %

A7. Comparing Welfare to Wealth

Figure 23 contrasts relative welfare with relative wealth in the Federal Reserve's Survey of Consumer Finances in various years. Wealth gaps are very large relative to welfare gaps, and actually widened over our sample.

Figure 23: Relative welfare and wealth



Note: The wealth series we use is net worth from the Survey of Consumer Finances (SCF) between 1989 and 2019.

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