A. Appendix

A.1 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 2018, life tables stopped reporting survival rates for Black and White Americans irrespective of Latin origin. Hence, 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.[23] Death records are obtained from the CDC's National Center for Health Statistics (NCHS) and the corresponding population at risk is obtained from the CDC's bridged race population estimates.[24,25]

A.2 Incarceration rates

We construct incarceration rates using data from the National Prisoner Statistics (NPS) and the Annual Survey of Jails (ASJ) for the years 1984 to 2022. The NPS provides counts of individuals incarcerated in state and federal prisons, and it reports this data specifically for Black and White Americans not of Latin origin. The ASJ provides data on the local jail populations but has missing entries for certain years. For these years, we linearly interpolate the missing ASJ data. To calculate incarceration rates, we first combine the prison and jail populations from the NPS and ASJ data. We then divide it by the corresponding population estimates for Black and White Americans not of Latin origin from

[23] https://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_03.pdf.
[24] https://wonder.cdc.gov/mcd.html.
[25] https://wonder.cdc.gov/bridged-race-population.html

the U.S. Census Bureau.

A.3 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 consumption categories reported in their work, with three exceptions. First, we do not constrain our sample to 4-interview urban 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 *nondurable* consumption for below 4-interview households is not artificially high, we slightly adjust their nondurable consumption. In fact, we re-scale it such that within each race group, the standard deviation of nondurable consumption expenditures 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 total individual consumption expenditures such that they aggregate to NIPA real personal consumption expenditures (PCE) 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 age profile of consumption within each year using an HP filter with a penalty term of 1,600.

A.4 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 account for differences in unemployment, 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 consider a broad definition of unemployment, including the unemployed and marginally attached workers as well as workers who are involuntarily working part-time. 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 age profile of leisure within each year using an HP filter with a penalty term of 100.

A.5 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 nondurables). 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 that:

$$c = \mu \times c^{sb}.$$

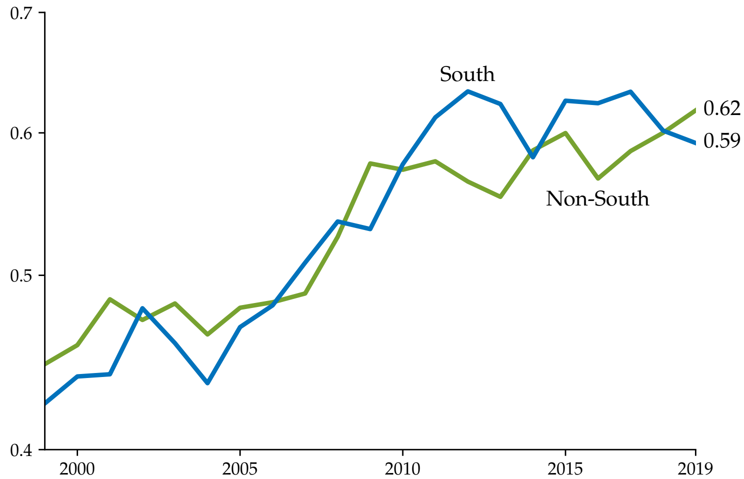
That is, true consumption is a "markup" μ over measured Starbucks consumption. Suppose also that lifetime utility is

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

where $\overline{u} \equiv \overline{u}_0 + \log(\mu)$. The VSL $=$ \$7.4m $= V/u'(c)$ in the model where $u'(c) = 1/c$ is the marginal utility of all consumption. Rearranging, we have:

$$\begin{aligned} V &= \$7.4\text{m} \times u'(c) \\ &= \frac{\$7.4\text{m}}{c} \\ &= \frac{\$7.4\text{m}}{\mu \times c^{sb}} \end{aligned}$$

Figure A1: Black vs. White welfare in the South vs. Non-South



Note: The figure shows the consumption-equivalent welfare for Black relative to White Americans from 1999 to 2019 in the South and Non-South (Northeast, Midwest, and West) Census regions, computed according to equation (3).

That is, we have to use "true" consumption to convert the VSL into utils so that V has the units (with log utility) of "years of consumption". Now, we can combine these two sets of equations for V and solve for $\overline{u}$:

$$\overline{u} = \frac{7.4\text{m}/c_{2006} - \sum_a \beta^a S_a[\log(c_a^{sb}) + v(\ell_a)]}{\sum_a \beta^a S_a}.$$

We use a value of c_{2006} of \$31,046, which is nominal per capita NIPA personal consumption expenditures (PCE).

A.6 Geographic heterogeneity

Figure A1 illustrates the welfare gap between Black and White Americans from 1999 to 2019 across two geographic groupings: the South and the Non-South (comprising the Northeast, Midwest, and West Census regions). These series are derived by calculating regional-level statistics for consumption, leisure, life expectancy, and incarceration, which are then aggregated using equation (2). The analysis begins in 1999, as state-level life expectancy data necessary for this computation is unavailable for earlier years.

A.7 Morbidity

Our data on morbidity status comes from the CDC's National Health Interview Survey (NHIS) for each year from 1997 through 2018.[26] This survey collects information on medical conditions, physical activity, and other health behaviors through personal interviews for the civilian noninstitutionalized population of the United States. Each year, approximately 35,000 households are interviewed, which amounts to approximately 87,500 individuals. We construct the Health and Activities Limitation Index (HALex) developed by Erickson, Wilson and Shannon (1995) from those interviews. The HALex has two ingredients, perceived health and activity limitations, which are derived from questions available in the NHIS until 2018. Information on both of those is combined to construct a single health score defined on the unit line, which we then multiply by survival rates to obtain quality-adjusted life years (QALYs). Quality-adjusted life expectancy (QALE) is simply the sum of QALYs for all ages.

An important issue is how to convert the qualitative survey-based HALex measure into consumption-equivalent units. The HALex score ranges from 0.10 for the worst health state to 1 for the best. The traditional QALY approach simply multiplies this index by life years: so a year in the worst health state is the equivalent of 0.10 years in the best health state. Specifically, denoting the HALex for group i at age a by Q_{ia}, our lifetime utility definition for someone whose consumption is multiplied by a factor λ at each age follows that of Murphy and Topel (2006) and becomes:

$$U_i(\lambda) = \sum_{a=0}^{100} S_{ia} Q_{ia} (1 - I_{ia}) \times \mathbb{E}\left[u(\lambda c_{ia}, \ell_{ia})\right].$$

For the consumption equivalent variation in welfare defined by $U_W(\lambda) = U_B(1)$, we

[26] https://nhis.ipums.org/nhis/

now obtain the following decomposition of consumption-equivalent welfare:

$$
\begin{aligned}
\log(\lambda) = {} & \textstyle\sum_{a=0}^{100} \Delta s_{Ba} \times u_{Ba} && \text{Life expectancy} \\
& + \textstyle\sum_{a=0}^{100} \Delta i_{Ba} \times u_{Ba} && \text{Incarceration} \\
& + \textstyle\sum_{a=0}^{100} \Delta q_{Ba} \times u_{Ba} && \text{Morbidity} \\
& + \log(\bar{c}_B) - \log(\bar{c}_W) && \text{Consumption} \\
& + v(\bar{\ell}_B) - v(\bar{\ell}_W) && \text{Leisure} \qquad \text{(A.1)} \\
& + \mathbb{E}\log(c_B) - \log(\bar{c}_B) - [\mathbb{E}\log(c_W) - \log(\bar{c}_W)] && \text{Consumption inequality} \\
& + \mathbb{E}\, v(\ell_B) - v(\bar{\ell}_B) - [\mathbb{E}\, v(\ell_W) - v(\bar{\ell}_W)] && \text{Leisure inequality}
\end{aligned}
$$

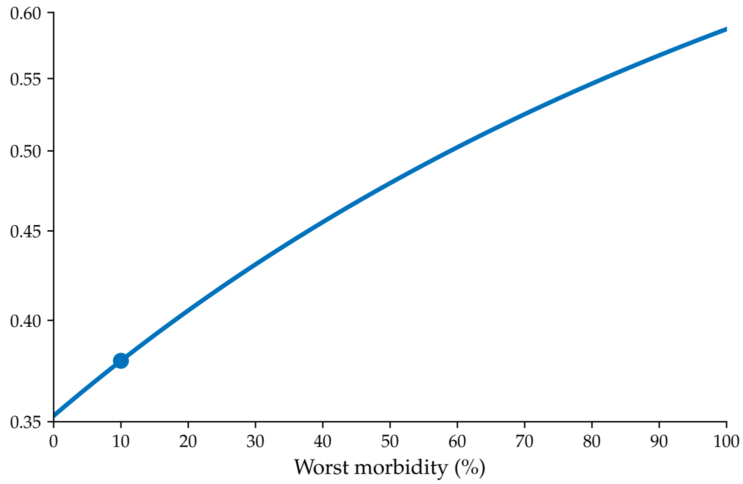
where the flow utility intercept $\bar{u}$ must be re-calibrated and we now have slightly different definitions for each term. The consumption, leisure, and inequality terms remain almost unchanged with the exception that they are weighted by quality-adjusted life years. But most importantly, the life expectancy, incarceration, and morbidity terms are defined as:

$$
\begin{aligned}
\Delta s_{Ba} &\equiv \frac{(S_{Ba} - S_{Wa}) Q_{Ba} (1 - I_{Ba})}{\sum_{a=0}^{100} S_{Wa} Q_{Wa} (1 - I_{Wa})}, \\
\Delta i_{Ba} &\equiv \frac{(I_{Wa} - I_{Ba}) S_{Wa} Q_{Wa}}{\sum_{a=0}^{100} S_{Wa} Q_{Wa} (1 - I_{Wa})}, \\
\Delta q_{Ba} &\equiv \frac{(Q_{Ba} - Q_{Wa}) S_{Wa} (1 - I_{Ba})}{\sum_{a=0}^{100} S_{Wa} Q_{Wa} (1 - I_{Wa})}.
\end{aligned}
$$

Figure A2 shows the impact on Black vs. White welfare in 2018 of incorporating the HALex as a measure of morbidity differences. The dot in Figure A2 shows the effect of following the traditional approach and treating the HALex itself as a cardinal measure of QALYs needing no re-scaling. Under this assumption the higher morbidity of Black Americans lowers their relative welfare from 59% down to 40% in 2018. The other points on the curve in Figure A2 show the effect of stretching or compressing the HALex to range from 0 to 1 (on the left) to not varying at all (on the right). In other words, we linearly adjust the scale so that the 0.10 worst health state is the equivalent of x percent years of life at the best state, where x is the value on the horizontal axis.[27] Clearly, mor-

[27] A separate issue from the range of the HALex is whether the HALex's curvature appropriately captures QALYs.

Figure A2: Black vs. White welfare in 2018 incorporating QALYs



Note: The vertical axis reports the value of Black relative welfare in 2018. The blue dot treats the HALex score itself as a cardinal measure of QALYs with no rescaling. The other points in the graph show the effect of rescaling the worst health state to be the equivalent of x% of the best health state.

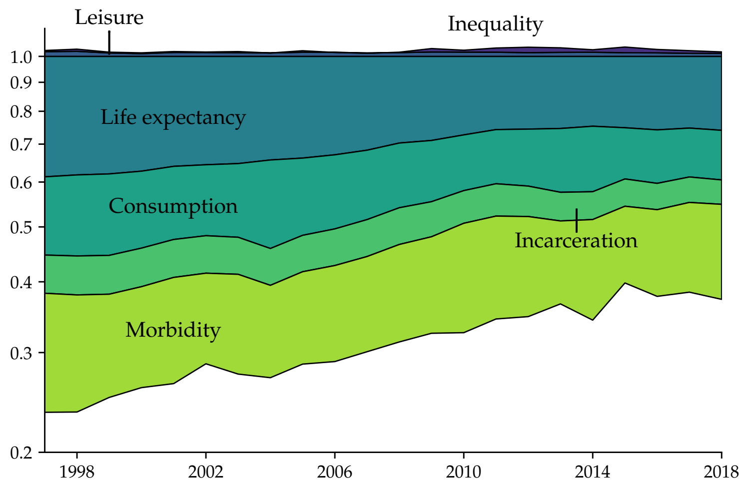
bidity differences between Black and White Americans could be quite important. Our baseline calculation that ignores morbidity may understate the welfare gap substantially.

Figure A3 shows that while there has been a fair amount of convergence in Black relative to White life expectancy and consumption between 1997 and 2018, the racial gap in morbidity remained almost unchanged during that period. In fact, Figure A4 compares our baseline consumption-equivalent welfare results (dark blue line) with the results we obtain when accounting for morbidity and the gap is strikingly large.

A.8 The Role of Taxes and Transfers

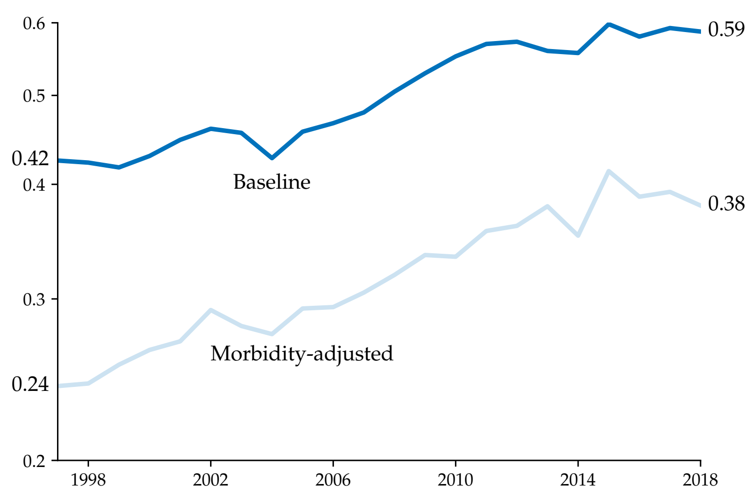
In Figure A5, we present the evolution of consumption, earnings, and post-tax-and-transfer income for Black Americans relative to White Americans from 1984 to 2022. The earnings series is derived from the CPS and captures wage, salary, business, and farm income, while the consumption series is calculated from the CEX. We compute post-tax-and-transfer earnings by starting with pre-tax earnings, to which we add government transfers such as Supplemental Security Income (SSI), unemployment insur-

Figure A3: Relative welfare decomposition incorporating QALYs



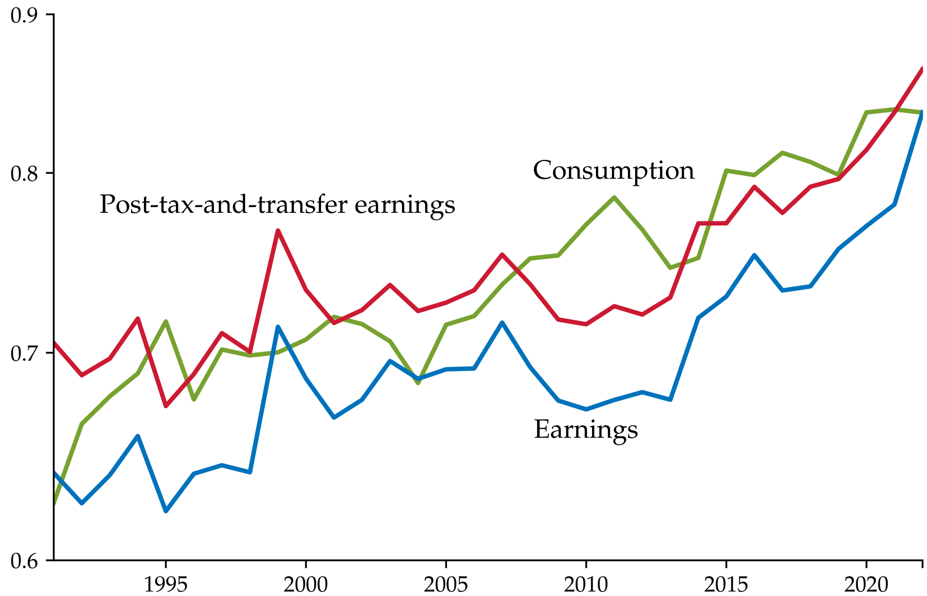
Note: The figure shows the decomposition of consumption-equivalent welfare for Black relative to White Americans from 1997 to 2018, computed according to equation (A.1). Author calculations using data from the CDC's NVSS, the Department of Labor's CPS as well as the CEX and NHIS.

Figure A4: Consumption-Equivalent Welfare incorporating QALYs



Note: The figure shows the consumption-equivalent welfare for Black relative to White Americans from 1997 to 2018, computed according to equation (2) for the dark blue line and equation (A.1) for the pale blue line.

Figure A5: Consumption, Earnings, and Post-tax-and-transfer Earnings



Note: The figure shows the consumption, earnings, and post-tax-and-transfer earnings for Black relative to White Americans from 1984 to 2022. The earnings series are from the CPS and include wage, salary, business, and farm income. The consumption series is calculated from the CEX.

ance, veteran benefits, and food assistance. We then subtract federal and state tax liabilities and FICA contributions, and finally, we account for tax credits like the Earned Income Tax Credit (EITC) and the Additional Child Tax Credit (ACTC), which effectively increase post-tax income.

We notice from Figure A5 that the gap between the relative earnings and relative post-tax-and-transfer earnings has narrowed over time. This implies that the extent of racial progress in terms of consumption cannot be fully attributed to more generous transfers to Black Americans. Indeed, the fact that post-tax-and-transfer earnings have converged with pre-tax earnings over time suggests that improvements in consumption may be driven by factors other than expanded government benefits.