Race and economic well-being

Large and persistent racial differences in economic outcomes in the U.S.

- Earnings: Chetty, Hendren, Jones and Porter (2020), Karger (2020)
- Mortality: Case and Deaton (2015) and Chetty et al. (2016)

Studied separately, but likely correlated

- How large is the racial gap in overall living standards?
- Has it changed over time?
- What are the sources of the racial welfare gap?
Methodology

Build on the expected utility framework of Jones and Klenow (2016)

Construct a consumption-equivalent welfare statistic

- Life expectancy
- Consumption
- Consumption inequality
- Leisure
- Leisure inequality
• Black welfare started at 45% of White welfare in 1984, rose to 64% by 2019
  ○ Progress from rising relative consumption and life expectancy

• Black welfare was only 28% of White welfare in 1940 (limited data)
  ○ Black welfare increased by a factor of 30 between 1940 and 2019

• COVID has temporarily reversed some of the relative life expectancy gains
Framework

Expected utility for individual of race $i$:

$$U_i = \sum_{a=0}^{100} S_{ia} \cdot \mathbb{E} \left[ u(c_{ia}, \ell_{ia}) \right]$$

where $S_{ia} = \text{survival rate}$, $c_{ia} = \text{consumption}$ and $\ell_{ia} = \text{leisure}$

Expected utility if consumption is multiplied by factor $\lambda$ at each age:

$$U_i(\lambda) = \sum_{a=0}^{100} S_{ia} \cdot \mathbb{E} \left[ u(\lambda c_{ia}, \ell_{ia}) \right]$$
Consumption-equivalent welfare

How to adjust consumption of White Americans for them to be indifferent between living their lives in the conditions faced by Black Americans and their own?

\[ U_W(\lambda_{EV}) = U_B(1) \]

Analogously, how to adjust consumption of Black Americans for them to reach the same indifference point as White Americans?

\[ U_W(1) = U_B(1/\lambda_{CV}) \]

Our consumption-equivalent welfare statistic geo-averages \( \lambda_{EV} \) and \( \lambda_{CV} \).
Main datasets

Welfare calculation requires data on mortality, consumption and leisure

- Mortality: Centers for Disease Control and Prevention (CDC)
- Consumption: Consumer Expenditure Surveys (CEX)
- Leisure: Current Population Surveys (CPS)
- Primary period: 1984 to 2019
- Groups: Black and White Americans
Centers for Disease Control and Prevention (CDC)

- Life Tables for each age in each year

- Death records ($D$) and population-at-risk estimates ($P$)

- Probability of surviving up to age $a$:

$$S_a = \prod_{age=0}^{a} (1 - M_{age}) \quad \text{where} \quad M_{age} = \frac{D_{age}}{P_{age}}$$
Consumer Expenditure Surveys (CEX)

- Rotating panel of about 20,000 households

- Divide consumption equally among all household members

- Scale up to NIPA real consumption per capita in each year
Current Population Surveys (CPS)

- Rotating panel of about 60,000 households

- Leisure $\equiv (5,840 - \text{hours worked in the year}) / 5,840$
  - $5,840 = 16 \text{ hours per day} \cdot 365 \text{ days}$

- e.g., 40 hours a week for 48 weeks $\rightarrow 67\%$ of waking time is leisure

- Divide leisure equally among all 25 to 64 year olds in the household
Leisure by race

[Graph showing leisure by race for White and Black from 1985 to 2019]
Flow utility

\[ u(c, \ell) = \bar{u} + \log(c) + v(\ell) \]

where \[ v(\ell) = -\frac{\theta \epsilon}{1 + \epsilon} \cdot (1 - \ell)^{\frac{1+\epsilon}{\epsilon}} \]

- Death is normalized to zero
- \( \epsilon \) is the constant Frisch elasticity of labor supply
## Calibration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frisch elasticity</td>
<td>$\epsilon$</td>
<td>1.0</td>
<td>Hall (2009) and Chetty et al. (2012)</td>
</tr>
<tr>
<td>Leisure utility weight</td>
<td>$\theta$</td>
<td>14.2</td>
<td>Jones and Klenow (2016)</td>
</tr>
<tr>
<td>Flow utility intercept</td>
<td>$\bar{u}$</td>
<td>6.23</td>
<td>VSL of $7.4\text{M}$ in 2006 (EPA)</td>
</tr>
</tbody>
</table>

- Leisure: one percentage point is worth about 1.6% of consumption in 2019
- Intercept: one year of life is worth 6.23 years of consumption in 2019
Calibrating $\bar{u}$ from the VSL

With no discounting, growth, leisure of inequality:

$$U = \sum_{a=0}^{\infty} S_a \cdot u(c) = e \cdot u(c) = e \cdot [\bar{u} + \log(c)]$$

Slope of the indifference curve $dU = 0$ implies:

$$\frac{dc}{c} = \frac{u(c)}{u'(c) \cdot c} \cdot \frac{de}{e} = \bar{u} \cdot \frac{de}{e}$$

1% higher LE is equivalent to $\bar{u}$% higher consumption:

$$\bar{u} = \frac{u(c)}{u'(c) \cdot c} = \frac{VSLY}{c} = \frac{VSL/e_{40}}{c} \approx \frac{$7,400,000/40}{$30,000} = \frac{$185,000}{$30,000} \approx 6.2$$
Definitions

Survival rates normalized by White life expectancy:

\[ s_{Ba} \equiv \frac{S_{Ba}}{\sum_a S_{Wa}} \quad \text{and} \quad \Delta s_{Ba} \equiv \frac{S_{Ba} - S_{Wa}}{\sum_a S_{Wa}} \]

Average lifetime utility from consumption and leisure:

\[ \mathbb{E} \log(c_i) \equiv \sum_a s_{Wa} \cdot \mathbb{E}[\log(c_{ia})] \quad \text{and} \quad \mathbb{E}v(\ell_i) \equiv \sum_a s_{Wa} \cdot \mathbb{E}[v(\ell_{ia})] \]

Average lifetime consumption and leisure:

\[ \bar{c}_i \equiv \sum_a s_{Wa} \cdot \mathbb{E}[c_{ia}] \quad \text{and} \quad \bar{\ell}_i \equiv \sum_a s_{Wa} \cdot \mathbb{E}[\ell_{ia}] \]
Decomposition

$$\log(\lambda_{EV}) = \sum_a \Delta s_{Ba} \cdot \mathbb{E}[u(c_{Ba}, \ell_{Ba})]$$  

Life expectancy

$$+ \log(\bar{c}_B) - \log(\bar{c}_W)$$  

Consumption

$$+ v(\bar{\ell}_B) - v(\bar{\ell}_W)$$  

Leisure

$$+ \mathbb{E} \log(c_B) - \log(\bar{c}_B) - [\mathbb{E} \log(c_W) - \log(\bar{c}_W)]$$  

Consumption inequality

$$+ \mathbb{E} v(\ell_B) - v(\bar{\ell}_B) - [\mathbb{E} v(\ell_W) - v(\bar{\ell}_W)]$$  

Leisure inequality
Black relative to White welfare

![Graph showing the trend of Black relative to White welfare from 1985 to 2019. The graph indicates an overall increase in the ratio over time, with a peak of 0.64 in 2019.](image-url)
Black relative to White welfare, income and wealth
Relative welfare decomposition

Leisure
Inequality
Life expectancy
Consumption
Relative welfare decomposition in 1984, 2000 and 2019

<table>
<thead>
<tr>
<th></th>
<th>$\lambda$</th>
<th>$\log(\lambda)$</th>
<th>$LE$</th>
<th>$c$</th>
<th>$\sigma(c)$</th>
<th>$\ell$</th>
<th>$\sigma(\ell)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>0.64</td>
<td>-0.44</td>
<td>-0.27</td>
<td>-0.22</td>
<td>0.02</td>
<td>0.03</td>
<td>0.00</td>
</tr>
<tr>
<td>2000</td>
<td>0.50</td>
<td>-0.69</td>
<td>-0.42</td>
<td>-0.34</td>
<td>0.02</td>
<td>0.04</td>
<td>0.01</td>
</tr>
<tr>
<td>1984</td>
<td>0.45</td>
<td>-0.80</td>
<td>-0.40</td>
<td>-0.46</td>
<td>-0.00</td>
<td>0.05</td>
<td>0.02</td>
</tr>
</tbody>
</table>
### Welfare growth between 1984 and 2019 (in % per year)

<table>
<thead>
<tr>
<th></th>
<th>Welfare</th>
<th>Income</th>
<th>LE</th>
<th>c</th>
<th>σ (c)</th>
<th>∈</th>
<th>σ (∈)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>3.39</td>
<td>2.29</td>
<td>1.22</td>
<td>2.49</td>
<td>-0.03</td>
<td>-0.17</td>
<td>-0.12</td>
</tr>
<tr>
<td>White</td>
<td>2.32</td>
<td>1.63</td>
<td>0.78</td>
<td>1.84</td>
<td>-0.10</td>
<td>-0.12</td>
<td>-0.08</td>
</tr>
<tr>
<td>Gap</td>
<td>1.08</td>
<td>0.66</td>
<td>0.44</td>
<td>0.66</td>
<td>0.07</td>
<td>-0.05</td>
<td>-0.04</td>
</tr>
</tbody>
</table>
A longer view with more limited data

U.S. Census goes back further in time:

- Decadal: 1940 to 2000
- Annual American Community Survey (ACS): 2005 to 2019
- Impute consumption from income in the Census data
- Coefficients from consumption on income in the CEX 1984–2019
- Omit the inequality terms
Life expectancy

![Graph showing life expectancy for White and Black populations from 1940 to 2019.](image)

- **White** population has generally shown an increase in life expectancy from 1940 to 2019.
- **Black** population has also shown an increase but generally at a lower rate compared to the White population.

<table>
<thead>
<tr>
<th>Year</th>
<th>White Life Expectancy</th>
<th>Black Life Expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>55 years</td>
<td>55 years</td>
</tr>
<tr>
<td>1950</td>
<td>60 years</td>
<td>60 years</td>
</tr>
<tr>
<td>1960</td>
<td>65 years</td>
<td>65 years</td>
</tr>
<tr>
<td>1970</td>
<td>70 years</td>
<td>70 years</td>
</tr>
<tr>
<td>1980</td>
<td>75 years</td>
<td>75 years</td>
</tr>
<tr>
<td>1990</td>
<td>80 years</td>
<td>80 years</td>
</tr>
<tr>
<td>2000</td>
<td>85 years</td>
<td>85 years</td>
</tr>
<tr>
<td>2010</td>
<td>90 years</td>
<td>90 years</td>
</tr>
<tr>
<td>2019</td>
<td>95 years</td>
<td>95 years</td>
</tr>
</tbody>
</table>
Imputing consumption from income and demographics

Run this simple regression on CEX data from 1984–2019:

\[
\frac{c_{it} - \bar{c}_t}{\bar{c}_t} = \beta \cdot \frac{y_{it} - \bar{y}_t}{\bar{y}_t} + \sum_x \alpha_x \cdot \frac{x_{it} - \bar{x}_t}{\bar{x}_t} + \epsilon_{it} \quad \text{for } x_{it} = \{\text{race, gender, age}\}
\]

- $\hat{\beta} = 0.301 \ (0.001)$
- $R^2 = 0.249$

Impute consumption from fitted values using Census data for 1940 onward
Imputed consumption per capita
Black relative to White welfare

![Graph showing the trend of Black relative to White welfare over time from 1940 to 2019. The graph illustrates a consistent increase in the ratio, with minor fluctuations.]
Relative welfare decomposition

Leisure
Life expectancy
Consumption

0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Welfare growth between 1940 and 2019

<table>
<thead>
<tr>
<th></th>
<th>1940–1980</th>
<th></th>
<th></th>
<th></th>
<th>1940–2019</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>λ</td>
<td>LE</td>
<td>c</td>
<td>l</td>
<td>λ</td>
<td>LE</td>
<td>c</td>
<td>l</td>
</tr>
<tr>
<td>Black</td>
<td>5.41</td>
<td>2.78</td>
<td>2.61</td>
<td>0.03</td>
<td>4.41</td>
<td>2.18</td>
<td>2.27</td>
<td>-0.04</td>
</tr>
<tr>
<td>White</td>
<td>3.86</td>
<td>1.70</td>
<td>2.27</td>
<td>-0.10</td>
<td>3.31</td>
<td>1.34</td>
<td>2.07</td>
<td>-0.10</td>
</tr>
<tr>
<td>Gap</td>
<td>1.55</td>
<td>1.08</td>
<td>0.34</td>
<td>0.13</td>
<td>1.10</td>
<td>0.85</td>
<td>0.20</td>
<td>0.06</td>
</tr>
</tbody>
</table>
Cumulative welfare growth

- White welfare
- Black welfare
- Consumption (all races)


Growth: 1x, 2x, 4x, 8x, 16x, 30x, 13x, 5x
## COVID-19 and welfare

<table>
<thead>
<tr>
<th></th>
<th>Deaths per thousand</th>
<th>Age of victims</th>
<th>Years of life lost per victim</th>
<th>Lower lifespan</th>
<th>Group welfare loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black non-Latinx</td>
<td>1.93</td>
<td>71.4</td>
<td>15.6</td>
<td>2.5</td>
<td>17.3</td>
</tr>
<tr>
<td>White non-Latinx</td>
<td>1.68</td>
<td>79.3</td>
<td>11.2</td>
<td>1.3</td>
<td>9.7</td>
</tr>
<tr>
<td>Latinx</td>
<td>1.66</td>
<td>68.9</td>
<td>20.0</td>
<td>4.3</td>
<td>26.3</td>
</tr>
<tr>
<td>All groups</td>
<td>1.65</td>
<td>75.8</td>
<td>14.2</td>
<td>2.0</td>
<td>13.8</td>
</tr>
</tbody>
</table>

Note: As of April 24, 2021, the CDC reports a total of 555,569 COVID-19 deaths.
Per capita consumption with Latinx as a separate group
Leisure with Latinx as a separate group
Life expectancy with Latinx as a separate group

Years

- White non-Latinx
- Black non-Latinx
- Latinx


72 74 76 78 80 82 84

35 / 51
Black and Latinx welfare relative to White welfare

![Graph showing Black non-Latinx and Latinx welfare trends from 2007 to 2019.]

- Latinx welfare appears to increase over the years, peaking around 2015 and slightly decreasing thereafter.
- Black non-Latinx welfare shows a more fluctuating pattern, with a notable increase around 2013 and another around 2017.
Extensions (more speculative)

- Morbidity
- Incarceration
- Unemployment
- Education
Health and Activity Limitations Index (HALex)

\[
\text{HALex} = \underbrace{\alpha}_{\text{HALex} = 0.1} + (1 - \alpha) \times [0.41 \times (P + A) + 0.18 \times P \times A]
\]

1. Personal health assessment \((P)\) goes from 0 to 1:
   - 5 answers from “poor” \((P = 0)\) to “excellent” \((P = 1)\)

2. Activity limitations \((A)\) also goes from 0 to 1:
   - Limited in non-work activities
   - Limited in work
   - Unable to work
   - Limited in household chores, shopping, etc.
   - Limited in eating, bathing, dressing, etc.
Health and Activity Limitations Index (HALex)
Health and welfare

Expected utility with health:

\[ U_i = \mathbb{E} \sum_{a=0}^{100} S_{ia} \cdot Q_{ia} \cdot u(c_{ia}, \ell_{ia}) \]

\[ Q_{ia} = \text{compressed or stretched HALex}_{ia} \]
Black relative welfare in 2019 with QALYs
Health and the Black-White welfare gap

Leisure
Inequality
Life expectancy
Consumption
Health

0.4
0.6
0.8
1.0
Incarceration rates

%
Incarceration and welfare

Expected utility with incarceration:

\[ U_i = \mathbb{E} \sum_{a=0}^{100} S_{ia} [(1 - I_{ia}) u(c_{ia}, \ell_{ia}) + I_{ia} u_{a}^I] \]

where \( I_{ia} = \) incarceration rate and \( u_{a}^I = \) incarcerated flow utility

Incarcerated flow utility is some fraction of average flow utility for individuals of all groups with high school education or less
The effect of incarceration on Black relative welfare in 2016
Broad unemployment rates

![Graph showing unemployment rates for different years with a comparison between Black and White populations.](image)
The effect of unemployment on Black relative welfare in 2019
## Welfare by race and education in 2019

<table>
<thead>
<tr>
<th></th>
<th>High school or less</th>
<th>Some college</th>
<th>Bachelor’s or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black welfare</td>
<td>0.23</td>
<td>0.36</td>
<td>0.64</td>
</tr>
<tr>
<td>% of 30+ population</td>
<td>52%</td>
<td>26%</td>
<td>22%</td>
</tr>
<tr>
<td>White welfare</td>
<td>0.30</td>
<td>0.46</td>
<td>1.00</td>
</tr>
<tr>
<td>% of 30+ population</td>
<td>45%</td>
<td>22%</td>
<td>33%</td>
</tr>
</tbody>
</table>
Recap of results

- Black welfare started at 45% of White welfare in 1984, rose to 64% by 2019
  - Progress from rising relative consumption and life expectancy

- Black welfare was only 28% of White welfare in 1940 (limited data)
  - Black welfare increased by a factor of 30 between 1940 and 2019

- COVID mortality has temporarily lowered Black welfare by 17%
  - 10% for White welfare
Potential policy implications

- Quantifying welfare loss due to past and present discrimination
  - Potential welfare gains from eliminating this misallocation

- Quantifying sources of the welfare gap
  - Helpful for gauging benefits of competing policies