The Economic Well-Being of the U.S. Population, 1970 – present

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NBER Macro Perspectives on Health
Preliminary and Incomplete – November 8, 2019

Are people worse off today than in the past?

- Many changes in U.S. economy in recent decades
  - Rising inequality (Piketty and Saez, Chetty)
  - Declining life expectancy (Case and Deaton)
  - Slowing economic growth
- Often studied separately, but likely correlated
- How have overall living standards in the U.S. changed?
  - Rural whites in West Virginia
  - Blacks in Mississippi
  - People in the Rust Belt
  - College graduates in California and New York

Very much a work in progress...

- Apply our "Beyond GDP" (*AER* 2016) methodology to different groups within the United States:
  - Consumption-equivalent welfare comparisons
  - Across groups and over time
  - Include consumption, life expectancy, and inequality
- Many things not yet implemented
  - No splits by education (life expectancy harder to get)
  - Using Census data on incomes to impute consumption (CEX in future as well, 1990s onward)
  - Leisure, unemployment, incarceration rates
  - Finer geographical splits? By zip code?

Methodology

Consumption-Equivalent Welfare

- Let Rawls live a lifetime as a random person in some group, facing their mortality rates and consumption/leisure distribution.
  - "Group" = state $\times$ race in a given year
  - Analogous to life expectancy: summarize cross-sectional distributions

- Expected utility behind the Rawlsian veil of ignorance:

$$V(e, c, \ell, \sigma) = e\left(\bar{u} + \log c + v(\ell) - \frac{1}{2}\sigma^2\right)$$

  Details next...

Preferences

- Let C denote an individual's consumption.
- Let ℓ denote leisure or time spent in home production.
- Flow utility in benchmark case

$$u(C, \ell) = \bar{u} + \log C + v(\ell)$$

- $\bar{u}$ influences the value of life given C, ℓ.

Consumption and Inequality

- Micro data on consumption (CEX, or imputed from Census)
- Top coded in complicated time-varying ways
- Assume consumption is log-normal
  - Arithmetic mean c (consumption per person)
  - Standard deviation σ
  - Inferred from median and 90/10 ratio to handle top-coding
- Expected utility from consumption behind the "veil of ignorance"

$$E[\log C] = \log c - \frac{1}{2} \cdot \sigma^2$$

Mortality

- Probability of surviving to age a is $S(a)$
  - Assume consumption is independent of age (for now)
- Life expectancy at age 25 is $e \equiv \sum_{a=25}^{100} S(a)$
  - Live entire "life" facing the mortality rates from (say) 1970
- Then Rawls' expected lifetime utility is

$$\sum_{a=25}^{100} S(a)\, E[u(C,\ell)] = e\left(\log c + v(\ell) - \frac{1}{2}\cdot\sigma^2\right)$$

Expected utility behind the Rawlsian veil of ignorance:

$$V(e, c, \ell, \sigma) = e\left(\bar{u} + \log c + v(\ell) - \frac{1}{2}\sigma^2\right)$$

- Years of expected life $\times$ expected flow utility
- No discounting or life-cycle growth (easy to add)
- Easy to generalize to CRRA utility

Comparing Welfare across Groups

- Our comparison group is U.S. whites
- How much would we have to scale consumption to make Rawls indifferent between U.S. whites and, e.g., blacks in Illinois?
- Scaling U.S. white consumption by some proportion λ_i.

$$V(e_{us,whites}, \lambda_i \cdot c_{us,whites}, \ell_{us,whites}, \sigma_{us,whites}) = V(e_i, c_i, \ell_i, \sigma_i)$$

- Group i could be blacks in Illinois or whites in West Virginia or Native Americans in Oklahoma

Decomposing Welfare Differences Across Groups

$$\log \lambda_i = \frac{e_i - e_{us}}{e_{us}} (\bar{u} + \log c_i + v(\ell_i) - \tfrac{1}{2}\sigma_i^2) \quad \textit{Life Expectancy}$$

$$+ \log c_i - \log c_{us} \quad \textit{Consumption}$$

$$+ v(\ell_i) - v(\ell_{us}) \quad \textit{Leisure}$$

$$- \tfrac{1}{2}(\sigma_i^2 - \sigma_{us}^2) \quad \textit{Inequality}$$

Equivalent vs. Compensating Variation

- Alternative: Scale consumption in group i instead

$$V(e_{us}, c_{us}, \ell_{us}, \sigma_{us}) = V(e_i, c_i/\lambda_i, \ell_i, \sigma_i)$$

- Changes the life expectancy term only

$$EV: \quad \frac{e_i - e_{us}}{e_{us}}(\bar{u} + \log c_i + v(\ell_i) - \tfrac{1}{2}\sigma_i^2)$$

$$CV: \quad \frac{e_i - e_{us}}{e_i}(\bar{u} + \log c_{us} + v(\ell_{us}) - \tfrac{1}{2}\sigma_{us}^2)$$

- Baseline: Weight by flow utility of U.S. average person instead — values all lives equally

Decomposing Welfare Differences *Over Time*

$$\log \lambda_{t,t+1} = \frac{e_{t+1}-e_t}{e_{t+1}}(\bar{u} + \log c_t + v(\ell_t) - \tfrac{1}{2}\sigma_t^2) \quad \textit{Life Expectancy}$$

$$+ \log c_{t+1} - \log c_t \quad \textit{Consumption}$$

$$+ v(\ell_{t+1}) - v(\ell_t) \quad \textit{Leisure}$$

$$-\tfrac{1}{2}(\sigma_{t+1}^2 - \sigma_t^2) \quad \textit{Inequality}$$

Baseline: report the geometric average of the compensating and equivalent variations.

Data and Calibration

Data

- Mortality, 1968–2016
  - Compressed mortality table, CDC Wonder
  - Mortality by age, year, state, race, gender
  - Not by education at the moment (future)
- Consumption
  - Consumer Expenditure Survey
  - Decennial Census (1970–2000), American Community Survey (2009 onward)
  - Currently: Observe relationship between non-durable consumption and income in the CEX.
  - Impute from income in the Census/ACS (year, state, race, gender, education)

Race/Ethnicity Categories

Our label	Census group
White	White, Non-Hispanic
Black	Black, Non-Hispanic
Hispanic	Hispanic (White or Black)
Asian	Asian and Pacific Islander
Native American	American Indian / AK native

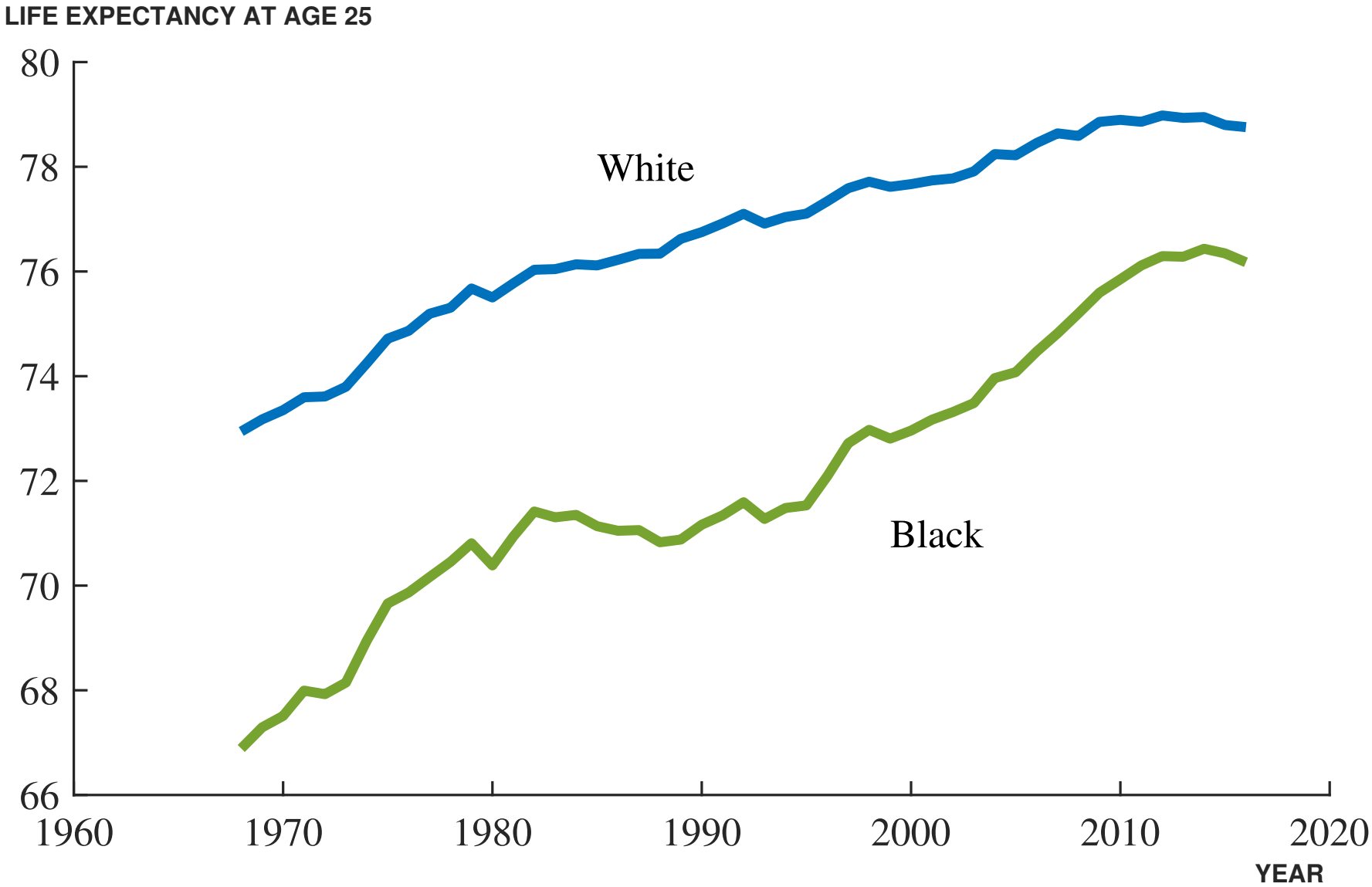
Note: Pre-1999 mortality only for White, Black, and Other at the moment

Regions and States

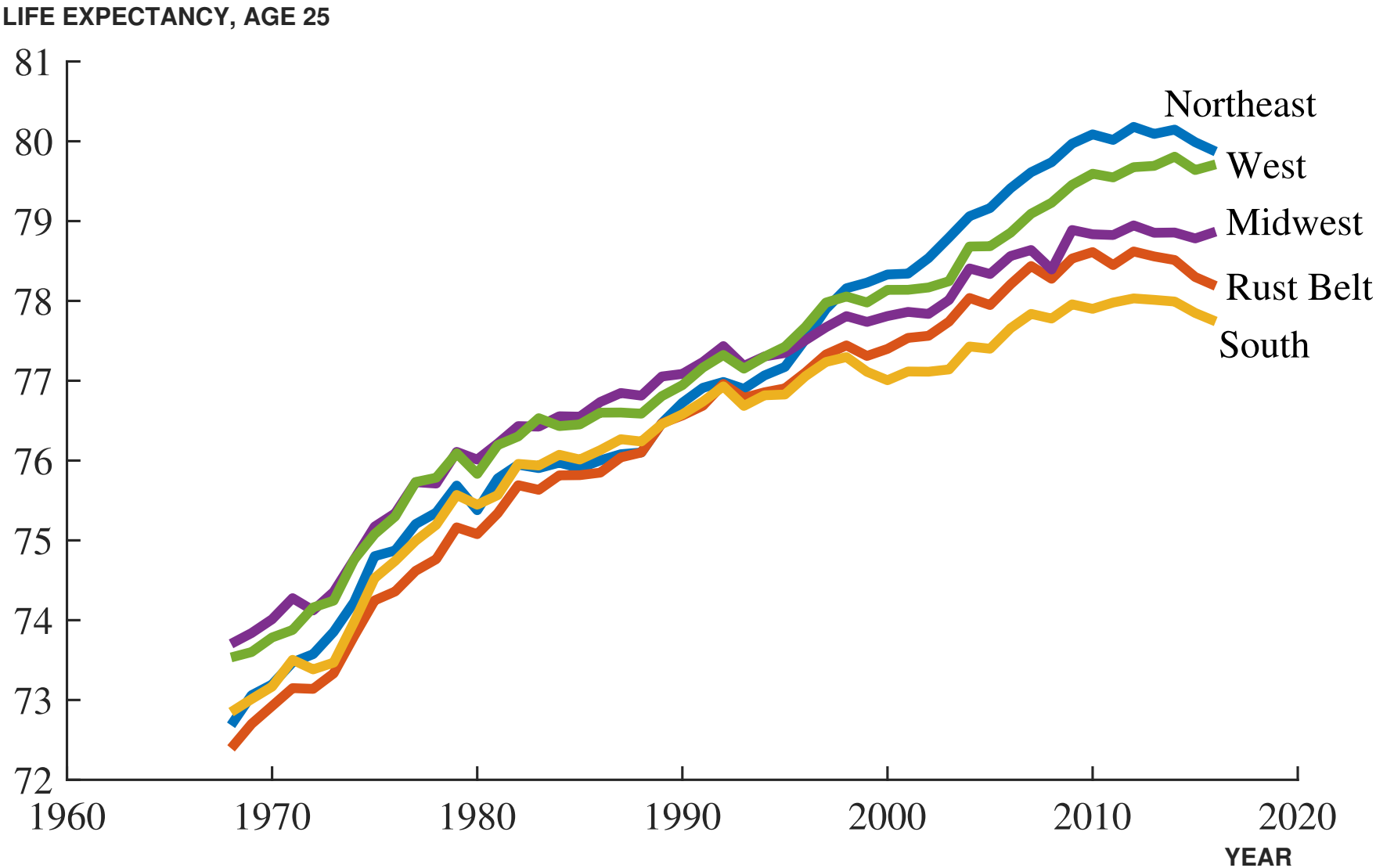
States divided into 5 regions, to include Rust Belt:

Northeast:	CT DE DC ME MD MA NH NJ NY RI VT
Rust Belt:	IL IN MI OH PA WV
South:	AL AR FL GA KY LA MS NC SC TN VA
Midwest:	IA KS MN MO NE ND OK SD TX WI
West:	AK AZ CA CO HI ID MT NV NM OR UT WA WY

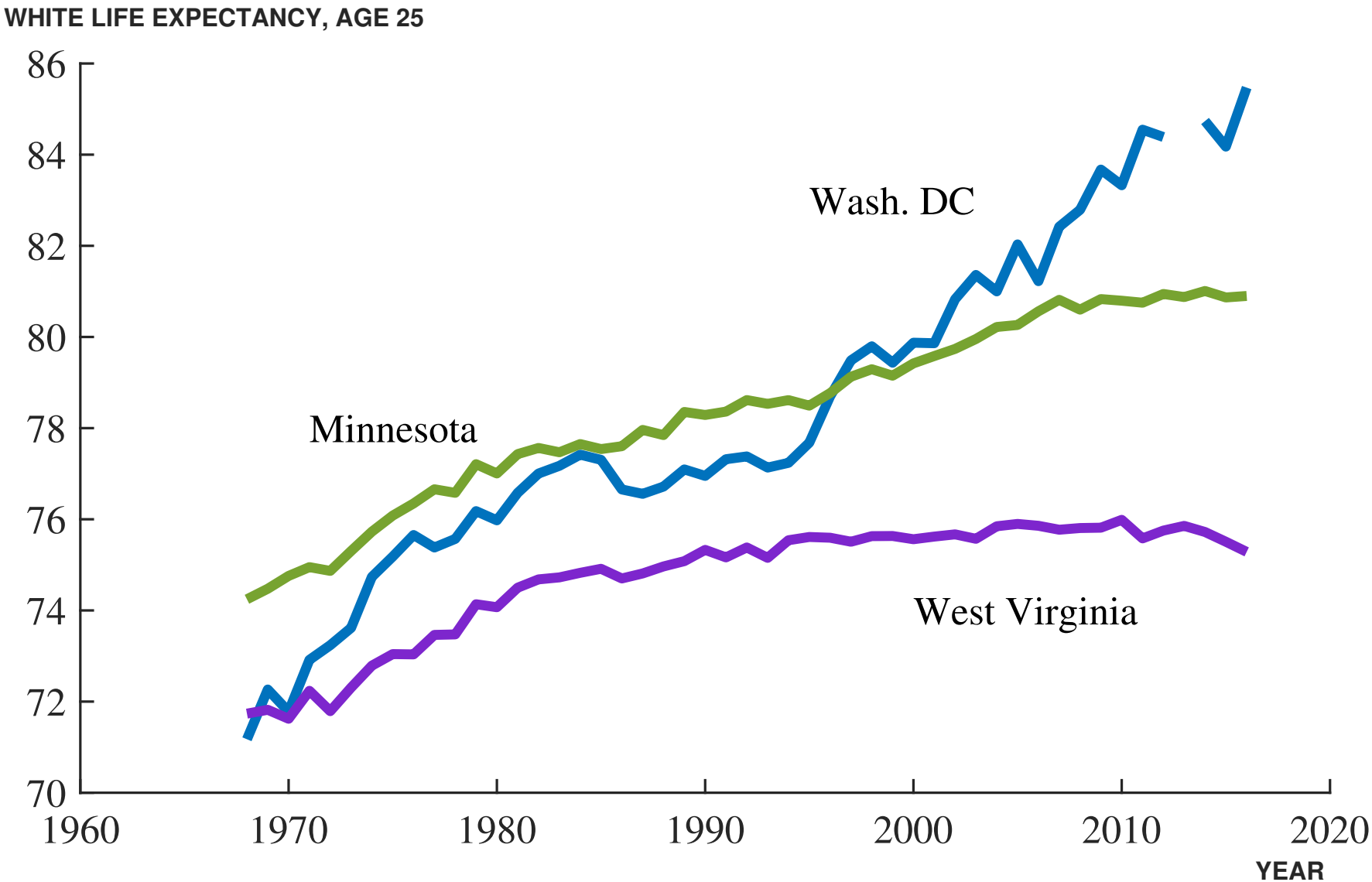
U.S. Life Expectancy by Race



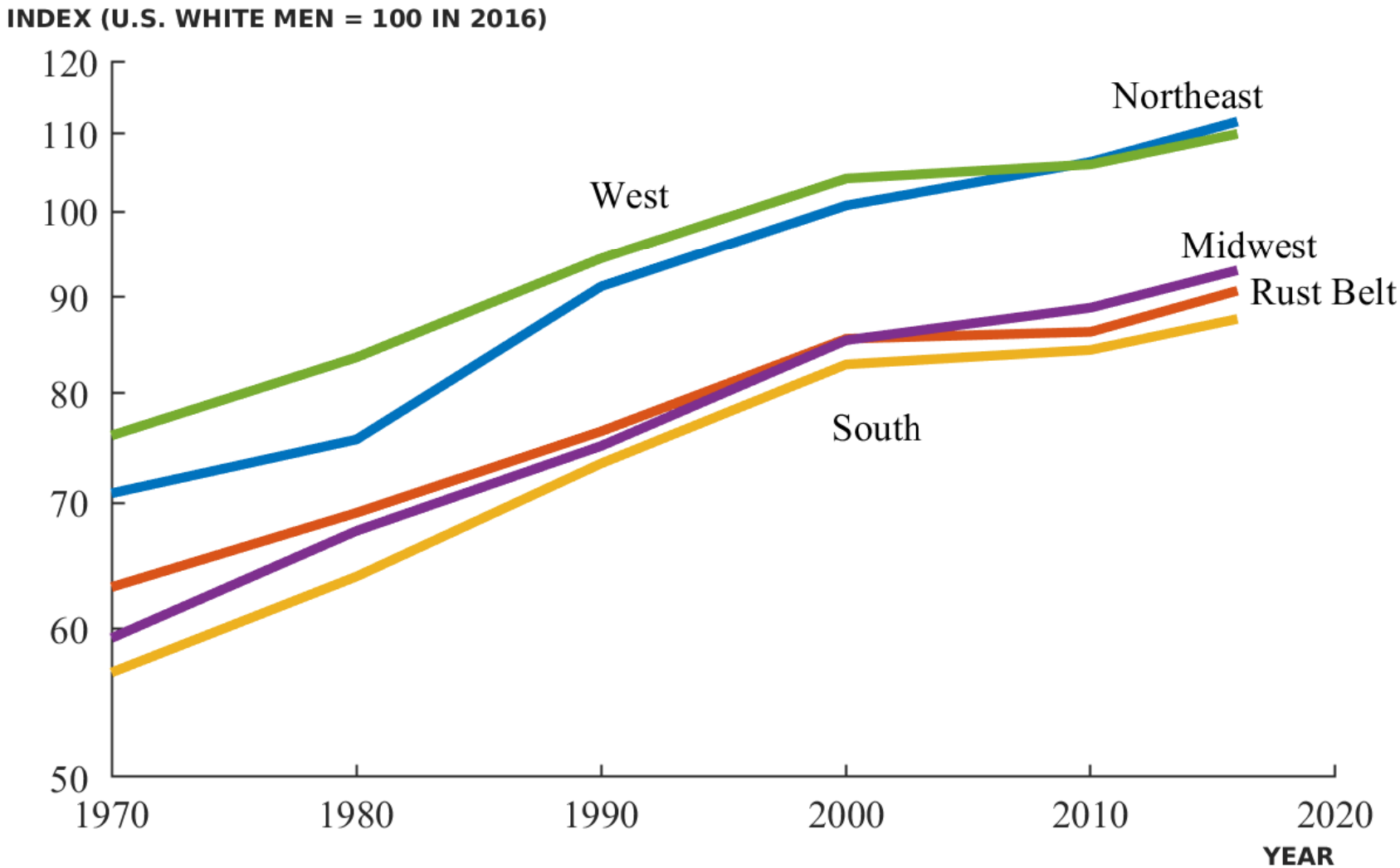
U.S. Life Expectancy by Region, Whites



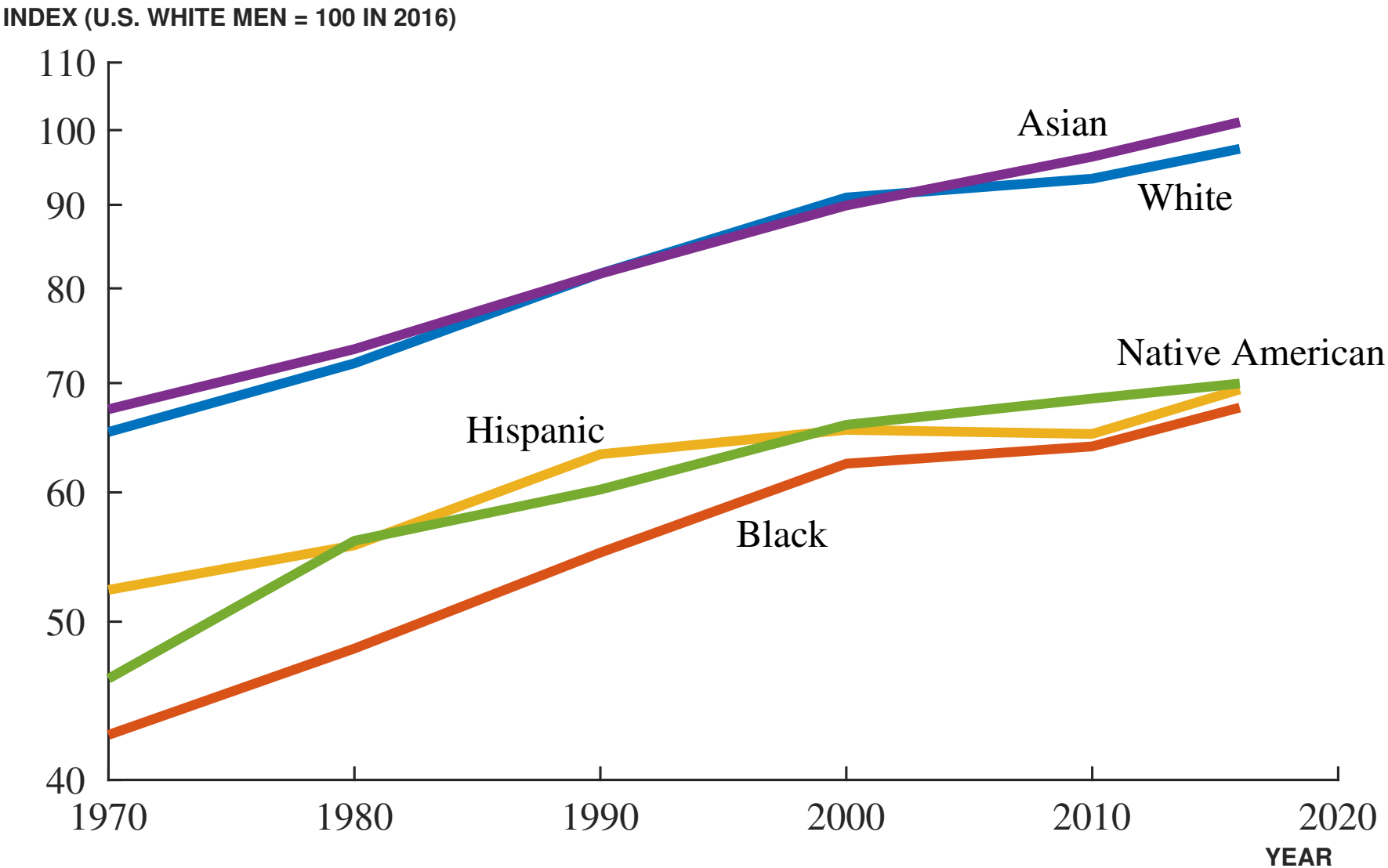
White Life Expectancy, Select States



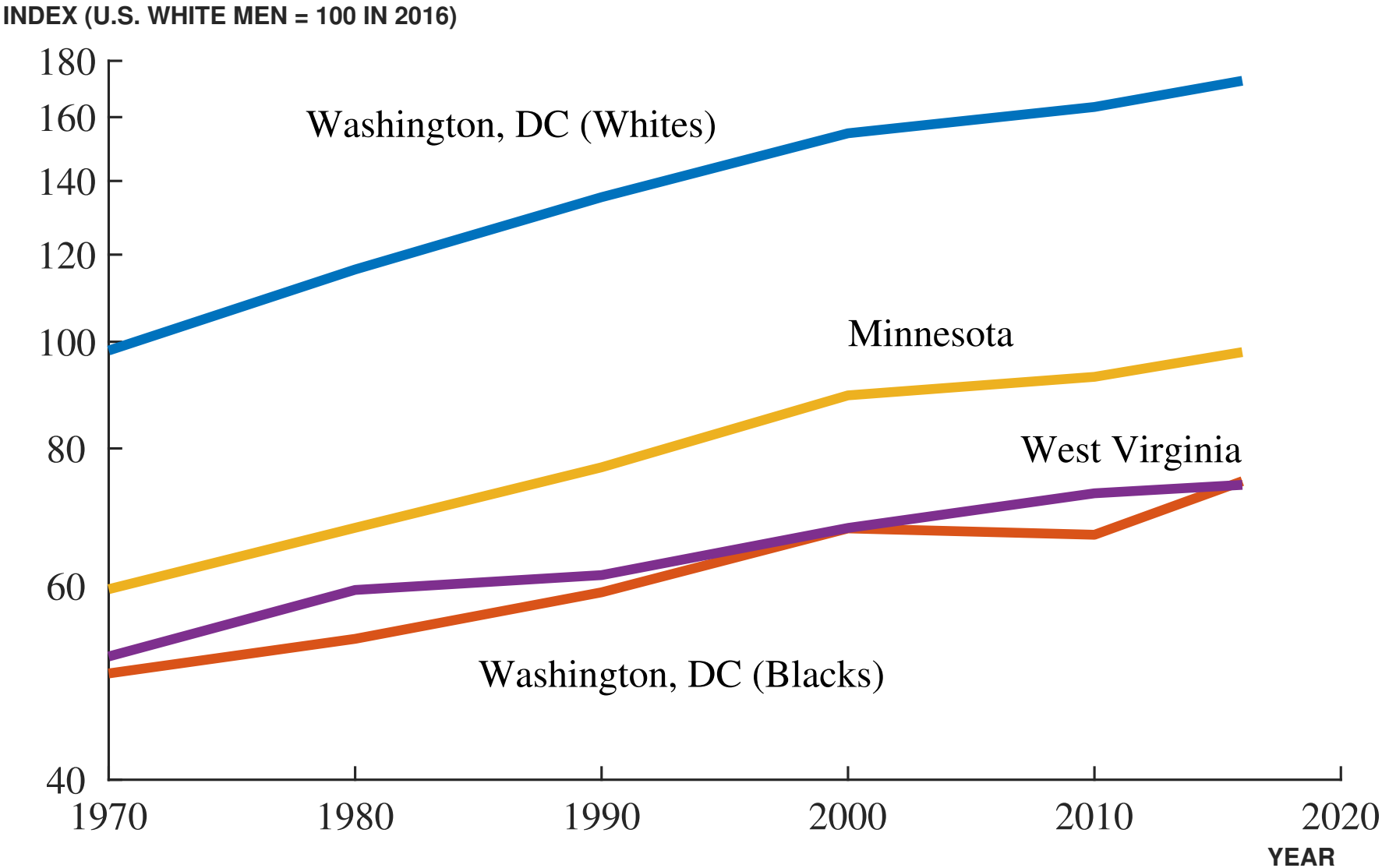
Average Consumption per Person, by Region (Whites)



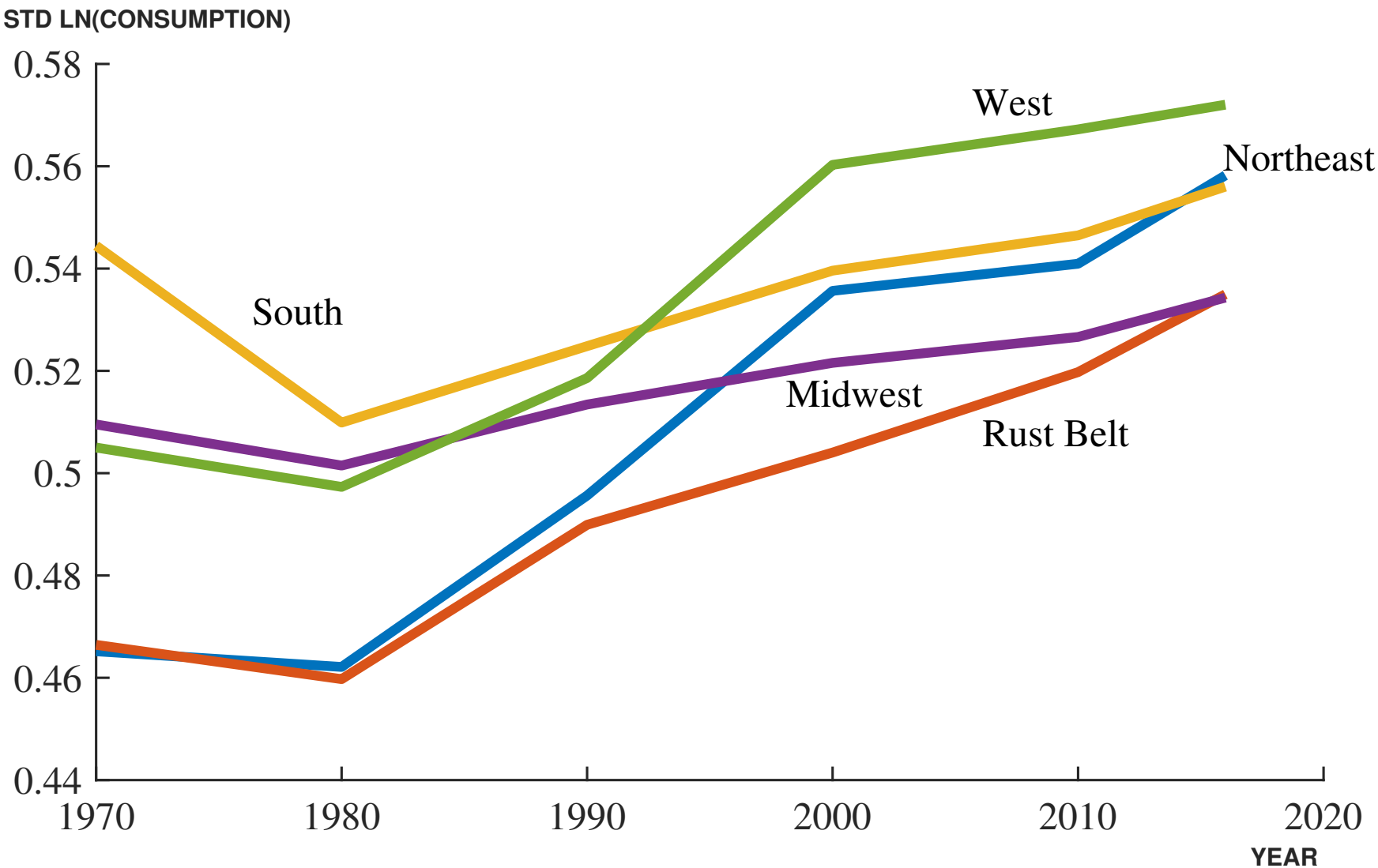
Average Consumption per Person, by Race



Average Consumption per Person, Specific States



Consumption Inequality by Region



Calibrating the Utility Function

- Log utility leads to the simple accounting decomposition
- Leisure not currently in the calculations: $v(\ell) = 0$
- Estimates of the value of remaining life for a U.S. 25-year old:
  - Currently using \$10 million in 2016 prices
- Value of a year of life, in consumption units, as ratio to c:

$$\frac{V}{eu'(c)c} = \bar{u} + \log c + v(\ell) - \frac{1}{2}\sigma^2 \approx 4.8$$

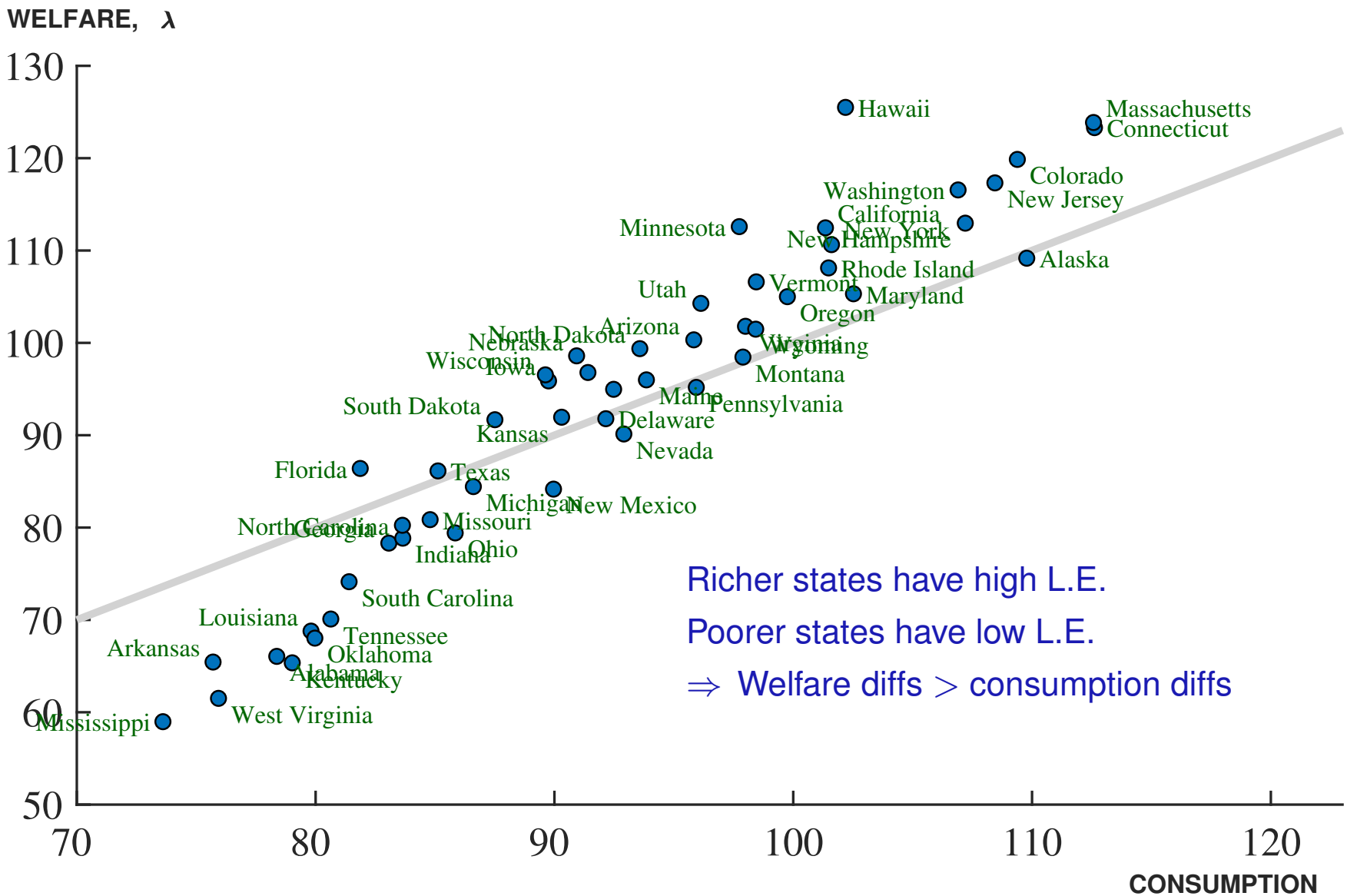
Recall: converts the percentage diff in L.E. in accounting

$\Rightarrow$ *A one percent point gain in life expectancy*

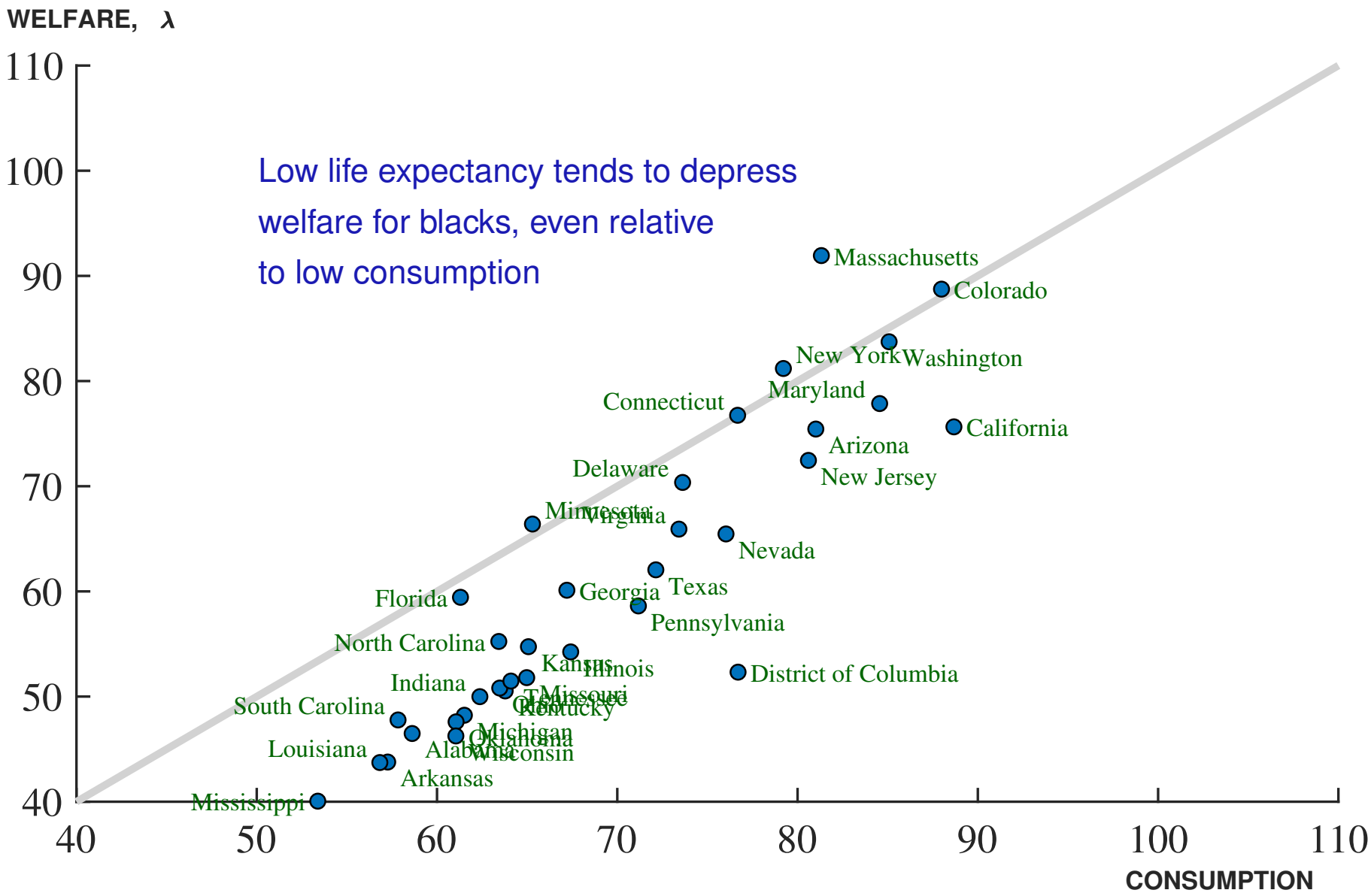
$\approx$ *5 percent of consumption*

Results: Levels of Welfare

Welfare vs Consumption, All Races



Welfare vs Consumption, 2016 for Blacks



Accounting for Welfare Levels, Whites 2016

		— *Contribution from* —			—— *Data* ——		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
U.S.	100	0	0	0	78.8	100	.55

Accounting for Welfare Levels, Whites 2016

		— *Contribution from* —			—— *Data* ——		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
U.S.	100	0	0	0	78.8	100	.55
NorthEast	123	.066	.137	.002	79.9	115	.54
West	119	.057	.121	-.004	79.7	113	.56
MidWest	98	.007	-.046	.016	78.9	95	.52
RustBelt	91	-.034	-.071	.015	78.2	93	.52
South	85	-.061	-.106	.000	77.7	90	.55

Accounting for Welfare Levels, Whites 2016

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RustBelt	91	-.034	-.071	.015	78.2	93	.52
South	85	-.061	-.106	.000	77.7	90	.55
D.C.	270	.400	.572	.020	85.5	177	.51
W.Virg.	62	-.207	-.273	-.000	75.3	76	.55

Accounting for Welfare Levels, Blacks 2016

		— *Contribution from* —			—— *Data* ——		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
U.S. Whites	100	0	0	0	78.8	100	.55
U.S. Blacks	60	-.154	-.365	.006	76.2	69	.54

Accounting for Welfare Levels, Blacks 2016

		— *Contribution from* —			—— *Data* ——		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
U.S. Whites	100	0	0	0	78.8	100	.55
U.S. Blacks	60	-.154	-.365	.006	76.2	69	.54
NorthEast	77	-.051	-.216	.012	77.9	80	.53
West	76	-.118	-.142	-.009	76.8	87	.56
MidWest	58	-.184	-.365	.013	75.7	69	.52
South	53	-.167	-.471	.012	76.0	62	.53
RustBelt	52	-.229	-.423	.008	74.9	65	.53

Accounting for Welfare Levels, Blacks 2016

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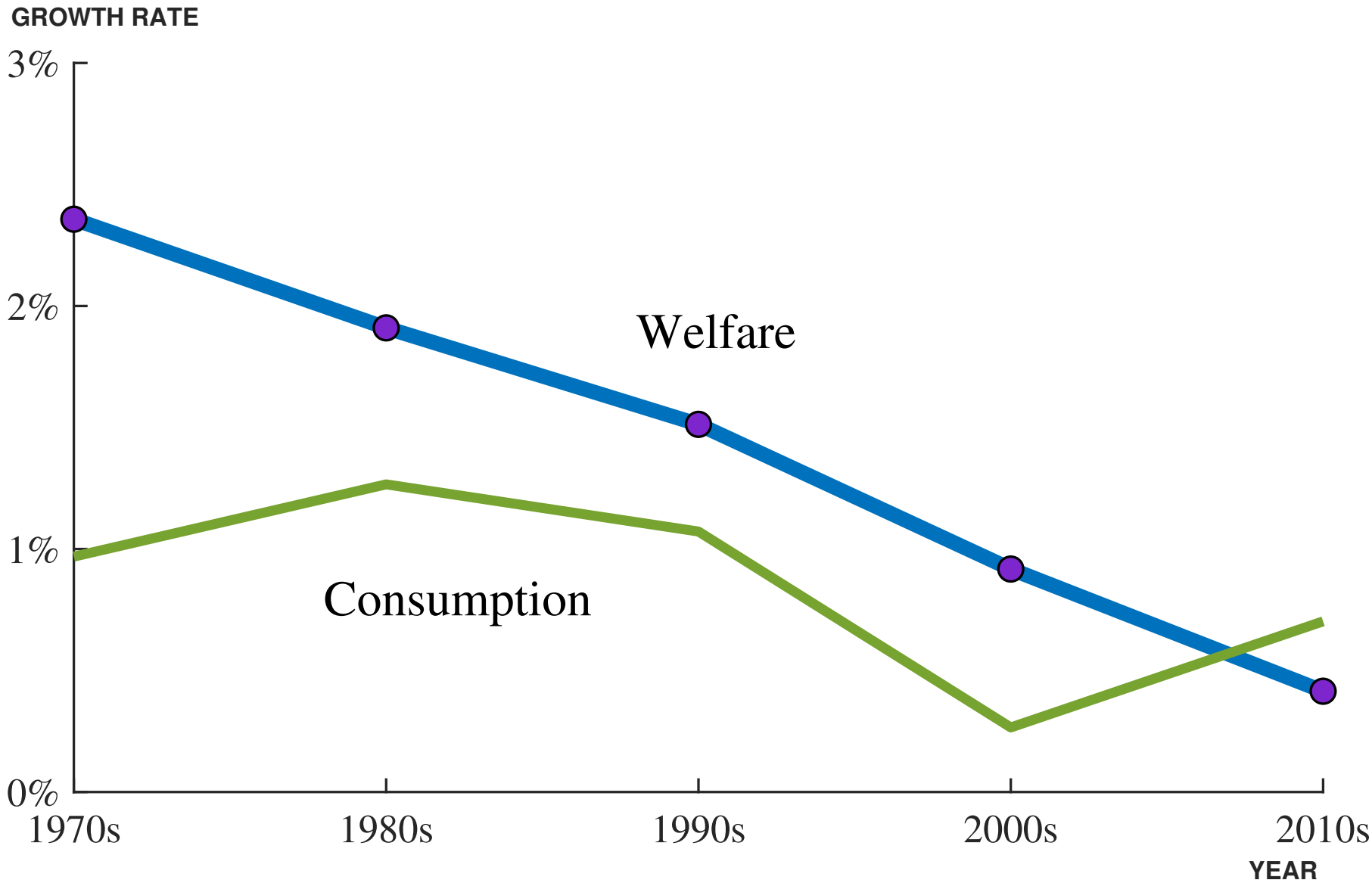
MidWest	58	-.184	-.365	.013	75.7	69	.52
South	53	-.167	-.471	.012	76.0	62	.53
RustBelt	52	-.229	-.423	.008	74.9	65	.53
Mass.	92	.089	-.207	.034	80.3	81	.48
D.C.	52	-.324	-.265	-.059	73.3	77	.64
Miss.	40	-.276	-.628	-.011	74.1	53	.57

Welfare vs Consumption by Race, 2016

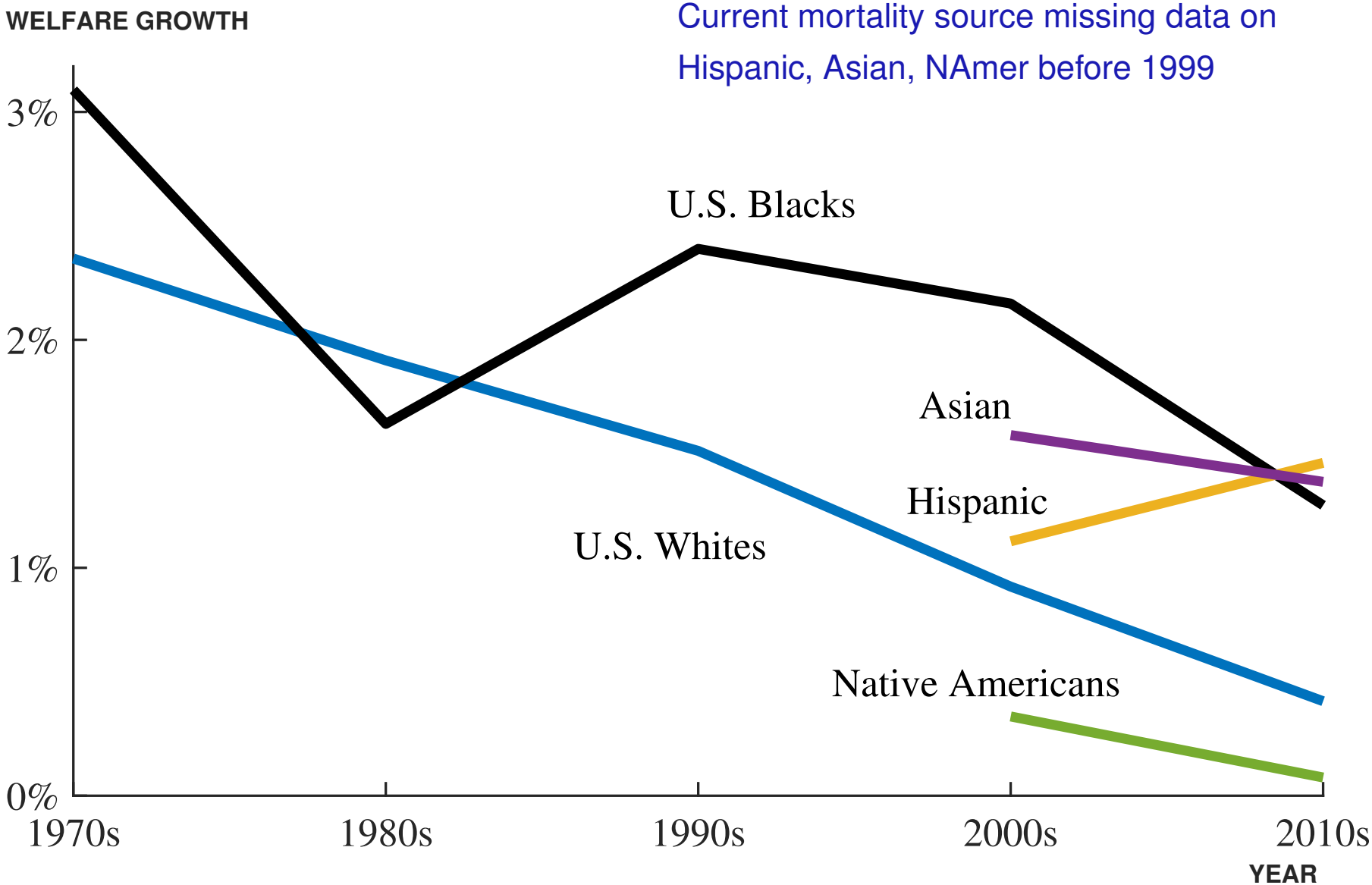
	Welfare	Consumption
Asian	156	104
White	100	100
Hispanic	86	71
Black	60	69
Native American	59	72

Results: Welfare Growth over Time

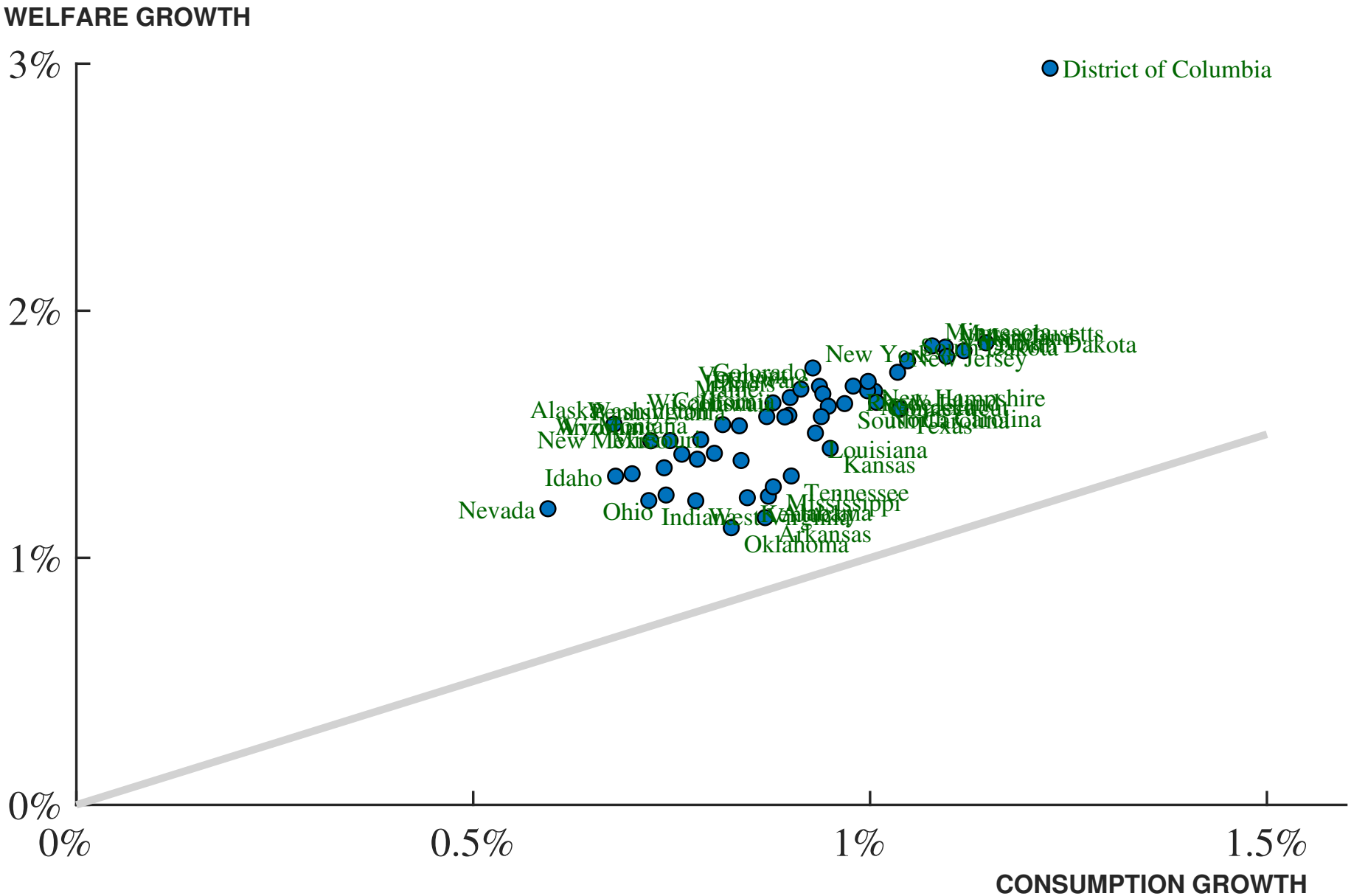
Welfare Growth (All Races) is Plummeting!



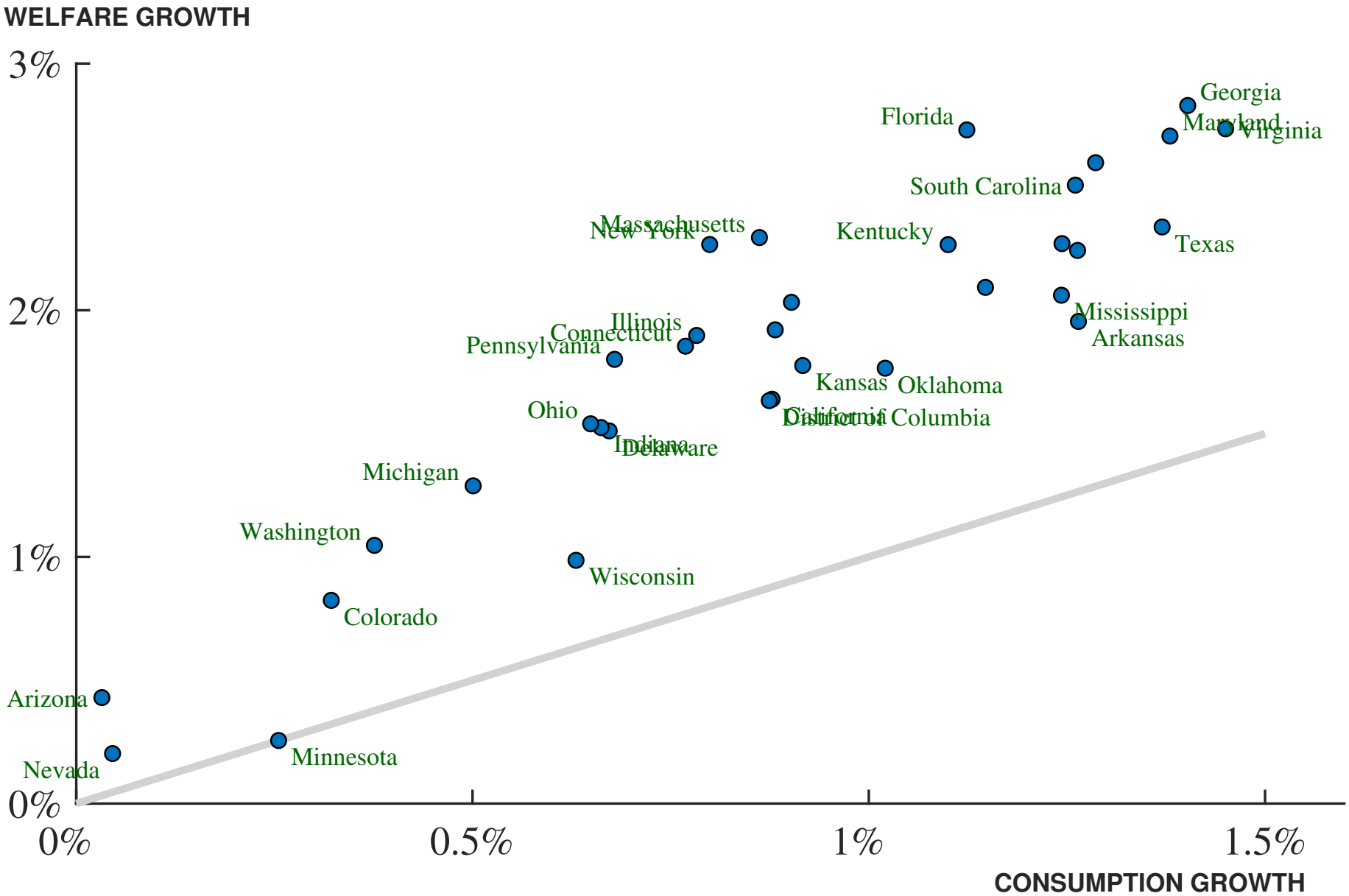
Welfare Growth by Race



Welfare vs Consumption Growth, 1970–2016, Whites



Welfare vs Consumption Growth, 1970–2016, Blacks



Accounting for Welfare Growth, Whites 1970–2016

		— *Contribution from* —			——— *Data* ———		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
U.S.	1.51	.70	.87	-.06	(73.4,78.8)	(67,100)	(.50,.55)

Accounting for Welfare Growth, Whites 1970–2016

		— Contribution from —			——— Data ———		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
U.S.	1.51	.70	.87	-.06	(73.4,78.8)	(67,100)	(.50,.55)
Northeast	1.76	.86	.99	-.09	(73.2,79.9)	(73,115)	(.46,.54)
Midwest	1.58	.63	.98	-.02	(74.0,78.9)	(61, 96)	(.50,.52)
South	1.50	.59	.94	-.03	(73.2,77.7)	(58, 90)	(.52,.55)
West	1.49	.76	.80	-.07	(73.8,79.7)	(78,113)	(.49,.55)
RustBelt	1.41	.68	.79	-.06	(72.9,78.2)	(65, 93)	(.46,.52)
D.C.	2.98	1.73	1.23	.02	(71.8,85.5)	(101,177)	(.53,.51)
Minn.	1.86	.78	1.08	.00	(74.8,80.9)	(61,100)	(.49,.49)
Okla.	1.12	.38	.83	-.08	(73.4,76.4)	(58, 85)	(.51,.58)

Accounting for Welfare Growth, Blacks 1970–2016

		— *Contribution from* —			——— *Data* ———		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
US Whites	1.51	0.70	0.87	-.06	(73.4,78.8)	(67,100)	(.50,.55)
US Blacks	2.19	1.20	1.00	-.01	(67.5,76.2)	(44,69)	(.52,.54)

Accounting for Welfare Growth, Blacks 1970–2016

		— *Contribution from* —			——— *Data* ———		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
US Whites	1.51	0.70	0.87	-.06	(73.4,78.8)	(67,100)	(.50,.55)
US Blacks	2.19	1.20	1.00	-.01	(67.5,76.2)	(44,69)	(.52,.54)
South	2.53	1.25	1.29	-.01	(66.9,76.0)	(35,62)	(.52,.53)
Northeast	2.29	1.41	0.94	-.06	(67.6,77.9)	(52,81)	(.47,.53)
Midwest	2.15	1.00	1.18	-.03	(68.4,75.7)	(40,69)	(.49,.52)
West	1.72	0.95	0.85	-.09	(69.8,76.8)	(59,87)	(.49,.56)
RustBelt	1.65	1.06	0.66	-.07	(67.3,74.9)	(48,65)	(.47,.53)

Accounting for Welfare Growth, Blacks 1970–2016

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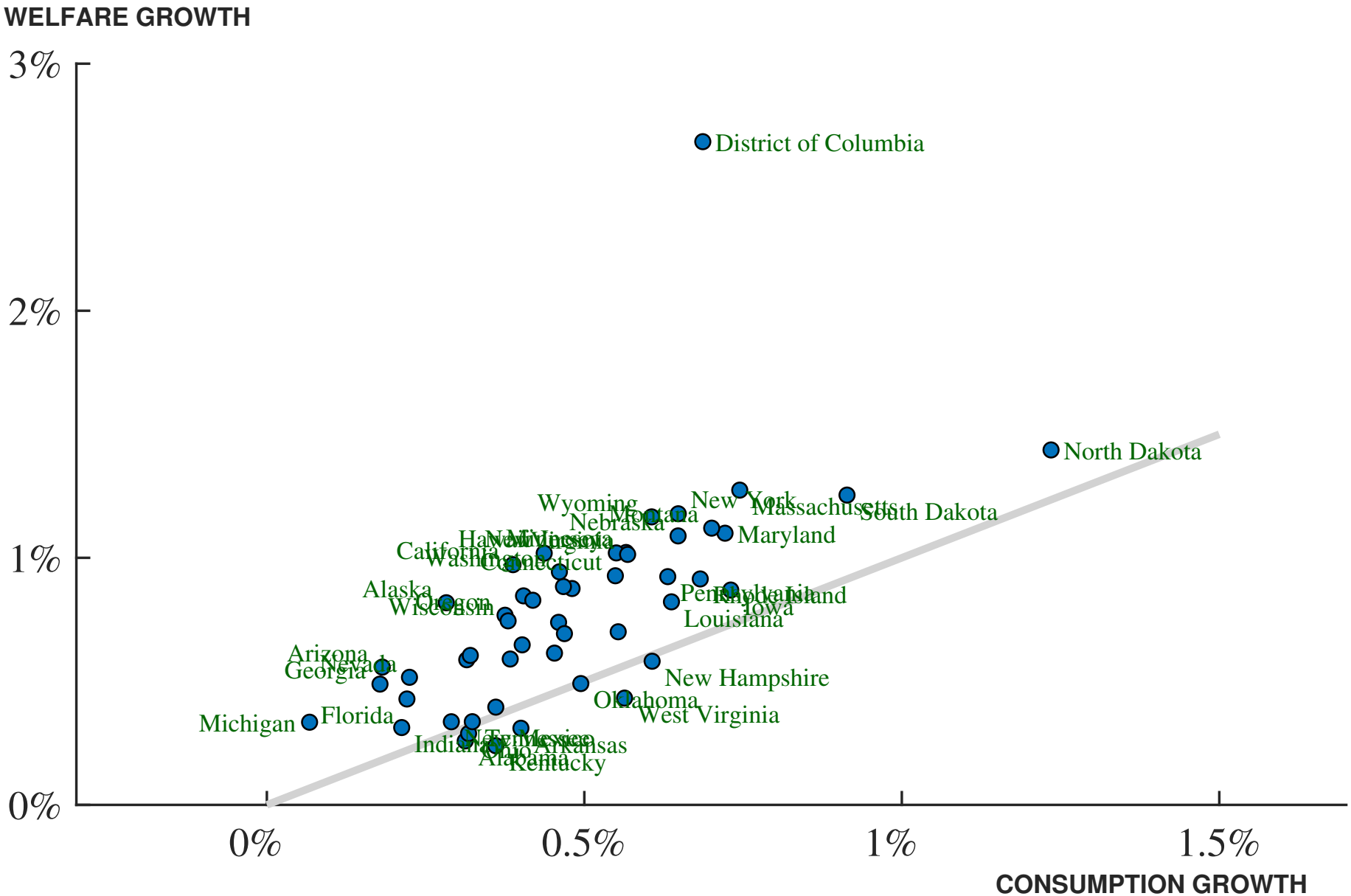
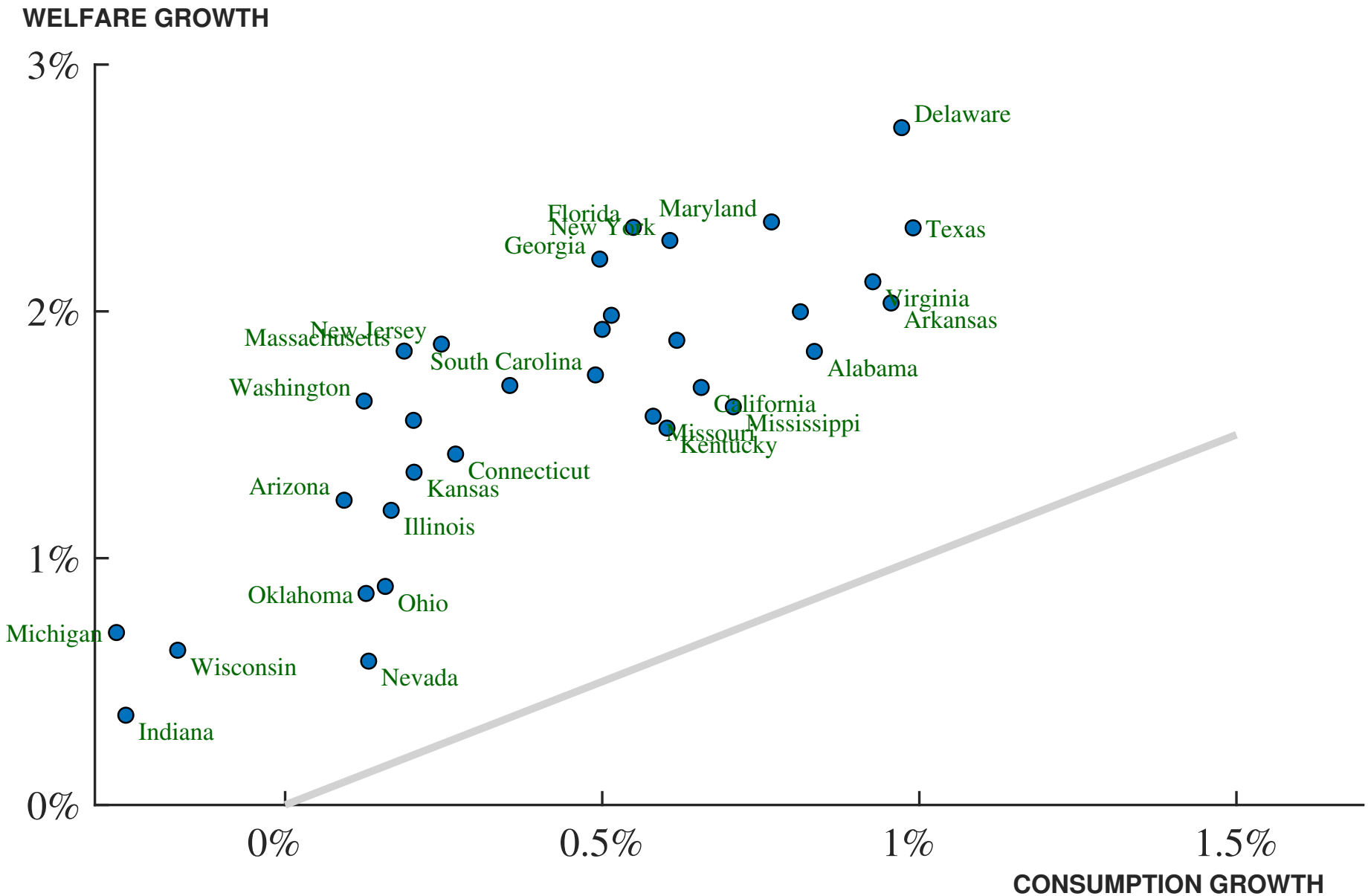
RustBelt	1.65	1.06	0.66	-.07	(67.3,74.9)	(48,65)	(.47,.53)
Georgia	2.83	1.41	1.40	.01	(66.4,76.6)	(35,67)	(.53,.52)
D.C.	1.63	0.96	0.87	-.20	(66.6,73.3)	(51,77)	(.48,.65)
Wisconsin	0.99	0.41	0.63	-.06	(70.9,74.0)	(46,61)	(.48,.53)

Welfare vs Consumption Growth, 2000-2016, Whites



Welfare vs Consumption Growth, 2000-2016, Blacks



Accounting for Welfare Growth, Whites 2000–2016

		— *Contribution from* —			——— *Data* ———		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
U.S.	0.73	0.41	0.43	-.11	(77.7,78.8)	(93,100)	(.52,.55)

Accounting for Welfare Growth, Whites 2000–2016

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	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
U.S.	0.73	0.41	0.43	-.11	(77.7,78.8)	(93,100)	(.52,.55)
Northeast	1.09	0.57	0.64	-.11	(78.3,79.9)	(103,115)	(.51,.54)
Midwest	0.85	0.39	0.54	-.08	(77.8,78.9)	(88, 96)	(.49,.52)
West	0.83	0.58	0.34	-.10	(78.1,79.7)	(107,113)	(.53,.55)
RustBelt	0.56	0.29	0.37	-.10	(77.4,78.2)	(88, 93)	(.49,.52)
South	0.52	0.28	0.35	-.11	(77.0,77.7)	(85, 90)	(.51,.55)

Accounting for Welfare Growth, Whites 2000–2016

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RustBelt	0.56	0.29	0.37	-.10	(77.4,78.2)	(88, 93)	(.49,.52)
South	0.52	0.28	0.35	-.11	(77.0,77.7)	(85, 90)	(.51,.55)
D.C.	2.68	1.98	0.69	.02	(79.9,85.5)	(159,177)	(.52,.51)
NDakota	1.44	0.25	1.24	-.05	(79.6,80.3)	(79, 96)	(.51,.52)
Kentucky	0.24	-0.15	0.36	.02	(75.9,75.5)	(76, 80)	(.56,.55)
W. Virg.	0.43	-0.11	0.56	-.02	(75.6,75.3)	(70, 76)	(.54,.55)
Arkansas	0.31	0.00	0.40	-.09	(76.2,76.2)	(75, 80)	(.51,.54)

Accounting for Welfare Growth, Blacks 2000–2016

		— *Contribution from* —			——— *Data* ———		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
US Whites	0.73	0.41	0.43	-.11	(77.7,78.8)	(93,100)	(.52,.55)
US Blacks	1.83	1.26	0.49	.08	(73.0,76.2)	(64, 69)	(.56,.54)

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US Whites	0.73	0.41	0.43	-.11	(77.7,78.8)	(93,100)	(.52,.55)
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Northeast	2.20	1.54	0.56	.09	(73.9,77.9)	(74, 81)	(.55,.53)
South	2.06	1.33	0.65	.09	(72.6,76.0)	(56, 62)	(.55,.53)
Midwest	1.99	1.10	0.78	.12	(72.9,75.7)	(61, 69)	(.56,.52)
West	1.61	1.10	0.51	-.00	(73.9,76.8)	(80, 87)	(.56,.56)
RustBelt	1.06	0.98	0.09	-.00	(72.4,74.9)	(65, 65)	(.53,.53)

Accounting for Welfare Growth, Blacks 2000–2016

		— *Contribution from* —			——— *Data* ———		
	λ	L.E.	Cons.	Ineq.	L.E.	Cons.	Ineq.
US Whites	0.73	0.41	0.43	-.11	(77.7,78.8)	(93,100)	(.52,.55)
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RustBelt	1.06	0.98	0.09	-.00	(72.4,74.9)	(65, 65)	(.53,.53)
Delaware	2.74	1.54	0.97	.23	(73.6,77.6)	(63, 74)	(.57,.50)
D.C.	1.88	1.29	0.62	-.02	(70.2,73.3)	(69, 77)	(.64,.65)
Indiana	0.36	0.68	-0.25	-.07	(73.0,74.7)	(65, 62)	(.49,.51)

Welfare of Blacks

- Levels (Whites=100):

	1970	2016
Blacks	45	60

- Growth rates

	1970-2016	2000–2016
Whites	1.5%	0.7%
Blacks	2.2%	1.8%

The Role of Inequality

- Accounting results so far: inequality plays a small role
- But sometimes important
  - Stdev(ln Consumption) = .55 $\Rightarrow \frac{1}{2}\sigma^2 \approx .15$
  - So eliminating inequality is worth 15% of consumption
  - 1970: 13.1% vs 2016: 15.7%
  - So rising inequality costs about 2.6% of consumption
  - Would double if risk aversion = 2 instead
- But almost entirely within groups. Inequality contribution:
  - Equalizing mean consumption across states: 0.7%
  - Equalizing mean consumption across states/races: 1.9%

Summary of Key Points (so far)

(1) Welfare differences $>$ Consumption differences
   (a) Rich groups are even better off
   (b) Poor groups are even worse off

(2) Central role of life expectancy – often as large as consumption

(3) Welfare growth is positive throughout state $\times$ race $\times$ time
   - No state $\times$ race is worse off today than in 1970 or 2000

(4) Welfare growth has slowed markedly
   - From 2.3% in 1970s to 0.6% in 2010s

(5) Black welfare is substantially below that of whites, but has grown faster, especially because of $\uparrow L.E.$

Conclusion: On our "To Do" List

- Mortality rates by education since $\sim$1992
- Consumption, CEX, annually since 1984 (or 1990s)
- Leisure, unemployment, incarceration rates
- Rural vs. urban
- By zipcode
- By state of birth instead of current residence
- Effect of changing mobility