Widening socioeconomic differences in mortality and the progressivity of public pensions and other programs

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Drawing on preliminary results of a study of the US National Academy of Sciences: “The Growing Gap In Life Expectancy By Income: Consequences And Policy Responses”

Committee On Economic Effects Of Aging Population -- membership

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Overview

I. Mortality differences by education and by income are large and are widening.

II. Widening longevity differences reduce the progressivity of government programs for elderly: poor collect benefits for fewer years.
- Social Security (public pension)
- Medicare (health care for elderly, 65+)
- Medicaid (need-based long term care)

III. Fiscal consequences of population aging require policy adjustments that interact with widening mortality differences, such as:
- Raising the Normal Retirement Age or Early Retirement Age
- Changing cost of living adjustment
- Raising the eligibility age for Medicare
- Indexing pension benefits to life expectancy

Why care about effect of widening mortality disparities on progressivity?

- For many programs (e.g. national defense) it is not a problem; there is no age/time dimension.
- For transfers to elderly there is a strong age/time dimension, and mortality is relevant.
- *Ex post*, some die young, some die old, and we share this risk through annuities. No problem.
- *Ex ante* differences in expected age of death for groups in the population do raise concerns.

I. Disparities in mortality

- Kitagawa and Hauser (1973) estimated mortality by educational attainment using 1960 US data.
- Many people think these socioeconomic differences have declined since then.
  - Yes, Black-White mortality differences did decline in past two decades.
  - e_{50} difference is now only 2.8 years.
- However, differences by education and income are widening, even as racial differences are narrowing.

Difficulties in measuring the effect of socioeconomic status (SES) on mortality of older people

- Mortality and Income
  - Reverse causality: Poor health reduces current earnings, exaggerating measured effect of income on health and mortality.
  - Remedy: use “midcareer earnings” (average earnings at ages 41-50).
- Mortality and Education
  - Increasing selectivity of group with low education:
    - low education (e.g. less than High School or less than 8th grade) used to be common and now is rare, and so the low education group is now more “adversely selected” on other characteristics.
    - Comparison over time reflects both changing effect of educational attainment on health and mortality and changing selectivity.
  - Remedy: use quantiles to describe position in the education distribution.
    - But then we are not studying effect of *level* of education; we are answering a different question

A. Recent Lit on Education and period life expectancy

- Meara et al (2008) on $\mathbf{e_{25}}$ in 2000: 13 yrs of educ vs less High School or less

	African American Men	White Men
Difference in e_{25} by education: **High School or less** versus **at least some College**	8.4 yrs	7.8 yrs

  - Both these differences had increased since 1990 by 1.3 to 1.9 years.
  - Differences by education increased even as differences by race narrowed.

Recent literature (cont.)

- Rostron et al (2010) on $\mathbf{e_{45}}$ in 2003 or 2005
  - "Adjusted estimates for the U.S. population show a large disparity in life expectancy by education level, on the order of **10–12 years for females** and **11–16 years for males.**"
- Olshansky et al (2012) on $\mathbf{e_0}$ (extrapolating outside ages 25-84)
  - life expectancy of white women with fewer than 12 years of education **declined from 1990 to 2008, by 4 or 5 years**.
  - difference in life expectancy between men with less than 12 years of education and those with more than 16 **rose from 13.4 years in 1990 to 14.2 years in 2008**, while for women the comparable increase was from **7.7 to 10.3** years.
- Bound et al (2014) address selectivity problem by analyzing education quartiles in 1990 and 2010
  - No decline in life expectancy for low education women with this measure but
  - Difference of 6 or 7 years in period median age at death in 2010 between the bottom educational quartile of males and the top three quartiles.

Recent literature (cont.)

- Recent NBER paper by Goldring, Lange and Richards-Shubik (2015)
- Reports no evidence that mortality declines were numerically greater for high education men
- However, proportional declines were much greater for them than for low education men.
- Despite authors' negative interpretation, findings are consistent with other literature, showing a steepening of the gradient.

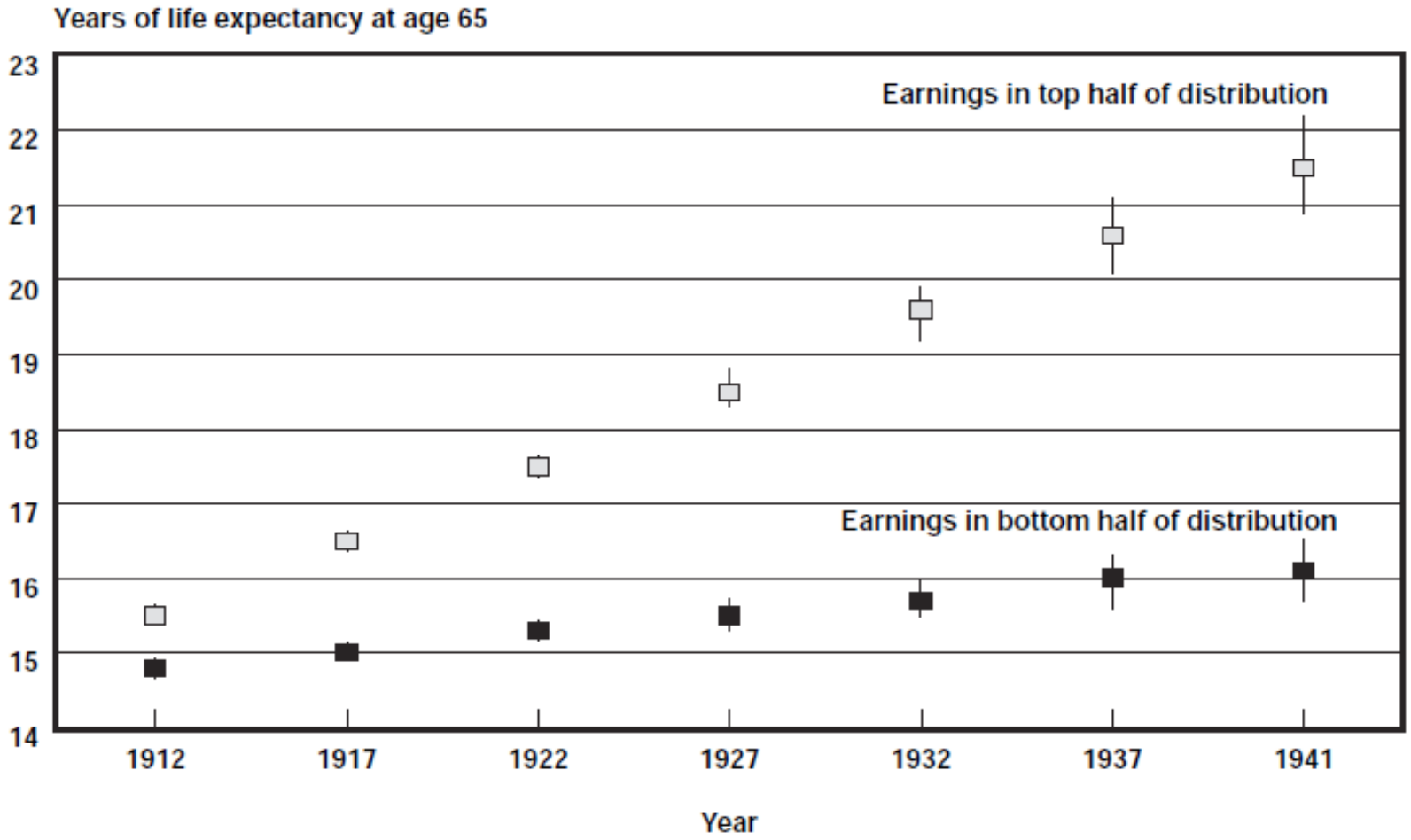
B. Recent Literature on Income and Life Expectancy

- Waldron (2007, 2013) – a Key Study
  - Income Data from Social Security
    - Social Security earnings histories
    - Average of adjusted earnings at ages 45-55
    - Can't do lifetime earnings because many workers joined Social Security later in careers since coverage was expanding.
    - Contrast top half of income distribution to bottom half – relative position.
  - Mortality Data also from Social Security
    - Deaths observed at ages 60–89 in years 1972-2001 (different ages by birth cohort)
    - For no cohort are deaths observed above age 89, she projected mortality.
    - Fewer and fewer years actually observed for more recent cohorts.
    - Only one year for 1941 birth cohort.
    - Graph comes from a model fitted to the data and then extrapolated.
    - Mortality must be projected for later ages.

Main Waldron Result

[Waldron (2007) Social Security Bulletin • Vol. 67 • No. 3 • 2007]

Chart 3.
Cohort life expectancy at age 65 (and 95 percent confidence intervals) for male Social Security–covered workers, by selected birth years and earnings group



Note:
More recent cohorts are observed for fewer years

The gap in e_{65} increases by 4.6 years.

Life expectancy at 65 rises by only one year for bottom half of income distribution.

Following Waldron …

- Bosworth-Burke (2014)
  - Follows Waldron in general design but
    - Uses Health and Retirement Survey (HRS) data, with linked Social Security income data
    - Defines “midcareer earnings” as average for age 41-50 to include more recent cohorts
    - Includes education and race covariates – not good for our purposes.
    - For married adults in household it sums their earnings and divides by square root of 2 (scale adj).
  - Results quite similar to Waldron, finds widening of the gap.
- Bosworth-Burtless (2014)
  - Same design as previous, but now also done by cause of death
  - Confirms previous results.
- In all these studies, **results for females are shaky**, perhaps because for women in earlier generations, husband’s earnings were more important than own.

C. National Academy Committee ("We") estimates of mortality gradient

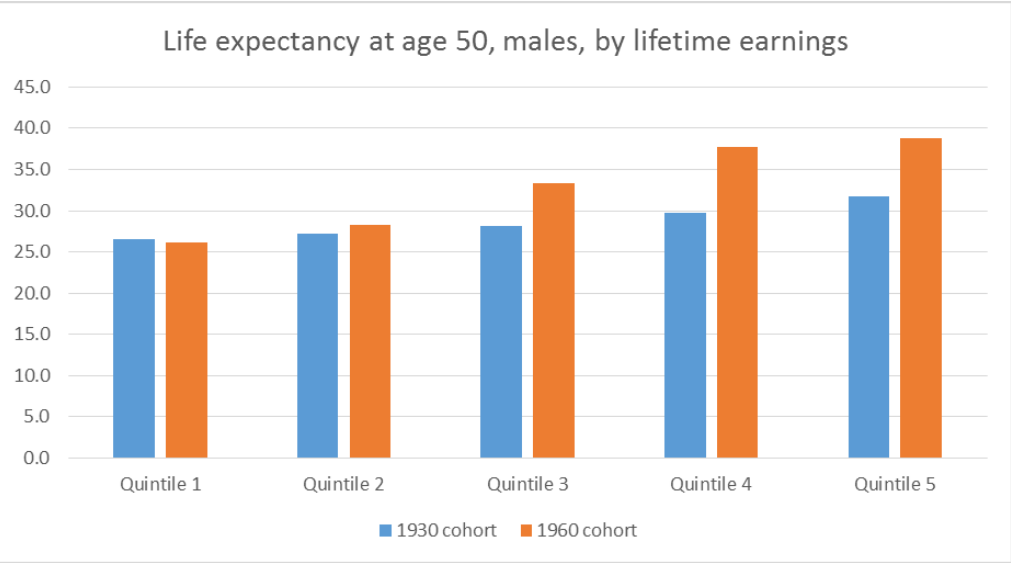
- Committee's analysis follows Waldron (2007), and particularly Bosworth and Burke (2014)
- For our purposes we need:
  - association of midcareer earnings with later mortality, controlling for gender and age **and nothing else**.
  - Direction of causality is irrelevant – all that matters is whether poor people have shorter lives for whatever reason.
  - We follow the literature and use income **quintiles rather than levels**, so relative position rather than absolute level.
  - For this reason, **we cannot ask whether widening differences in income are causing widening differences in mortality**.
  - Unfortunate, because this is an important question.

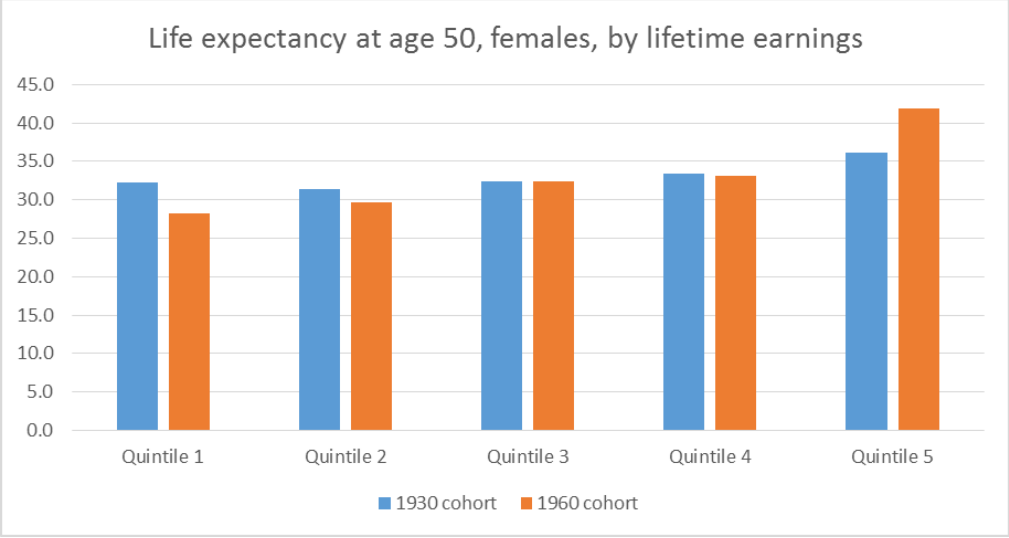
- We use same data as Bosworth and Burke
  - Health and Retirement Surveys 1992-2008 linked to Social Security earnings histories;
  - midcareer income measure (average non-zero earnings age 41-50)
  - Sum of earnings in couple divided by square root of 2.
  - We use income quintiles (bottom 20% etc.)
  - Analyze mortality at ages 50+
  - Include cohorts born 1912 to 1957.
- Model
  - Logit on age specific death rates with cohort dummies and continuous year of birth variable
  - Alternatives tried for robustness and these gave similar results
    - Dummies for 10-year birth cohorts
    - Weibull distribution

We focus birth cohorts of 1930 and 1960

- For 1930 cohort, observe deaths at ages 62-78. After that, extrapolate using model.
- For 1960 cohort, we observe no deaths after 50 at all.
  - This mortality scenario is entirely a projection from the fitted model
  - We might call it an hypothetical “high dispersion” scenario that would result from continuing trends.
- Why use this projected mortality dispersion rather than dispersion for an actual observed cohort?
  - The 1960 cohort will turn 60 in 2020.
  - It is the right cohort to consider for impact of policy changes.
  - Downside is uncertainty about whether trends in dispersion will continue.
  - Do a sensitivity test for this 1960 “cohort” assuming half the mortality dispersion, same mean mortality trend.

Life expectancy at age 50 by midcareer earnings quintile: Preliminary Committee estimates **and projections** for birth cohorts of 1930 and 1960.





The diff between top and bottom quintile for males grows from 5.1 to 12.7 years .

Same as extrapolated increase in e_{65} from Waldron.

The diff for females grows from 3.9 to 13.6 years.

The projected increase in disparities is large, but not out of line with some other studies like Rostron et al (2010).

For sensitivity test, we constructed alternative scenario with growth in dispersion only half this great.

II. Widening longevity differences reduce the progressivity of government programs for elderly

We run two hypothetical simulation experiments

- What is held constant for both?
  - Policy rules for taxes and benefits are fixed as in 2010.
  - Individual earnings histories are same in both, as are quintile positions.
- What differs? Only mortality and health.
  - In one simulation, individuals experience the mortality of the 1930 birth cohort
  - In other, they experience the mortality of the 1960 birth cohort (as we project it)
  - Their health and use of public health care varies accordingly.

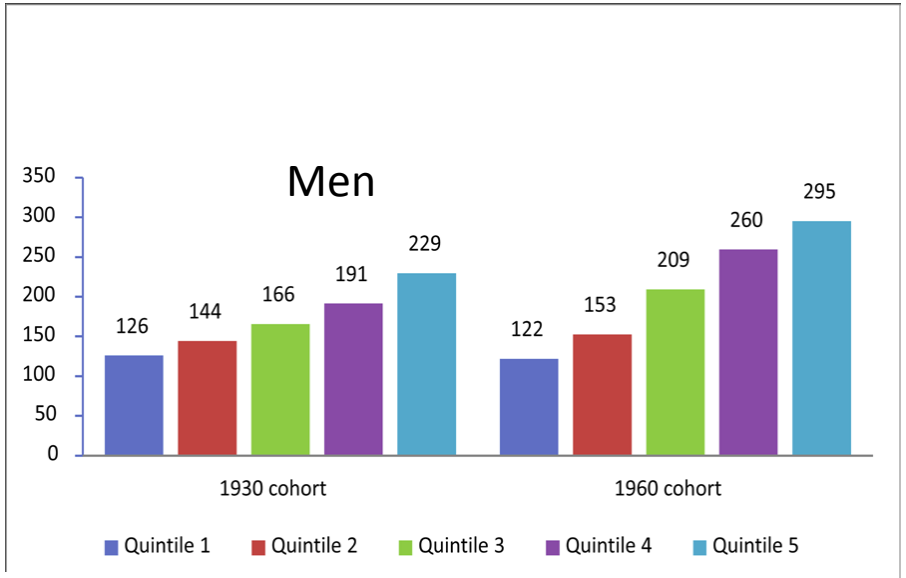
We calculate and compare --

- Present Value of benefits received and taxes paid above age 50 until death
- We compare these present values and their difference by income quintile under the two mortality regimes

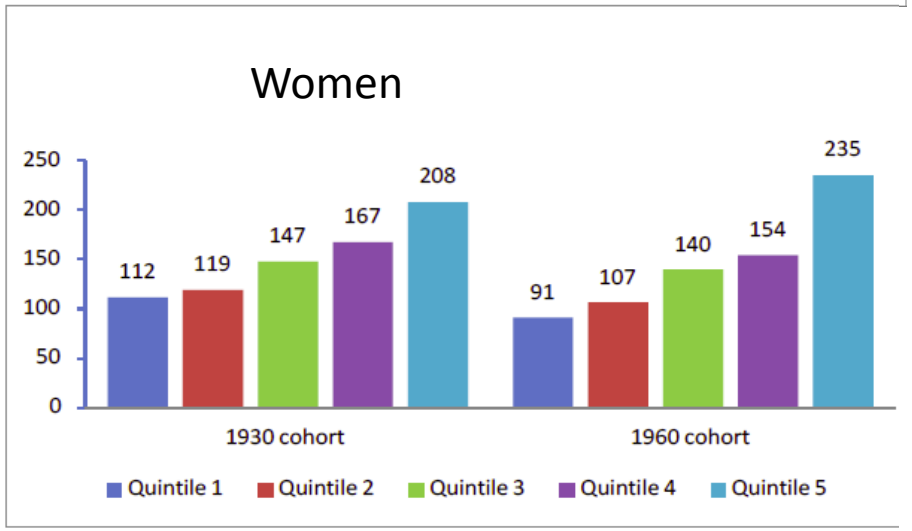
The calculations

- Future Elderly Model (FEM) is a well-established microsimulation model based on the Health and Retirement Survey.
- FEM simulates health, disability and mortality outcomes and program costs and taxes.
  - Professor Dana Goldman leads FEM project at University of Southern Calif.
- From FEM simulations, we calculate PV of benefits and taxes for each mortality regime at age 50.
  - Because HRS does not provide tax or benefit payments before age 50, we cannot include these.
- Mortality results arise almost entirely from benefits, not taxes, since variation in survival mostly occurs at very old ages when taxes are low.

Present Value (2.9% discount) Lifetime Social Security **Pension Benefits** (in $000s) under two mortality regimes; program rules of 2010.



For Men:
For 1930 mortality, the Q5-Q1 diff is $103,000
For 1960 mortality, the Q5-Q1 diff is $173,000
The High-Low difference rises by $70,000.



For Women:
For 1930 mortality, the Q5-Q1 diff is $96,000
For 1960 mortality, the Q5-Q1 diff is $144,000
The High-Low difference rises by $48,000.

Medicare – PV of benefits: public health care for 65+.

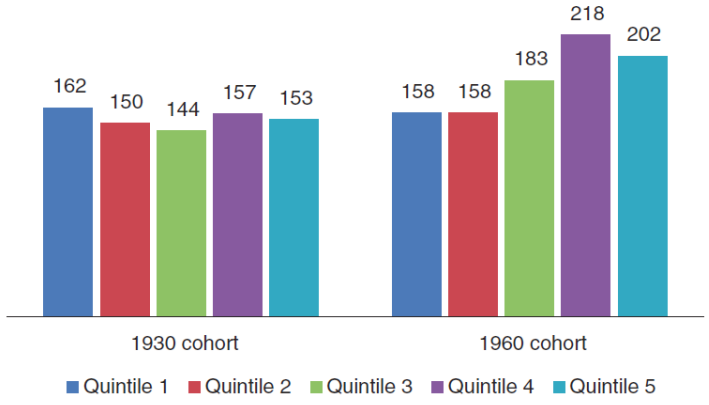


FIGURE 4-13 Average lifetime Medicare benefits for males (in thousands of dollars).
SOURCE: Committee generated using Health and Retirement Study data and cohort assumptions.

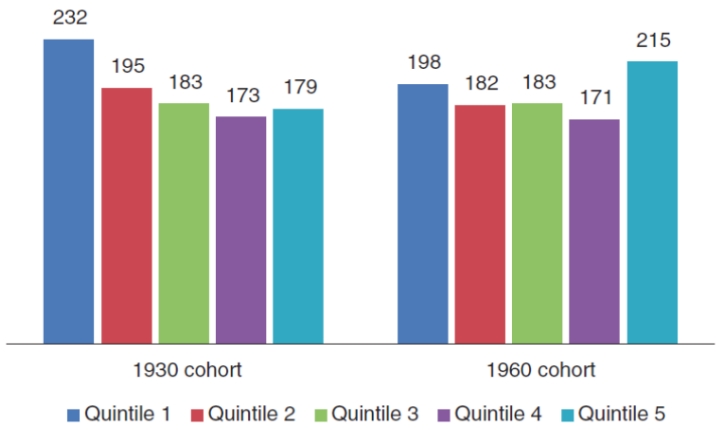


FIGURE 4-14 Average lifetime Medicare benefits for females (in thousands of dollars).
SOURCE: Committee generated using Health and Retirement Study data and cohort assumptions.

For Men:
For 1930 mortality, the Q5-Q1 diff is -$9,000
For 1960 mortality, the Q5-Q1 diff is +$44,000
The High-Low difference rises by $53,000

For Women:
For 1930 mortality, the Q5-Q1 diff is +$53,000
For 1960 mortality, the Q5-Q1 diff is -$17,000
The High-Low difference rises by $70,000.

Medicaid – PV of benefits:

--public health care for people in poverty
--Long Term Care for people with low assets.

- Many elderly receive long term care through this program
- Mostly beyond age 85
- Women receive twice the men's PV of Medicaid benefits
  - Women are more likely to need long term care than men at each age
  - Women are more likely to survive to old ages
- Note that low income (Q1) receives much more PV because
  - They meet asset test
  - They have higher disability rates

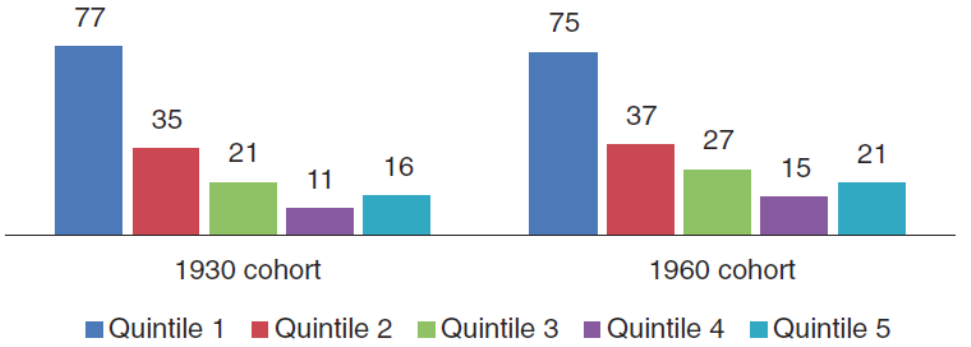


FIGURE 4-15 Average lifetime Medicaid benefits for males (in thousands of dollars).
SOURCE: Committee generated using Health and Retirement Study data and cohort assumptions.

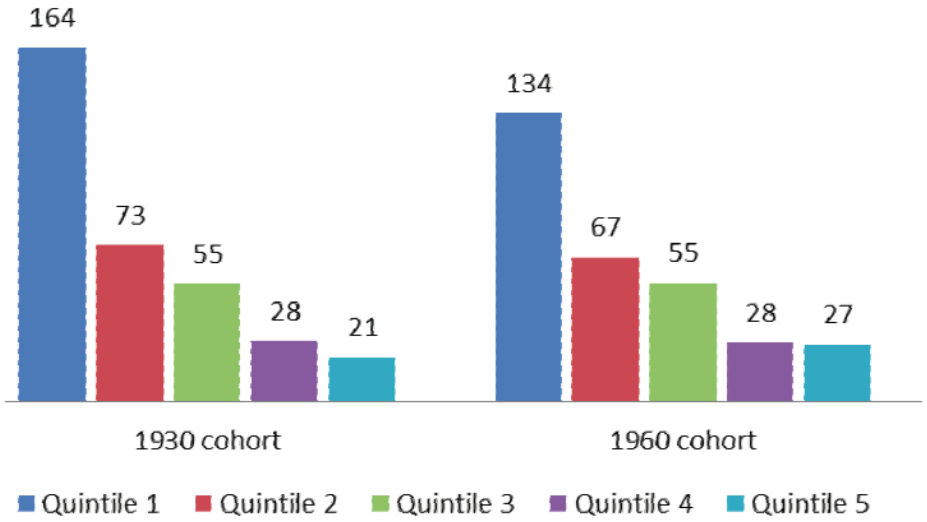
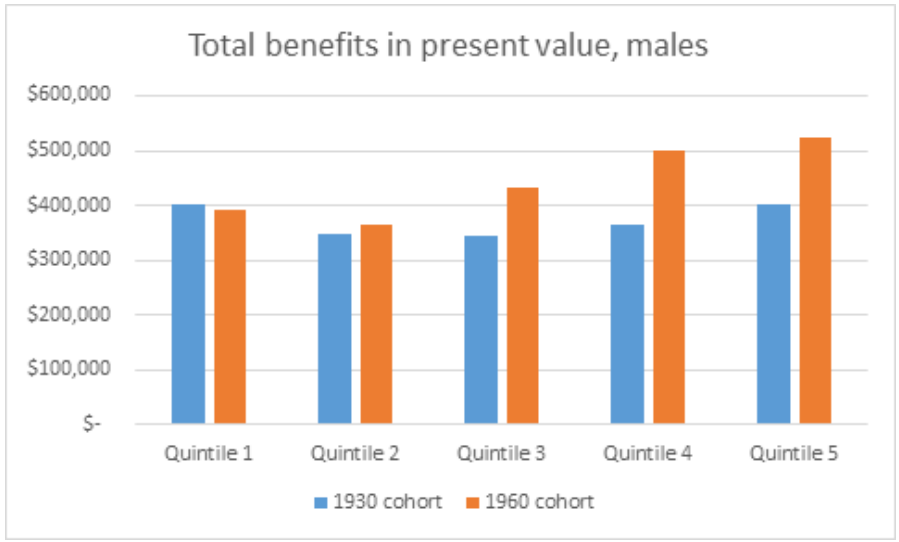
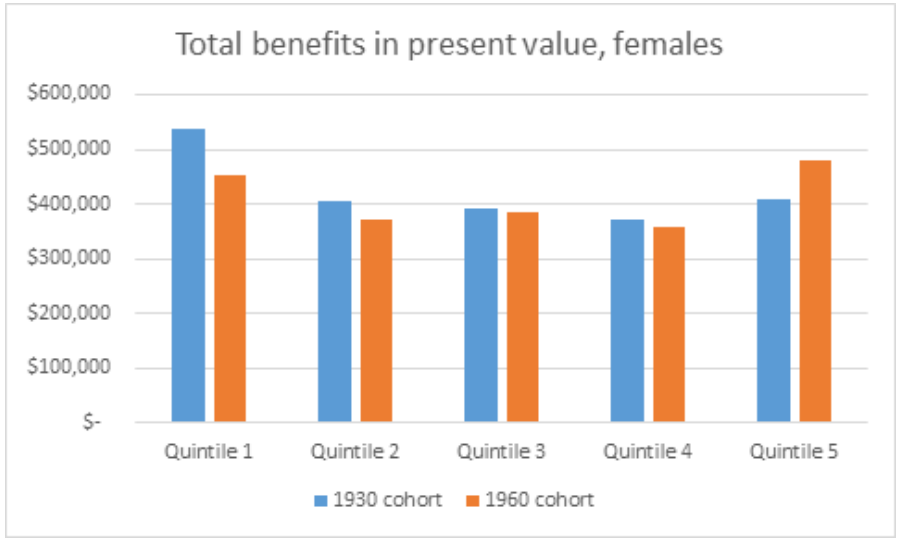


FIGURE 4-16 Average lifetime Medicaid benefits for females (in thousands of dollars).
SOURCE: Committee generated using Health and Retirement Study data and cohort assumptions.

Present value of total benefits under mortality regimes of 1930 and 1960 cohorts

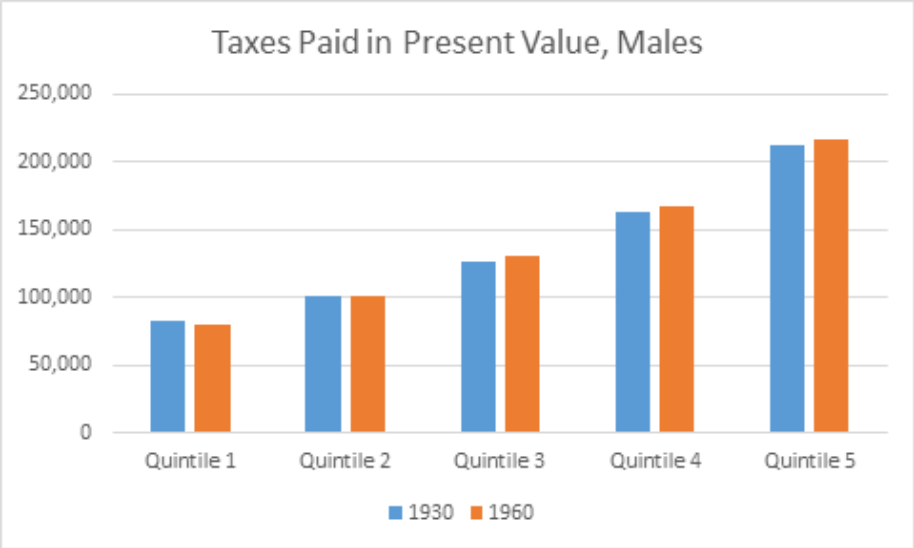


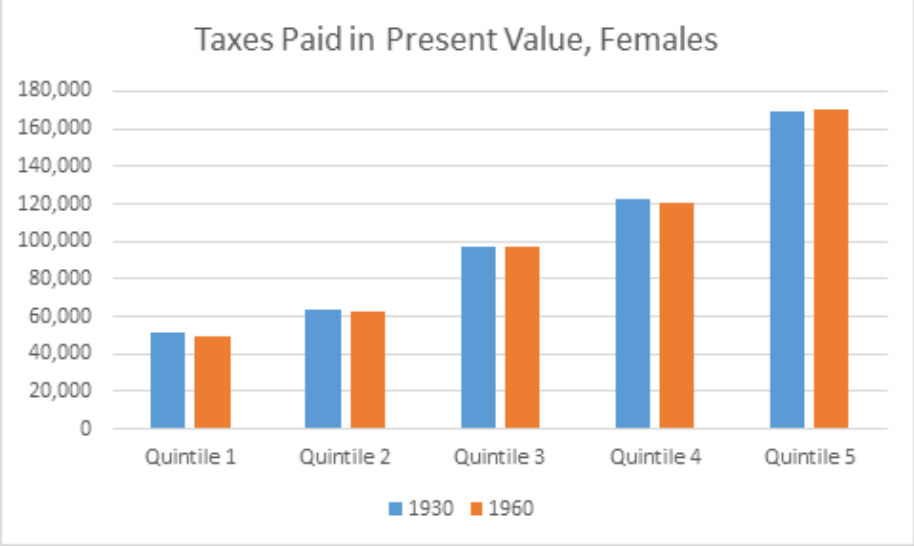


Benefits = Social Security, Disability, Survivors, Medicare, Medicaid, and SSI.

Q5-Q1 increases by about 120,000 for men, and more for women.

Present value of taxes above age 50 under mortality regimes of 1930 and 1960 cohorts

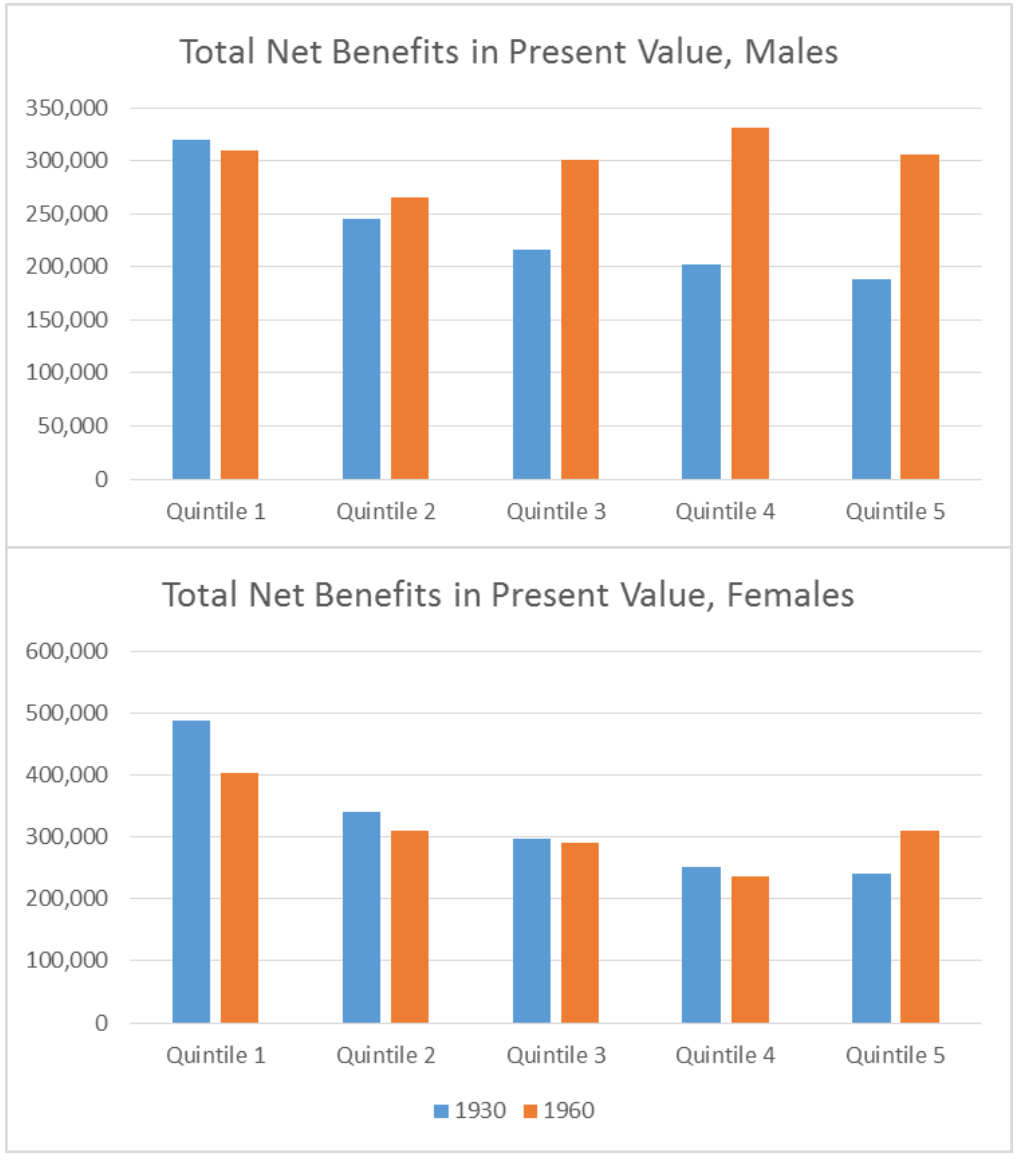




Taxes = personal income tax and both employer's and employee's payroll tax.

These taxes cover more than the costs of the benefit programs.

Present value of total net benefits above age 50 under mortality regimes of 1930 and 1960 cohorts



Taxes = personal income tax and both employer's and employee's payroll tax.
Benefits = Social Security, Disability, Survivors, Medicare, Medicaid, and SSI.

Because tax payments cannot be assigned to individual programs, we report these Net Benefits only for the Total, not for individual programs.

For men, Q5-Q1 increases by $130,000.
For women, increases by $170,000.

TABLE S-2 Present Value of Net Benefits (benefits received minus taxes paid after age 50) at Age 50, by Sex, for People Under the Mortality Regimes of the 1930 and 1960 Birth Cohorts

	Present value of net benefits at age 50 based on the mortality profile for those:	
Earnings Quintile	Born in 1930	Born in 1960
Males		
Lowest	$319,000	$310,000
2	246,000	266,000
3	217,000	301,000
4	202,000	331,000
Highest	189,000	306,000
Gap, High-Low	–$130,000	–$4,000
Ratio, High/Low	0.59	0.99
Females		
Lowest	$487,000	$402,000
2	341,000	310,000
3	296,000	290,000
4	251,000	236,000
Highest	240,000	310,000
Gap, High-Low	*–$247,000*	*–$92,000*
Ratio, High/Low	*0.49*	*0.77*

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Gap, High-Low	*–$247,000*	*–$92,000*
Ratio, High/Low	*0.49*	*0.77*

Advantage for low income men would be smaller by $126,000 under 1960 mortality regimes.

Advantage for low income women would be smaller by $155,000 under 1960 mortality regimes.

PV of Total Net Benefits as a share of Inclusive Wealth

- "Inclusive wealth" is measured at age 50 as
  - conventional wealth at age 50
  - plus PV of net benefits received in future
  - plus PV of after tax labor income.
- Better measure for progressivity?
- Shows reduction in progressivity under 1960 cohort mortality regime.

TABLE S-3 Present Value of Net Benefits as a Share of Present Value of Inclusive Wealth

Earnings Quintile	Present value of net benefits at age 50, relative to inclusive wealth, based on the mortality profile for those: Born in 1930 (%)	Born in 1960 (%)	Percentage Point Change
Males			
Lowest	45.7	45.6	–0.1
2	34.9	36.8	1.9
3	26.9	33.3	6.4
4	20.0	28.9	8.8
Highest	14.4	21.4	6.9
Females			
Lowest	69.0	65.4	–3.6
2	56.6	54.8	–1.8
3	45.3	44.9	–0.4
4	34.7	33.5	–1.3
Highest	25.4	30.8	5.4

III. Policy adjustments for population aging interact with widening mortality differences

- Here just show effects for the 1960 cohort mortality regime
- Consider 6 policies

1. Raise Early Retirement Age (ERA) from 62 to 64 under 1960 cohort mortality regime

- Because individuals tend to claim a little "too early" relative to what would maximize lifetime benefits, raising ERA raises the PV of Soc Sec Benefits and Total Benefits for all quintiles but more for longer lived high quintiles.
- Progressivity is reduced more under 1960 mortality regime than 1930.
- Net Benefits relative to wealth (see table) also become less progressive under 1960 mortality regime.

	Males Present value of net benefits at age 50, relative to wealth, based on the mortality profile for those born in 1960		
Earnings quintile	Baseline	Under policy experiment	Percentage point change
Lowest	45.6%	45.7%	0.1%
2	36.8%	37.0%	0.2%
3	33.3%	33.8%	0.5%
4	28.9%	29.3%	0.5%
Highest	21.4%	21.7%	0.4%
	Females Present value of net benefits at age 50, relative to wealth, based on the mortality profile for those born in 1960		
Earnings quintile	Baseline	Under policy experiment	Percentage point change
Lowest	65.4%	65.6%	0.2%
2	54.8%	55.1%	0.3%
3	44.9%	45.5%	0.6%
4	33.5%	34.1%	0.6%
Highest	30.8%	31.4%	0.6%

2. Raise Normal Retirement Age (NRA) to 70 in 1960 cohort mortality regime

- For males
  - PV of benefits falls by $30,000 (25%) for bottom quintile workers and by $59,000 (20%) for top quintile workers.
  - Gap between top and bottom quintiles rises from 142 percent to 157 percent of quintile 1 benefits.
- For females
  - PV of benefits falls by 17% for quintile 1 and 15% for quintile 5
  - Gap ratio between quintiles 1 and 5 rises from 158 percent to 164 percent of quintile 1 benefits.

3. Reducing the automatic COLA (Cost of Living Adjustment) for Social Security and other benefits (switch from CPI-W to Chained CPI; about .2% lower on average)

	Males Present value of net benefits at age 50, relative to wealth, based on the mortality profile for those born in 1960		
Earnings quintile	Baseline	Under policy experiment	Percentage point change
Lowest	45.6%	45.2%	-0.4%
2	36.8%	36.3%	-0.5%
3	33.3%	32.7%	-0.6%
4	28.9%	28.2%	-0.7%
Highest	21.4%	20.8%	-0.6%
	Females Present value of net benefits at age 50, relative to wealth, based on the mortality profile for those born in 1960		
Earnings quintile	Baseline	Under policy experiment	Percentage point change
Lowest	65.4%	65.1%	-0.2%
2	54.8%	54.4%	-0.3%
3	44.9%	44.5%	-0.4%
4	33.5%	33.1%	-0.4%
Highest	30.8%	30.3%	-0.5%

The longer a retiree lives, the greater the difference this makes.

Consequently, this change hits the top quintile harder than the bottom quintile.

Makes system more progressive.

Relatively small change in PV of net benefits, however.

4. Raise the usual eligibility age for Medicare from 65 to 67 (calculation does not reflect ACA interactions)

- Expect first quintile to have a bigger reduction in PV of benefits since
  - Shorter life expectancy
  - Higher health costs at 65 and 66
- Actual difference in effect is fairly small because
  - Health costs are much higher at older ages
  - More low income people qualify for Medicare through Disability so are not affected by "usual eligibility age".
- Result under 1960 mortality regime; % reduction in PV of Medicare benefits – makes Medicare a bit less progressive.
  - Males
    - Q1 5.1%
    - Q5 3.5%
  - Females
    - Q1 5.6%
    - Q5 3.3%

5. Reduce marginal replacement rate by 1/3 for high income workers (marginal replacement rate above second bend-point is reduced from 15% to 10%)

- Very modest savings for pension system (about 1% of deficit)
- Very slight increase in progressivity.

6. Move second bend point to median income, and reduce marginal replacement rate to 0 for high income workers.

- Greater savings for public pension system – 11% for males, 5% females.
- Gap is reduced by $42,000

Q5-Q1=173K Q5-Q1=131K

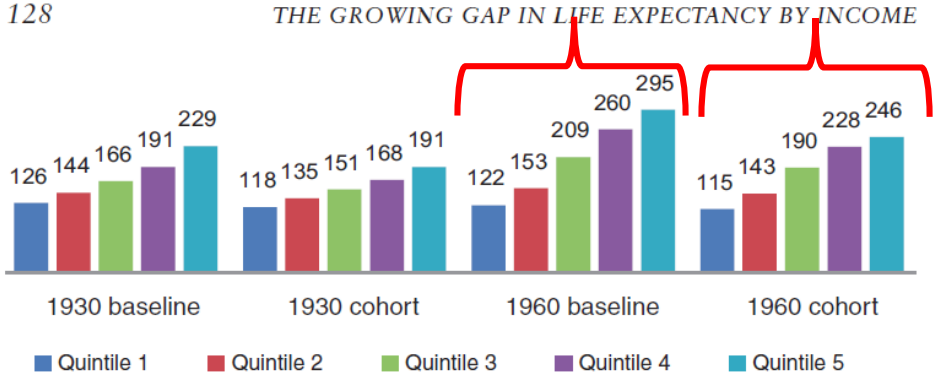

FIGURE 5-21 Average lifetime Social Security benefits for males (in thousands of dollars). Baseline compared with reducing benefits to workers in the top half of the average indexed monthly earnings distribution.
SOURCE: Committee generated using Health and Retirement Study data and cohort assumptions.

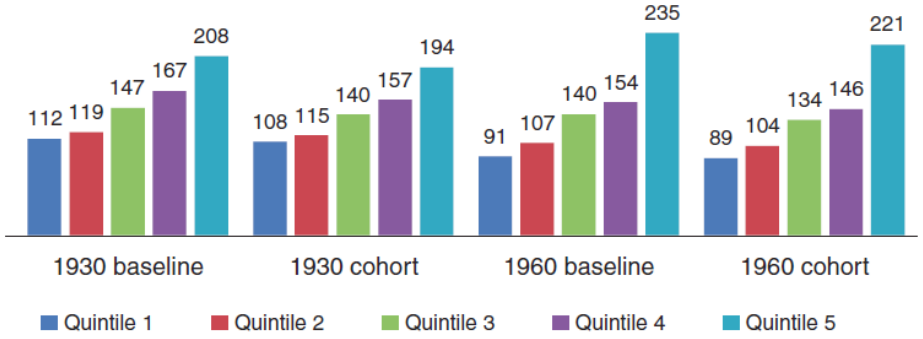

FIGURE 5-22 Average lifetime Social Security benefits for females (in thousands of dollars). Baseline compared with reducing benefits to workers in the top half of the average indexed monthly earnings distribution.
SOURCE: Committee generated using Health and Retirement Study data and cohort assumptions.

Q5-Q1=131K Q5-Q1=90K

6. (cont.) Effect on PV of Total Benefits of moving second bend point to median income, and reducing marginal replacement rate to 0 for high income workers.

- This policy helps to preserve progressivity of **total** benefits.
- Reduces gap by $41,000.

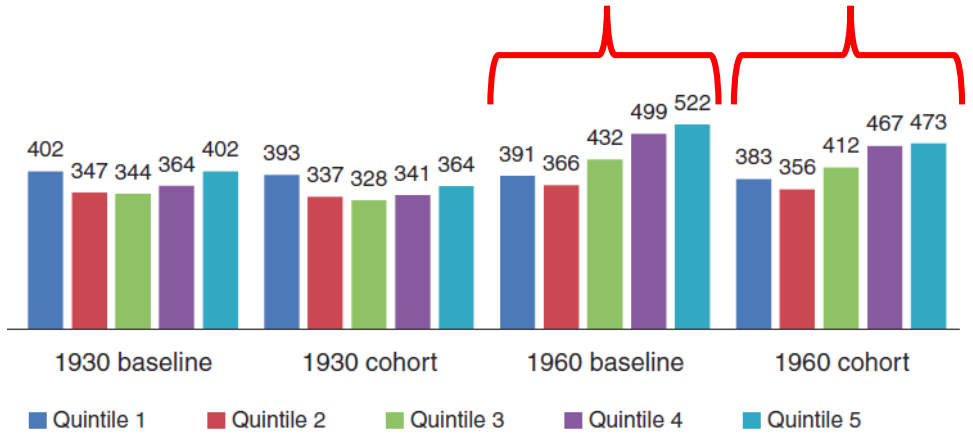

FIGURE 5-23 Average lifetime total benefits for males (in thousands of dollars. Baseline compared with reducing benefits to workers in the top half of the average indexed monthly earnings distribution.
SOURCE: Committee generated using Health and Retirement Study data and cohort assumptions.

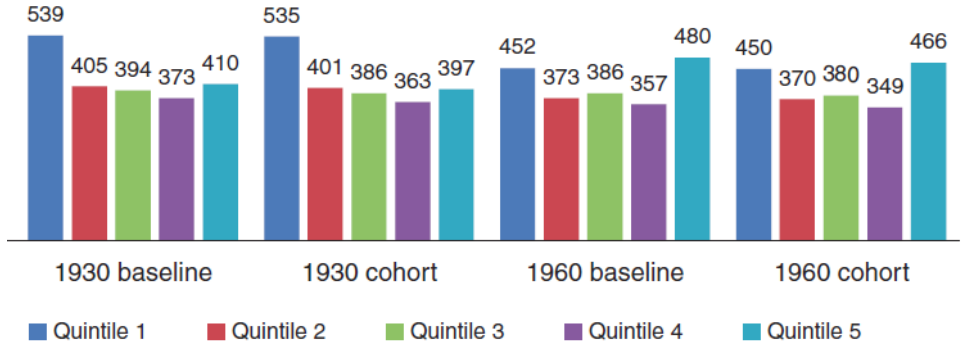

FIGURE 5-24 Average lifetime total benefits for females (in thousands of dollars). Baseline compared with reducing benefits to workers in the top half of the average indexed monthly earnings distribution.
SOURCE: Committee generated using Health and Retirement Study data and cohort assumptions.

TABLE 5-8 Progressivity of Policy Options for Improving the Solvency of Social Security and Medicare: Effect on Present Value of Benefits Relative to Consumption for Top and Bottom Quintiles Based on Average Indexed Monthly Earnings

Policy Experiment	Impact on Progressivity	Impact on Present Value of Net Benefits Relative to Wealth for Bottom/ Top Quintiles for Males	Impact on Solvency
Raise EEA from age 62 to 64	Somewhat less progressive	+0.1 +0.4	Small
Raise NRA to age 70	Somewhat more progressive	−4.8 −5.2	Significant (23% reduction in present value benefits for males; 15% reduction for females)
Raise EEA and NRA as above	Somewhat more progressive	−4.8 −5.1	Significant (22% reduction in benefits for males; 14% for females)
COLA based on chained CPI	Somewhat more progressive	−0.4 −0.6	Small (reduces benefits by less than 2%)
Marginal benefit 10% at top	Somewhat more progressive	−0.1 −0.3	Small (reduces benefits by less than 1%)
Marginal benefit after median	Substantially more progressive	−1.1 −3.4	Medium (11% reduction in benefits for males, 5% for females)
Raise Medicare eligibility to age 67	Less progressive	−1.4 −0.5	Modest (in part because 65 and 66 year olds are much less expensive than older beneficiaries, and in part because some would qualify through disability insurance)

- Raising ERA moves all toward higher PV – people retire before maximizing age, more so at high inc.
- PV(Benefits) declines 25% for lowest inc group, by 20% for highest inc group. Absolute reduction is greater for the highest inc group, however.
- Just sum of ERA and NRA

Conclusions

- Top half of income distribution has benefitted much more from rising life expectancy than bottom half.
- Widening mortality differentials reduce progressivity of public transfers substantially.
- Widening mortality differentials also interact with potential policy changes that are intended to improve the sustainability of programs.
- These points should be considered when designing policy responses to population aging.