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Abstract

Social Security reform proposals are often presented in terms of their differential impacts on hypothetical or ‘example’ workers. Our work explores how different benchmarks produce different replacement rate outcomes. We use the Health and Retirement Study (HRS) to evaluate how Social Security benefit replacement rates differ for actual versus hypothetical earner profiles, and we examine whether these findings are sensitive to alternative definitions of replacement rates. We find that workers with the median HRS profile would be estimated to receive benefits worth 55% of lifetime average earnings, versus 48% for the SSA medium scaled profile. Since US policymakers tend to prefer a replacement rate measure tied to workers’ own past earnings, using these metrics would yield higher replacement rates compared to commonly-used scaled illustrative profiles. However, benchmarks that use population as opposed to individual earnings measures to compare individual worker benefits to pre-retirement consumption produce lower replacement rates for HRS versus hypothetical earners.

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Social Security Replacement Rates For Own Earnings Benchmarks

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From the early days of US Social Security retirement program operations, policymakers have sought to balance the system's twin goals of *earnings replacement* and welfare or *income redistribution*. The earnings replacement objective motivates making retiree benefit payments a function of lifetime earnings. The redistributive goal is seeks to provide a relatively higher benefit formula to those workers having relatively lower lifetime earnings.

Over the years, policy analysts have periodically generated measures of "Social Security replacement rates" that assess how program benefits relate to workers' earnings levels. These measures have often been used as a means of assessing how effectively the program replaces workers' pay, and when computed for workers of different pay levels, they have also been used to evaluate the redistributive aspect of the U.S. Social Security program. Further, policymakers tend to use replacement rates to assess the likely impact of alternative system reforms, as in the case of the recent Commission to Strengthen Social Security (c.f. Cogan and Mitchell 2003).¹

Despite the myriad ways in which the replacement rate concept is used, there is no single commonly agreed-on definition of the term, or exactly what it is intended to capture.² In what follows, we first review previous formulates of the concept, and then we employ data from the Health and Retirement Study (HRS) to evaluate how Social Security benefit replacement rates differ for a range of hypothetical and actual earning profiles. We find that replacement rates based on individual earnings lead to higher replacement rates for workers with the median HRS profile compared to the SSA medium scaled profile: the HRS worker would be estimated to

receive benefits worth 55% of lifetime average earnings, versus 48% for the medium hypothetical earner. However, replacement rates that relate individual benefits to population average earnings (current or backward looking) produce higher replacement rates for hypothetical workers relative to the median HRS profile. Since US policymakers tend to prefer a replacement rate measure tied to workers' own past earnings, our results suggest that the replacement rates produced by hypothetical profiles imply lower earnings replacement in retirement than the calculated results for actual HRS earners.

Prior Studies³

In the US context, the Committee on Economic Security highlighted the concept of a replacement rate when it developed the Social Security system for Franklin Delano Roosevelt's Administration in 1935. Committee members held that "payment of benefits at a rate . . . approximating 50 percent of previous average earnings is socially desirable," though the group supplied no justification for that particular threshold, nor did it stipulate whether workers' own lifetime earnings or some larger economy-wide average should be the proper benchmark. In the very influential textbook *Fundamentals of Private Pensions*, Dan McGill (1964) three decades later wrote that a worker's retirement income, net of taxes, should be "approximately equivalent to the worker's spendable wages (gross wages less income tax and deductions for OASDI and private employee benefit plans) prior to retirement." In other words, he proposed a roughly a 100% net replacement rate, looking backward at the individual's own pay. Clarity retreated the next year when, in 1965, Congress passed the Older Americans' Act.⁴ Among other things, this bill held that older persons should receive "an adequate income in retirement in accordance with

the American standard of living.” But it was left for subsequent analysts to clarify what this meant.

In 1980, Meier et al. (1980) recommended that the “implicit or explicit goal is the maintenance of preretirement standards of living.” Dexter (1984) made this concrete with a Replacement Ratio (RR) defined as the ratio of retiree income to pre-retirement earnings. Yet he implemented this with a cross-section dataset, the 1973 Consumer Expenditure Survey (CEX), where he compared older retirees’ consumption levels with workers’ earnings in the cross-section (McGill et al. 2004). The analysis reported that the replacement ratio fell for those at higher pre-retirement income levels, though these were not the identical individuals followed through time. Subsequent analyses of retirement preparedness in the US context have also tended to use cross-sectional databases to compare retirement benefits in payment status, vis-à-vis earnings of those pre-retirement. In a series of studies alone and with Aon Consulting, Palmer used cross-sections of the CEX to develop replacement rate measures netting out taxes (and in some variants, work-related expenses). As McGill et al. (2004) note, the instability in results across years -- even for a hypothetical married man assumed to retire at age 65 with a spouse three years younger -- makes the results difficult to generalize. A more recent study by Bosworth et al. (1991) compared results using several cross-sections of the CEX and Surveys of Consumer Finances (SCF), and it again reported some discrepancies in saving rates.⁵

Relatively few studies thus far have had the opportunity to track individual workers’ actual earnings patterns when constructing benchmarks for replacement ratio measures.⁶ Nevertheless, that is what is needed to determine whether alternative pre-retirement pay benchmarks affect replacement rate computations. Bosworth et al (2000) did use a panel, the 1990-1993 Survey of Income and Program Participation (SIPP) linked to Social Security

Earnings Records (SSER). But instead of devising ‘own replacement rates’ using lifetime earnings patterns of individuals, that study instead developed a typology of earnings patterns.⁷ Only the work by Mitchell and Moore (2001; Moore and Mitchell 2000) used an early wave of the Health and Retirement Study (HRS) linked to Social Security earnings records to evaluate individual households’ retirement wealth adequacy as compared to the same individuals’ own pre-retirement household income. That work, however, focused exclusively on workers’ pre-retirement earnings and did not compute alternative replacement rate measures using lifetime earnings as benchmarks.⁸ In the next section we explore alternative measures linking benefit estimates to workers’ own pay levels.

Alternative Earnings Benchmarks

Some analysts provide measures of Social Security benefit replacement rates by comparing benefit entitlements for workers with “hypothetical” or illustrative pay profiles. In this section we first describe the hypothetical profiles developed by the Office of the Actuary at Social Security (OACT) and compare these with the actual profiles we have derived from a set of cohorts covered by the Health and Retirement Study. Our goal is to create alternative earnings benchmarks that can be used at the denominator for alternative replacement rate measures of interest.

Social Security Hypothetical Workers. The best-known hypothetical earnings provided in SSA reports are the “low/medium/high” pay trajectories developed by the Office of the Actuary. These have been used by the agency for various purposes, including the assessment of internal rates of return for hypothetical pay profiles under current and alternative social security rules. Initially, three steady earnings profiles were devised: one hypothetical case was assumed to

receive *average* annual covered earnings each year; one always had *half* the average covered earnings level; and one was at the *maximum* covered earnings cap in all years.⁹ Figure 1 depicts the low and high pay levels, as well as the Average Wage Index (AWI) representing the medium pay profile, are given in nominal and real (inflation corrected) terms.¹⁰ Subsequent refinements of the prototypical approach embedded a set of scaling factors to take into account the fact that real-world workers do not always receive exactly the low, medium, high, or maximum pay levels in all years of life. These scaled profiles are represented in Figure 2 (see the Appendix for further discussion of how these are derived).

Figures 1 and 2 here

Actual Earnings Profiles in the HRS. In our own research, we have used data from the Health and Retirement Study to examine lifetime pay profiles of actual workers (Mitchell and Phillips, 2004). For the purposes of analysis we linked the administrative records on lifetime earnings with the information provided in the main core of the 2004 HRS, to yield data needed to compute benefit entitlements and benefit levels.¹¹ There we showed that, on average, actual HRS workers have substantially lower earnings paths than the medium OACT hypothetical profile. We now extend the analysis by relying on the actual earnings profiles reported for the median 10% worker in the HRS and compute for this individual his expected benefits (given the relevant Social Security benefit formula).¹² We then compare the actual replacement rates with those generated for the OACT hypothetical profiles. The goal is to use these alternative pay patterns to assess how sensitive different replacement rate definitions are to distinct pay benchmarks.

Findings for Alternative Replacement Rates

Retiree replacement rates can be computed using many different denominators, as there is no clear guidance on what one might want to use as the benchmark earnings measure.

Accordingly, we propose four “backward-looking” alternatives and one contemporaneous measure to see what difference these measures might make for the purpose of replacement rate calculations. Specifically, the backward-looking metrics express estimated retirement benefits for each of the illustrative workers by four different denominators:

- (1) The worker’s own pre-retirement pay averaged over the five years prior to retirement;
- (2) The worker’s own average lifetime pay in inflation-corrected dollars;
- (3) The worker’s own average indexed monthly earnings in real terms;
- (4) The average (real) earnings of all workers employed in that year, for each year in the past.

In addition, we compute what the benefit replacement rate is contemporaneously; that is, comparing the benefit to average (real) earnings of all current workers. This latter measure is commonly used in Europe, where retirement adequacy is often judged according to whether retirees maintain a given *relative* position vis-à-vis current working cohorts. We do this for the three stylized OACT profiles, as well as for the HRS median 10% worker for the 1936 cohort.¹³

Results appear in Figure 3 which plots the low, medium, and high scaled SSA earnings contours against the median HRS worker in our sample. We also depict the earnings patterns of the fully insured population, which has worked long enough to be entitled to receive benefits, and compare it to the general population. Based on our prior work, we expect and find that the fully insured profile is higher than the average worker, and we confirm that both the medium and the high SSA profiles are almost always quite a bit above the HRS trend lines.

Figure 3 here

The graph in Figure 4 shows how the Social Security Primary Insurance Amount at the full retirement age (PIA) changes in real terms for additional years of work. This takes into account the fact that the benefit formula indexed earnings to the average wage index that year. It is interesting that the trends are so flat – that is, workers receive relatively little additional change in expected benefits for more years of contributions (after contributing for the basic 10 years required for eligibility). It is also worth noting that the median HRS earner who was fully insured for benefits would be entitled to about \$9,000 versus \$12,000 for the SSA “medium” worker, and the broader sample of HRS respondents would be down around \$8,000 (per year, in 2004 dollars). This is not surprising given our results from Figure 3 where the hypothetical medium scaled profile lies above the HRS profiles at almost all ages.

Figure 4 here

Next we display replacement rates for the five illustrative cases using a range of alternative earnings patterns in the denominators. Figure 5 indicates replacement rates using as a benchmark the worker’s own lifetime earnings indexed to average wages in the economy (his Average Indexed Monthly Earnings or AIME annualized). Here we see that the replacement rates computed for HRS workers are initially below, and later in life somewhat above, those evaluated for the medium scaled SSA profile. While they differ less than the earnings profiles might have led one to believe, it is still true that the median HRS fully insured worker would anticipate a benefit replacement rate of 51% versus 48% for the medium scaled worker (if we include all workers, not just the fully insured, the replacement rate is 55%). The first row of Table 1 summarizes the replacement rate measures for each earnings profile, for that cohort’s normal retirement age. Figure 6 shows the replacement rate path if, instead, we were to compare Social Security benefits to national average wages when the worker retired, in the European

variant of replacement rates mentioned above. Using average earnings in 2000 as the benchmark, we see that the scaled medium SSA path generates a benefit ratio of around 40% and standing at 42% at retirement, whereas the HRS median worker's replacement ratio falls below this target, standing at 33% at the end of the work life. Again, ratios as of the normal retirement date are presented in Table 1.

Figures 5 and 6 here, and Table 1

The Table also summarizes results for the other replacement rates, and the degree of variability is quite interesting. Focusing on the figures from the hypothetical earnings profiles, replacement rates range in the 42-54% range for the medium profile, but there is a much wider range for the low-earner profile (25-73%), and high-earner (40-61%). Turning to the HRS findings, the first two measures which tie benefits to own earnings measures yield higher replacement rates than one would see using the hypothetical profiles: for instance, the median HRS profile would have benefits worth 55% of AIME and lifetime average real earnings, versus 48% for the SSA figures. Interestingly the ratio falls to 41% for last five earnings years, reflective of the fact that HRS workers' pay continued to rise in real terms (whereas the SSA figures assume no real increases). The lowest replacement rates for the HRS profiles appear in measures that use national average earnings (the last two rows); for instance retirees from this cohort anticipated benefits only worth about 33-37% of national pay levels. By sharp contrast, benefit replacement ratios for the highly paid scaled hypothetical paths are very high (56-60%). Evidently, the choice of benchmark can dramatically alter replacement rate results for the 'median' worker, and also for workers in the below and above average pay groupings. Historically in the US, policymakers have tended to prefer a replacement rate measure tied to workers' *own* past earnings. Using that metric, we conclude that replacement rates are higher

when one uses “actual worker” earnings patterns instead of scaled illustrative hypothetical earnings paths.

Conclusions

Social Security reform proposals are often presented in terms of their differential impacts on hypothetical workers for a variety of earnings profiles. Our work explores how different concepts of replacement rates influence benefit outcomes, and how in turn these are associated with reported retiree wellbeing. We find that replacement rates for the median real world worker as represented in the nationally representative Health and Retirement Study are generally *higher* than for the medium scale profile developed by SSA. We also show that a replacement rate measure linking benefits to national average wages at retirement generate a more modest replacement rate, about 33% for the median HRS worker, instead of the higher rates often discussed in policy circles. More precise analyses of possible distributional patterns from Social Security reform proposals would follow, if benefit estimates were derived from actual earnings profiles rather than hypothetical scaled patterns.¹⁴

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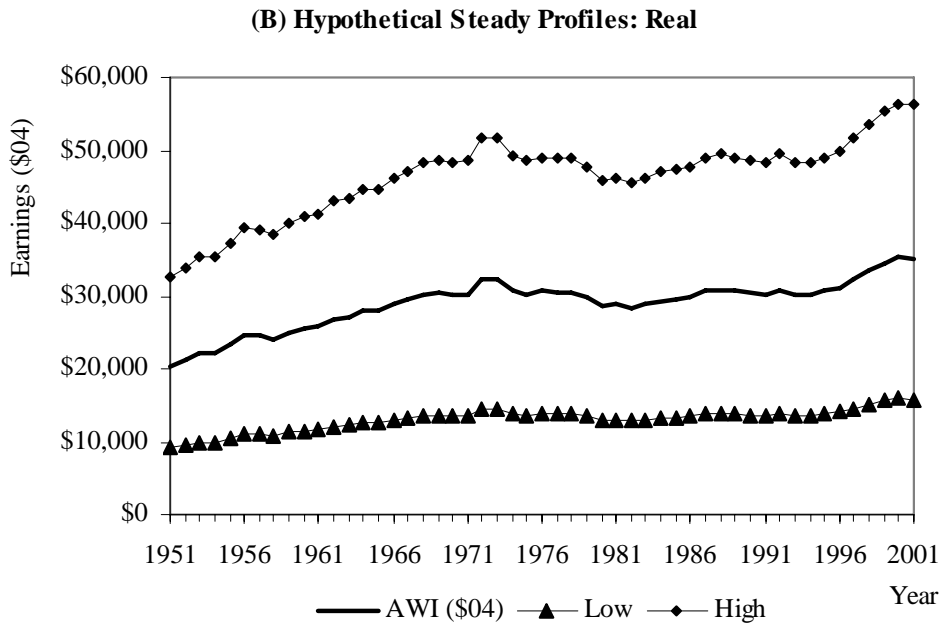
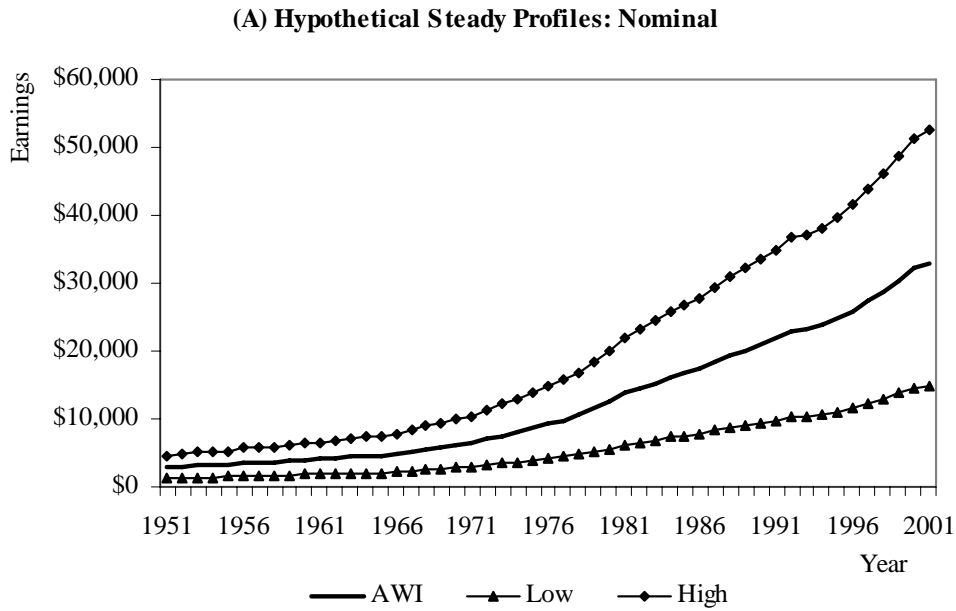
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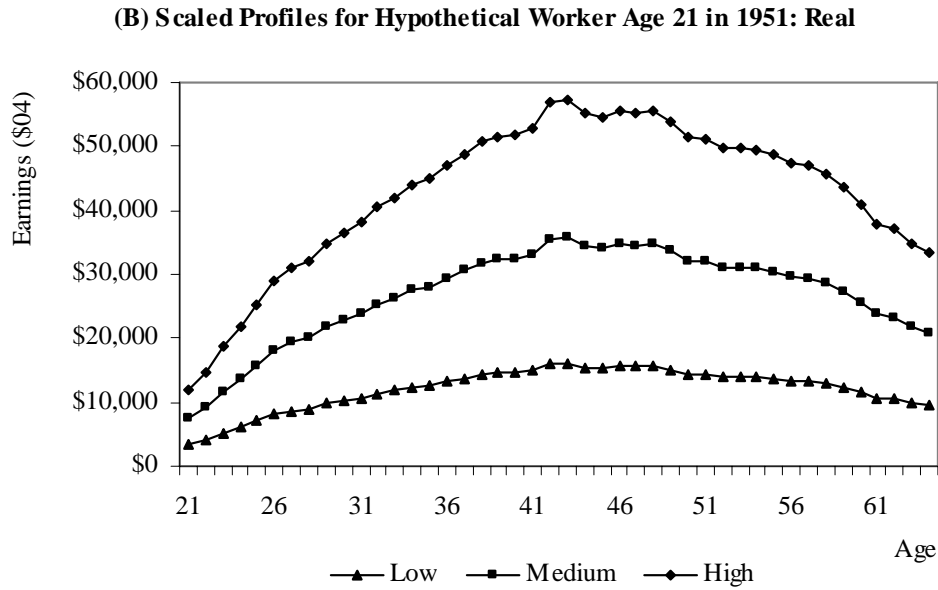
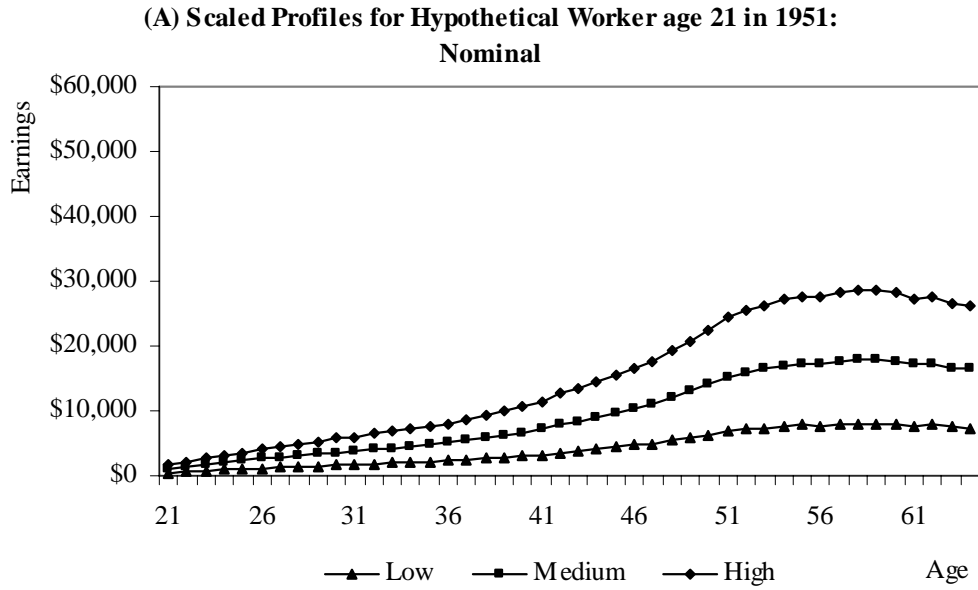
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Figure 1: Low/Average/High Steady SSA Earnings Profiles (1951-2001)



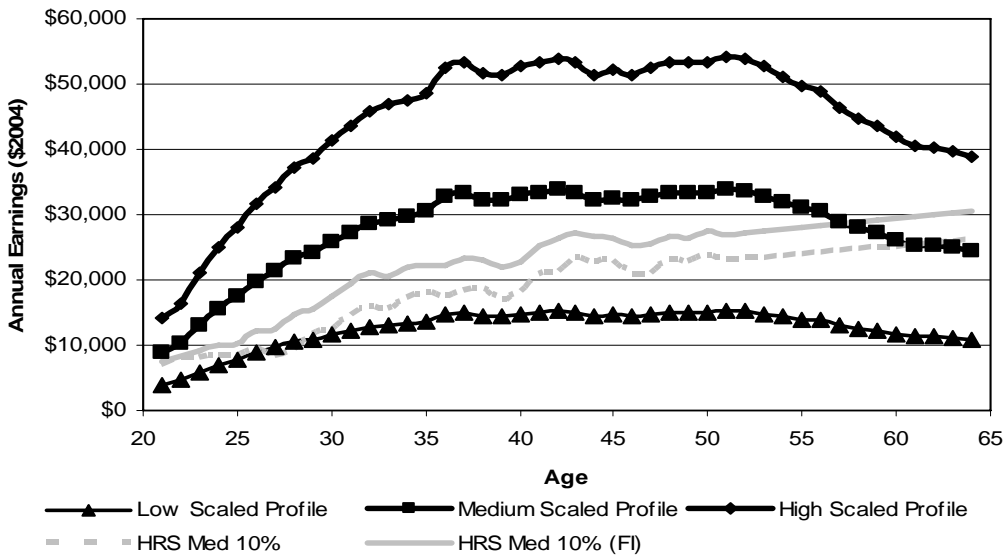
Source: Mitchell, Phillips, and Au (in progress)

Figure 2: Scaled Steady SSA Earnings Profiles: Age 21 in 1951



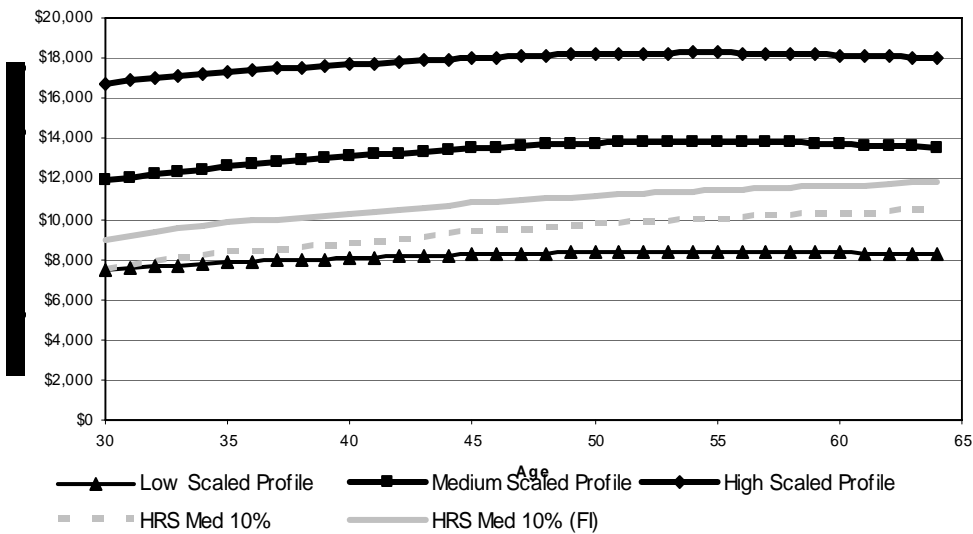
Source: Mitchell, Phillips, and Au (in progress).

Figure 3. HRS Earnings by Age and Earnings Profile



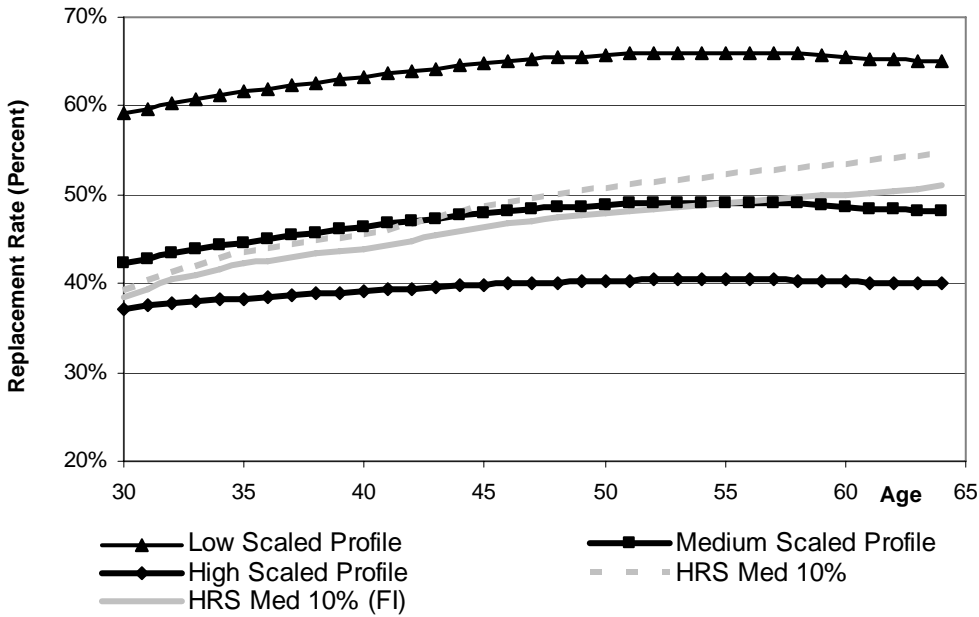
Note: HRS 1936 Birth Cohort median 10% shown. Source: Authors' computations.

Figure 4. Levels of PIA by Age and Earnings Profile



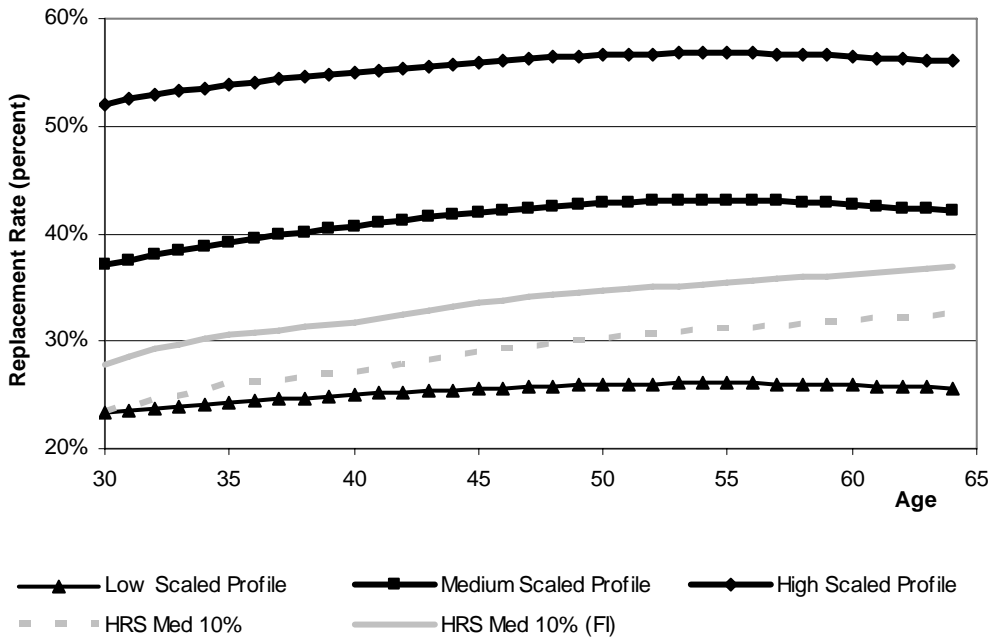
Note: HRS 1936 Birth Cohort median 10% shown. Source: Authors' computations.

Figure 5: AIME Replacement Rates by Age and Earnings Profile



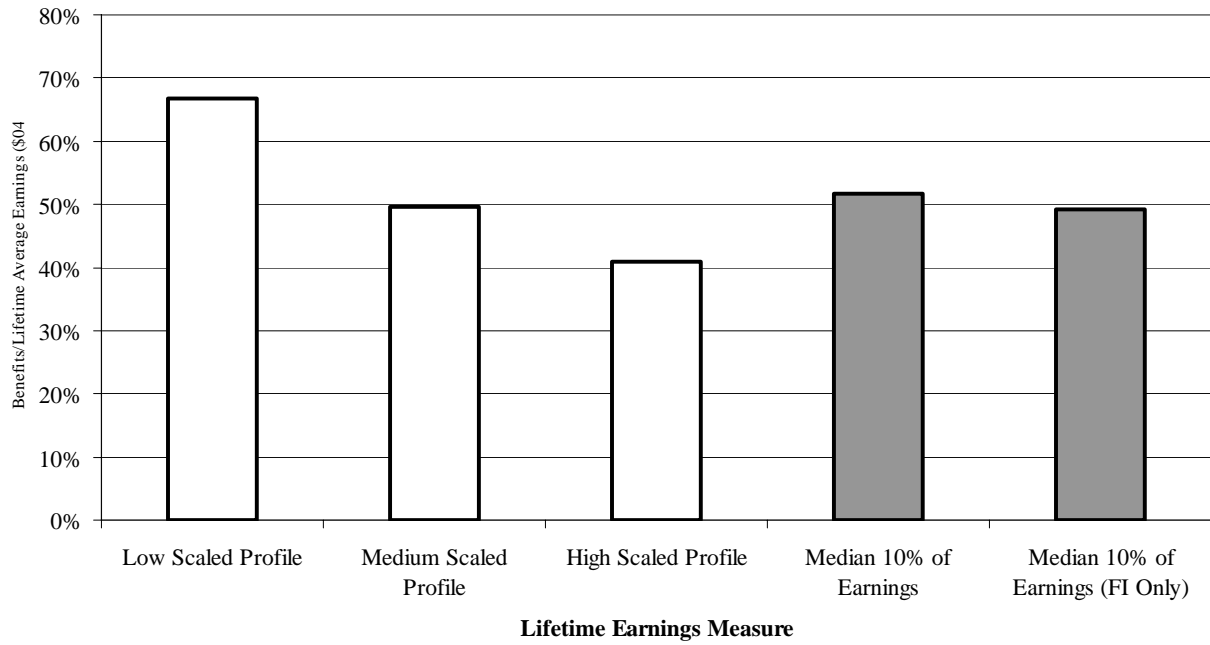
Note: HRS 1936 Birth Cohort median 10% shown. Source: Authors' computations.

Figure 6. National Average Wage (2000) Replacement Rates by Age and Earnings Profile



Note: HRS 1936 Birth Cohort median 10% shown. Source: Authors' computations.

Figure 7. Lifetime Average Earnings Replacement Rates from Benefits



Note: HRS 1936 Birth Cohort median 10% shown. Source: Authors' calculations

Table 1. Replacement Rates for Different Earnings Profiles

Replacement Rate Measure	SSA Scaled Profiles			HRS 10%	
	Low	Medium	High	HRS Med	HRS FI
Average Indexed Annual Earnings (\$2004)	64.9%	48.1%	39.9%	54.6%	51.0%
Lifetime Average Earnings	65.9%	48.8%	40.5%	55.6%	52.2%
Average Earnings Last 5 Pre-Retire Yrs	72.7%	53.8%	44.7%	40.8%	39.6%
National Average Earnings 1957-2000	27.8%	45.7%	60.7%	35.2%	40.0%
National Average Earnings 2000	25.6%	42.2%	56.1%	32.5%	36.9%

Source: Authors' calculations.

Notes:

HRS Median 10% earnings are based on authors' calculations as described in the text for the 1936 Birth Cohort; the HRS FI figures are based on the fully insured population only.

Appendix. Derivation of Social Security Hypothetical Earnings Profiles¹⁵

As per Mitchell et al. (in progress), we draw our evidence for the real-world earnings profiles from a nationally representative survey of respondents to the Health and Retirement Study (HRS), linked with tax records from administrative sources. These we compare with the hypothetical profiles devised by SSA for illustrative purposes. This note summarizes the complex method by which the SSA profiles are developed.

Derivation of the Average Wage Index (AWI). The SSA derives illustrative workers by starting with the Average Wage Index, a series originally drawn from first-quarter covered earnings data gathered by SSA from 1973-77, multiplied by 4 to get annualized earnings, and divided by the number of taxpaying workers in that period. Because similar records were unavailable prior to 1973, data extracts were used to track average covered earnings for 1951-72 (before that time, earnings were not tracked yearly by SSA). To avoid jumps in the series when the data sources changed, the agency used the pre-1973 changes to backward-index the base period AWI from 1973. In 1977 and 1978, the SSA began to rely on earnings reported in personal income tax forms (Form 1040); thereafter, earnings data derived from Internal Revenue Service (IRS) Wage and Tax Statements (“W-2 forms”) were used. Once again, instead of using ¹⁶actual annual earnings to compute actual AWI earnings levels, the new data sources were used to compute changes to inflate the base year AWI computed in the early 1970s (Clingman and Kunkel, 1992).

Hypothetical Steady and Scaled Earning Profiles: Several hypothetical “steady” profiles were developed by the SSA, on the presumption that each hypothetical worker entered the workforce at age 22 and remained continuously employed until age 65 (except for periods of disability). The “average steady” profile assumes the AWI throughout the lifetime; the “low steady” profile is assumed to earn only 45 percent of the AWI in all years; and the “high steady” profile is associated with pay at 160 percent of the AWI (Nichols et al., 2001). As the steady profiles ignored earnings and employment fluctuations, the SSA also created “scaled” profiles seeking to better reflect actual earning patterns over the lifecycle. The process of ‘scaling’ the AWI data involves three complex steps including (a) the development of “raw” scaled factors from a dataset on fully insured workers; (b) the implementation of a consistency adjustment; and (c) the determination of annual scaled earnings using “final” scaled factors. The net effect is to have scaled earnings rise with age, though the computation continues to assume that people enter the workforce at age 21 and remain rather tightly attached to the labor force until retirement, disability, or death. In real terms, the “medium” scaled profile has earnings worth one-third the AWI during the early phase of the work life, one-quarter higher than the AWI in middle age, and one-third less than the AWI in later life. While the scaled profiles do factor in an empirically-based age-linked life-cycle earnings profile, they only “count” the fully insured population, and the factors rely on a 10-year data window. Accordingly they will not represent any given cohort’s actual age-earnings patterns.

Endnotes

¹ The Pozen plan for “progressive indexing” was also assessed using this approach. .

² We abstract here from absolute income standards such as the poverty line, discussed in some detail in McGill et al (2994), Chapter 19.

³ This section draws heavily on McGill et al. (2004).

⁴ PL 89-73, July 4, 1965

⁵ Schieber (2004) and Vanderhei (2004) offer more complete discussions about medical care costs, work-related expenses, and other factors that analysts might want to subtract from gross income to arrive at net income measures for replacement rate purposes. In the present context, however, we concentrate on different benefits versus longitudinal gross earnings measure.

⁶ Schieber (2004) has a useful review of adequacy measures including utility-based formulations, which are not the focus of the present paper.

⁷ Butrica et al. (2003-4) also use this linked data, but they project future cohort wellbeing derived from the MINT model.

⁸ Scholz et al. (2003) also uses the HRS to assess retirement saving adequacy compared to workers’ earnings. However they do not compute conventional retirement replacement ratios as we do here.

⁹ See the Appendix for a discussion of how the AWI is computed.

¹⁰ A fourth illustrative pay profile between those of the average earner and the one always at the maximum earnings level was added by the 1994-1996 Advisory Council.

¹¹ We make use of statistical methods described in our prior study to address earnings over the taxable maximum in the years uncovered by the W2 earnings data (1951-1979).

¹² We use administrative data provided by linked records for the median 10-percentile worker (the average of the 45th to 55th percentiles of the distribution) in the HRS focusing on the 1936 birth cohort. As linked data are available under restricted data conditions only to 1991, we extend the real earnings series for the median earner to age 64 using the algorithm developed in Mitchell et al. (2001): $\text{EarnFactor} = (\text{EarnAge50} * 5) + (\text{EarnAge49} * 4) + (\text{EarnAge48} * 3) + (\text{EarnAge47} * 2) + (\text{EarnAge46} * 1)$. We also assume that the AWI going forward would rise at a real 1% per annum.

¹³ Inasmuch as each birth cohort has its own AWI series and benefit formulas can change from one cohort to the next, we present comparable figures computed for the given cohort rather than mixing birth-years across the figures.

¹⁴ For example, proposals to implement personal accounts in social security have emphasized retirement security for those at the bottom of the lifetime earnings distribution (Cogan and Mitchell, 2003).

¹⁵ This section draws from Mitchell, Phillips, and Au (in progress).