Hypothetical versus actual earnings profiles: implications for social security reform[1]

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Social security analysts have long been interested in the potential distributional impacts of changes in benefit and tax formulas. One way to examine these outcomes is to build a complex microsimulation model which inputs household data and then simulates how thousands of observations might respond given certain behavioral assumptions about transition paths. Efforts along these lines include models by the U.S. Congressional Budget Office and the Social Security Administration (SSA) Office of Research Evaluation and Statistics[2]. Yet because such models are elaborate, complicated, and slow to solve, analysts have often taken an alternative tack, namely by projecting how reforms might play out using a limited set of stylized hypothetical earnings profiles. Most prominently, the U.S. Office of the Actuary of the Social Security Administration (SSA) uses the well-known 'low/medium/high' trajectories to compute benefits and taxes for a handful of stylized earners when they compare alternative social security rules with those currently on the books[3]. Many other groups also find these stylized worker profiles informative. For example, the 2001 President's Commission to Strengthen Social Security used the OACT hypothetical profiles to evaluate its reform proposals [CSSS (2001)], and a plan for "progressive benefits indexing" was assessed using this approach [Goss (2005)].

This paper compares these hypothetical earnings profiles with real-world earnings profiles obtained for actual workers drawn from a national survey of older Americans who responded to the Health and Retirement Study (HRS). Using these data linked with tax records from administrative sources, we show that the distribution of actual earnings is substantially lower than the hypotheticals. Consequently, the hypotheticals used to evaluate policy alternatives may understate benefit replacement rates but overstate other possible reform outcomes such as accumulations in personal retirement accounts.

Social security hypothetical earnings profiles[4]

Retirement benefits in the U.S. rely on an average wage index (AWI), which is intended to make labor earnings in one year comparable to those in other years. Thirty years ago, before detailed annual earnings were collected and stored electronically, the SSA generated this index by gathering first-quarter taxable or 'covered' earnings and multiplying them by 4 to derive the total annualized covered earning base. Dividing this sum by the number of taxpaying workers produced the annual AWI measure for the 'base' period of 1973-77[5]. For prior years, this base level was backward indexed by changes in the aggregate covered earnings base (back to 1951)[6]. Subsequent to 1977, the agency began using earnings measures reported through the personal income tax system, and currently earnings data are collected from the Internal Revenue Service (IRS) wage and tax statements. Again, however, instead of using actual annual earnings to compute actual AWI earnings levels, the new data sources were used to compute earnings changes to the base year AWI [Clingman and Kunkel (1992)].

Several hypothetical steady earner profiles have been devised by the SSA using this AWI series, all of which assume that the hypothetical worker enters the workforce at age 22, remains continuously employed until age 65 (except for periods of disability), and earns some multiple of the AWI over his lifetime. The 'low steady' profile assumes pay of 45 percent of the AWI in all years; the 'average steady' assumes 100 percent, and the 'high steady' profile assumes 160 percent of the AWI [Nichols et al. (2001)]. Obviously the 'steady' construct ignores employment and pay fluctuations over the worklife, as well as within- and across-cohort differences in the ages of entering employment, unemployment (or un/nonemployment), and patterns of early retirement. For this reason, the SSA has also developed age-adjusted scaled earnings profiles thought to more accurately reflect actual workers' lifecycle earnings profiles [Nichols et al. (2001)]. The effect of these adjustments is to generate a hump-shaped real earnings profile with rather firm labor force attachment until retirement, disability, or death; peak earnings are seen in the mid-40s and decline sharply thereafter [Mitchell and Phillips (2006)].

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2 O'Hara, et al. (2004) summarize the long-term policy simulation model developed by the Congressional Budget Office; the SSA conducts distributional analyses of reform plans using the modeling income in the near term model (MINT; c.f. Butrica et al. (2003)].

3 Nichols et al. (2001) note that hypothetical earnings histories have increasingly been used to evaluate the effects of possible alternatives.

4 This section draws on Donkar (1982), Myers (1993), and Nichols et al. (2001).

5 See Donkar (1981). Pay earned above the SSA taxable earnings maximum in that first quarter was not recorded, but this was believed to be a minor omission since relatively few workers earned over the annual maximum contribution base in the first quarter of the year [Myers (1993)].

6 The data source, the longitudinal employee-employer dataset, was not available before 1957, so the SSA used a 0.1 percent sample of covered earnings records for 1951-56; changes in average first-quarter earnings over that period were then used to backward-index the AWI from 1957.

Comparing hypothetical and actual earnings profiles

Next we compare the hypothetical profiles just described with actual worker lifetime earnings patterns to determine whether using the hypothetical low/medium/high profiles might yield misleading conclusions about the distributional outcomes of potential social security reforms.

We begin by extracting actual pay data on workers in the nationally representative Health and Retirement Study, where we focus on the cohort aged 51-61 when first interviewed in 1992[7]. The first thing we do is assess patterns of labor market attachment, and as Figure 1 indicates, the data show that discontinuous work careers were rather common for this group. During the early 1950s, for instance, when this cohort was in its early 20s, many young men had high rates of non-employment (as many as 46 percent of HRS respondents indicated no positive earnings in any given year); after that, only about 5-7 percent of the men reported no positive earnings. The results for women are even more striking: over 40 percent of this cohort had no positive earnings over the peak childbearing/rearing years (1951-71). Even when they reached their 50s, more than 20 percent had zero earnings. In other words, the steady and even the scaled pay profiles assume far more work experience than was true for typical workers, and the overstatement is particularly notable for women[8]. This evidence, therefore, suggests that assuming consistent labor force attachment will overestimate actual workers' pay. Inasmuch as the social security benefit formula generates higher benefits for low lifetime earnings relative to high earners, using 'scaled' rather than actual pay profiles for replacement rate computations would be anticipated to yield replacement rates that are too low.

For other purposes, however, the hypothetical pay profiles may overstate benefit generosity, because AWI pay levels are computed only on covered earnings up to a 'taxable maximum' threshold. So,

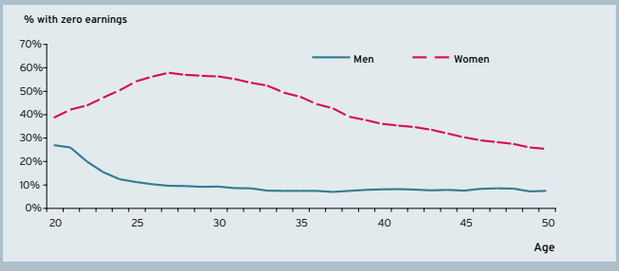

Figure 1 – Percent of actual HRS workers with zero earnings by sex
Source: authors' calculations using HRS 1931-41 birth cohort linked to administrative earnings records.

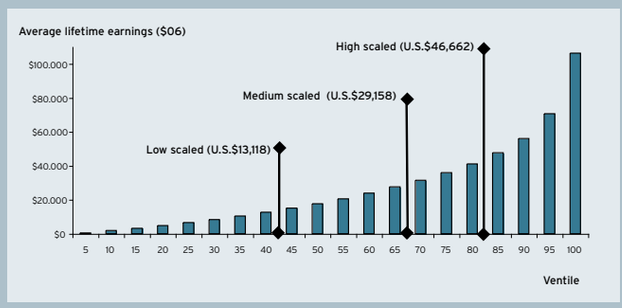

Figure 2 – Comparison of scaled low/medium/high profiles and actual HRS average lifetime earnings
Source: authors' calculations using weighted HRS 1931-41 birth cohort linked to administrative earnings records and low, medium, and high scaled worker earnings for same years.

for instance, replacement rates (or the ratio of benefits to pre-retirement pay) could be overestimated if pay above the taxable threshold is included in the calculation. How important this may be is unclear a priori, since the earnings threshold varied markedly over time. In fact, its impact differs by sex. Only two percent of the HRS women ever earned at or above the taxable threshold, but 15 percent of men hit the cap during the 1950s, 44 percent in the 1960s, and 47 percent in the 1970s[9]. As a result, the AWI would be expected to understate actual pay for the average HRS male worker.

Figure 2 depicts average lifetime annual earnings produced by the scaled earnings profiles and actual HRS earnings. Here we see that the implied average from the medium scaled profile is U.S.$29,158 (in '06 $) which lies at about the 67th percentile of actual lifetime HRS earnings. This is more than 50 percent greater than the median actual worker's earnings. The average derived from the low scaled profile (U.S.$13,118) is also high, falling at about the 42nd percentile of the actual distribution. Whereas average earnings generated by the high scaled profile should lie between the 65th and 70th percentiles, at about U.S.$28,000, the high scaled profile falls at the 82nd percentile of the actual distribution (U.S.$46,662). In other words, all of the averages produced using scaled earnings are substantially higher than their target values in the actual data[10].

Implications

Despite the fact that hypothetical scaled earnings profiles do not reflect any specific cohort's experiences, either in terms of their earnings when working or actual labor force attachment, these are often used to assess possible distributional aspects of the social security system. An implication of our analysis is that actual benefit

7 For a description of the HRS see USDHHS (2007).

8 We have omitted from the HRS sample workers with 2+ years of zero taxable earnings over 1980-91 who also had positive W-2 earnings, which likely indicates they worked in government or other non-covered sectors. We also exclude respondents with no positive lifetime earnings.

9 From 1980-91, 'W-2' earnings were available which include labor compensation above the taxable earnings ceiling. For years prior to 1980, data on earnings up to the cap were used to generate predicted values of year-specific real earnings for each capped worker [Mitchell and Phillips (2004)].

10 The HRS sample examined thus far includes only respondents with some positive earnings over the period of observation (1951-91). We have also computed earnings trajectories for the subset of workers who would eventually be eligible for Social Security benefits as of age 62; the so-called 'fully insured' group [Mitchell and Phillips (2001)]. Here too, scaled profiles prove high; that is, the medium scaled profile is about 28% higher than the HRS median, and the low scaled profile is 27% above the HRS median.

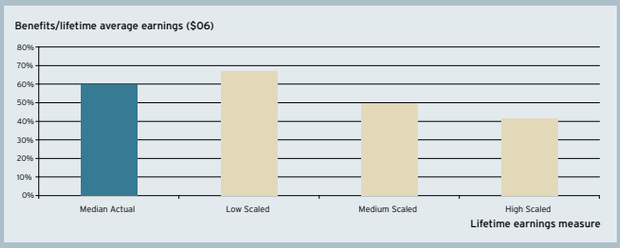

Figure 3 – Comparison of replacement rates for actual HRS median earnings and scaled low/medium/high profiles
Source: authors' calculations of social security benefits divided by average lifetime earnings for the median respondent in the HRS 1936 birth cohort, and low, medium, and high scaled worker earnings for same birth year.

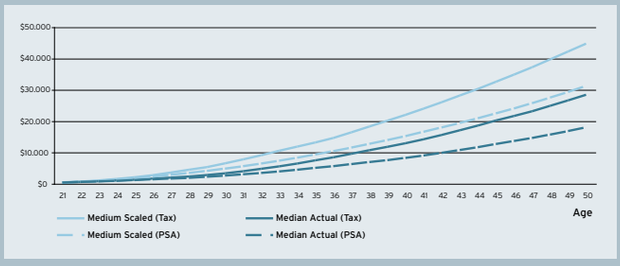

Figure 4 – How alternative lifetime earnings patterns influence social security policy variables
Source: authors' calculations use a sample of HRS respondents born in 1936 matched to administrative earnings data for the median 10%; the low, medium, and high scaled earners are those that would be comparable to this same birth cohort. Tax calculations include only employee contributions; for the personal retirement account, we assume 2 percent annual contributions to the PRA and a 4 percent real rate of return.

replacement rates for real-world workers may be higher than for the hypothetical profiles. To illustrate this point, Figure 3 reports replacement rates for the low/medium/high scaled earnings profiles and the median actual workers' average lifetime pay. Here we show that the replacement ratio is 60 percent for the median HRS worker, one-fifth higher than the 50 percent computed for the SSA medium scaled profile. In other words, using the scaled hypothetical profiles tends to understate the relative generosity of social security benefits for actual workers.

Our work is also germane to an assessment of other social security reform proposals. For instance, Figure 4 illustrates that, because actual pay profiles are below the scaled hypothetical ones, workers actually pay less in payroll tax than would be anticipated based on scaled earnings. We can simulate how workers' accumulations might grow if a portion of their contributions were to be invested in defined contribution-type personal retirement accounts (PRAs), a reform proposed by the recent Commission to Strengthen Social Security [Cogan and Mitchell (2003)]. For this analysis we use actual earnings received by the 1936 HRS cohort and assume an annual contribution rate of two percent of pay, invested in assets paying a 4 percent real return[11]. The results in Figure 4 show that the actual average earner would be projected to accrue half as much in the PRA, as would be presumed using the scaled medium profile.

Conclusion

Reforms in the nation's social security benefit and tax structure will be required to avoid system insolvency in the face of demographic aging. This political process must balance the twin goals of earnings replacement and welfare or income redistribution. In the past, data limitations have led analysts to use hypothetical profiles of low/medium/high earnings when modeling the distributional impact of potential reforms. Our work suggests that more accurate distributional analyses must use actual rather than hypothetical lifetime profiles.

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11 Alternative assumptions about contribution rates and rates of return do not affect the pattern of results.