

Biggs, Andrew G.; Schieber, Sylvester J.; Pang, Gaobo

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## **Measuring and Communicating Social Security Earnings Replacement Rates**

Andrew G. Biggs  
Resident Scholar  
American Enterprise Institute

Gaobo Pang  
Senior Economist  
Towers Watson

and

Sylvester J. Schieber  
Former Member and Chair, Social Security Advisory Board  
and Towers Watson (retired)

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### **Abstract**

Financial advisors commonly use earnings replacement rates to assist workers in their retirement planning. Policymakers and analysts use them to gauge the adequacy of Social Security benefits and other retirement income in allowing retirees to maintain preretirement living standards. In recent years, the Social Security trustees regularly published replacement rates that have been widely interpreted as the extent to which Social Security benefits replace earnings of workers at various points in the lifetime earnings distribution. However, the trustees' replacement rates are calculated differently than those generally used for retirement planning purposes possibly leading to confusion among policymakers and others regarding how much of workers' earnings are replaced by Social Security and how much those workers need to save on their own for retirement. Financial planners calculate replacement rates by comparing an individual's retirement income to that same individual's pre-retirement earnings, generally earnings in the years immediately preceding retirement. The Social Security Administration, by contrast, effectively calculates replacement rates by comparing retiree incomes to the incomes of contemporaneous workers. This latter measure is often used in other countries, but differs both qualitatively and quantitatively from the more common replacement rate calculations used for financial planning purposes. We find that replacement rates calculated on a financial planning basis are generally higher than those published by the Social Security trustees and that Social Security benefits generally replace somewhat more of individual workers' earnings than the trustees' rates suggest.

## 1. Introduction

Individuals today must take a more active role in planning their retirements than they might have in the past, when defined benefit pensions were more common. Thus, there is active discussion of how working-age households should save for retirement and whether they are doing so adequately. These discussions have led to claims of a “retirement crisis” and proposals to alter government incentives for private retirement saving and proposals to expand the Social Security program.<sup>1</sup>

But an informed discussion requires knowledge of background context, of how individuals think about retirement planning and how we are currently judging retirement income adequacy. Many retirement plan designers and advisors use replacement rates—the portion of preretirement earnings needed in retirement to maintain the living standard achieved while working—as a guide to assess whether retirement income levels and the resources needed to support it are adequate.

We have argued (Biggs and Schieber, 2014) that replacement rate figures published by the Social Security Administration (SSA) cause the public to underestimate the generosity of Social Security retirement benefits, in the process supporting perceptions of a “retirement crisis.” The SSA has a retirement planner on its website (Social Security Administration, 2014) where it states that,

Most financial advisors say you’ll need about 70 percent of your pre-retirement earnings to comfortably maintain your pre-retirement standard of living. Under current law, if you have average earnings, your Social Security retirement benefits will replace only about 40 percent.

It is crucial to note, however, that the numerical replacement rate target is tied to the measure of pre-retirement earnings to be replaced. Financial advisors measure replacement rates relative to final earnings – say, the final year or final five years prior to retirement. The replacement rates that were presented in the *Social Security Trustees Reports* from 2002 through 2013 were measured relative to the average of the highest 35 years of lifetime earnings, wage-indexed to the year before retirement. These are different figures and they represent different things. For example, using a sample of Social Security retired worker beneficiaries at the end of 2004, we estimate that workers with career patterns similar to the SSA hypothetical workers have median replacement rates of 39.7 percent of the average of their highest 35 years of earnings wage indexed to the year before they retire but a replacement rate of 44.7 percent of the average of their highest 35 years of earnings price indexed to the year before they retire and a replacement rate of 47.1 percent of their average price-indexed earnings for the second through sixth year of positive

earnings before they retire. This latter measure corresponds with the average final earnings defined by Goss et al (2014).

Other plausible means of measuring replacement rates, such as comparing retirement income to the inflation-adjusted averaged of pre-retirement earnings or to earnings in individuals' 50s, generally their peak earnings years, also produces higher replacement rates. The SSA actuaries' approach tends to generate the lowest measured replacement rates, but it is the least grounded in economic theory or in common financial planning practice.

These measurement issues are not of merely academic importance. For instance, analysts from the New America Foundation, a Washington, D.C. think tank, cite the SSA claims regarding replacement rates and propose increasing Social Security benefits by 50 percent so that an average wage earner would have a replacement rate (as measured by SSA) of 60 percent. (Lind et al 2013) This implies, however, that SSA's stylized "scaled medium earner" could retire with a Social Security benefit of 85 percent of his or her final salary, while SSA's stylized low-wage worker could retire at 140 percent of final earnings. There is no evidence that the proposal's supporters understand the implications of these issues, but if enacted they would likely reduce labor supply significantly at older ages and increase federal budget outlays.

Munnell, Webb and Delorne (2006) use a replacement rate calculation that is based on the highest 35 years of income, including capital income that is wage-indexed to age 60 in calculating the National Retirement Risk Index, which postulates that 53 percent of all working Americans are saving inadequately for retirement. If the NRRI establishes its replacement rate targets relative to final income or to inflation-adjusted lifetime average income, as opposed to lifetime income indexed to wages as of age 60, significantly lower numbers of Americans would be deemed at risk of an inadequate income in retirement.

Our argument is not new. The *2013 Social Security Trustees Report* (2013, p. 143), which contained replacement rate estimates, noted that calculating Social Security replacement rates based on career average earnings wage-indexed to the year before benefits are claimed "produces percentages that may differ significantly from those that would be produced by comparing benefits to these representative workers' recent average earnings levels or to other more common measures of pre-retirement income." The 2014 Trustees Report, published in early August, removed the replacement rate presentation included in prior reports, suggesting that the Trustees concluded the previously shown replacement rates were misleading. Measures of Social Security benefit adequacy are of crucial importance both to individuals planning their own retirement saving and to policymakers deciding how the Social Security program

should evolve over time. But it is better to provide no information in this regard than to supply statistics that mislead the public with regard to these important issues.

Since the release of the 2014 Trustees Report, SSA's Office of the Actuary (OACT) has published a defense of its replacement rate measurements (Goss et al 2014). The authors of that study conclude that their method of calculating replacement rates relative to wage-indexed average earnings in the year before retirement is methodologically sound, that it is consistent with how others have calculated replacement rates, and that it produces results that are similar to replacement rates calculated relative to final earnings. We are unconvinced by these claims. It is inevitable that individuals preparing for retirement and researchers considering the adequacy of Social Security benefits and overall retirement income will utilize replacement rates. Thus, it is of great practical importance to consider carefully what replacement rates are designed to measure, and that these measurements be more clearly communicated to the public.

## **2. Conceptual issues**

In the economics profession, the dominant mode of thinking about retirement planning is the so-called life cycle model, which originated with Modigliani and Brumberg (1954). The life cycle model argues that individuals, in seeking to maximize their total lifetime welfare (or "utility"), will tend to smooth their consumption from year to year, using borrowing and saving to compensate for changes in annual incomes. In the context of retirement planning, this implies that individuals will tend to desire a standard of living – meaning consumption, though not income – that is similar between work and retirement. A number of factors will generate deviations from this approximation, including liquidity constraints, uncertainty regarding future income, and random shocks (Bodie et al, 2007). Nevertheless, Attanasio and his co-authors (1995 and 1999), using U.K. and U.S. data, conclude that despite changing incomes and family sizes, steady consumption from year to year is a reasonable approximation of individual standards of living.

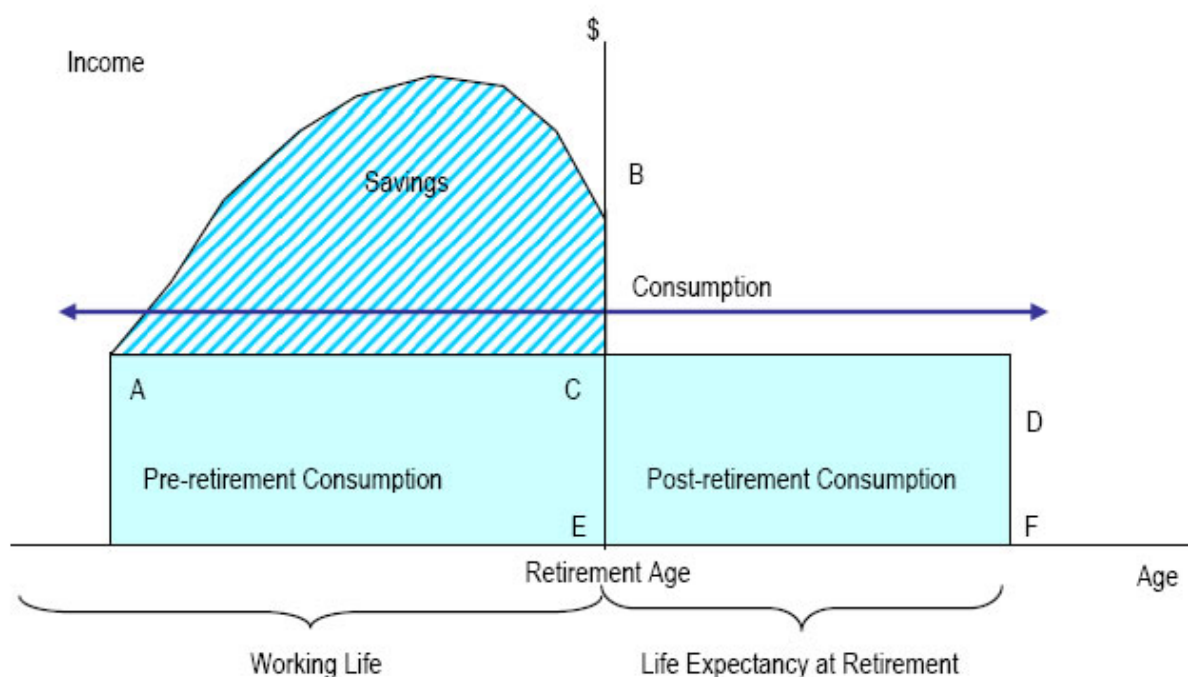
For individuals and financial advisors planning for retirement, optimizing consumption from year to year poses challenges in terms both of data gathering and calculations. For these reasons, they often rely upon rules of thumb built upon "replacement rates," which represent retirement income as a percentage of pre-retirement earnings. Financial advisors tend to recommend a replacement rate of around 70 percent of pre-retirement earnings, though different sources propose different targets.

Replacement rates need not be inconsistent with a life cycle approach. For instance, an individual's earnings immediately prior to retirement, net of taxes, retirement saving, and work-related expenses, is

roughly their consumption. Similarly, an individual's career-average earnings, adjusted for inflation, approximate the potential working-age standard of living that retirees are seeking to replicate through Social Security benefits and their own retirement saving. Thus, an appropriately-designed replacement rate should provide a serviceable rule-of-thumb approximation for what a more computationally-intensive life cycle analysis would recommend.

The life cycle pattern of spending and saving is sometimes illustrated using a graphic similar to Figure 1, generated by the New Zealand Treasury (Scobie and Gibson, 2003), in which earned income rises, falls and eventually ceases, but individuals seek to maintain a steady standard of living by building and drawing down savings. Similar depictions can be found in Munnell, Webb and Hou (2014), McGill et al. (2010) Mitchell and Moore (1997) and other sources.

**Figure 1.**



While a simple replacement rate measure can't fully represent the more complex process of retirement planning, comparing retirement benefits to the *inflation-adjusted* average of pre-retirement earning appears to be a reasonable shorthand. For instance, Scholz and Seshadri (2009) translate the results of a life cycle analysis into replacement rate terms, finding that the median household should aim for a replacement of 68 percent of their lifetime earnings, adjusted for inflation. Due to the complexities both of

individual earnings histories and the Social Security benefit formula, it is important to measure replacement rates using real-world individuals drawn from administrative data. However, some of the conceptual issues can be outlined using OACT's medium scaled earner, a stylized work history that OACT and (until 2014) the Social Security Trustees used to measure and illustrate replacement rates. In this case, the medium scaled earner's wage history was developed using assumptions from the *2013 Trustees Report* and who is assumed to retire in 2014 at age 65.

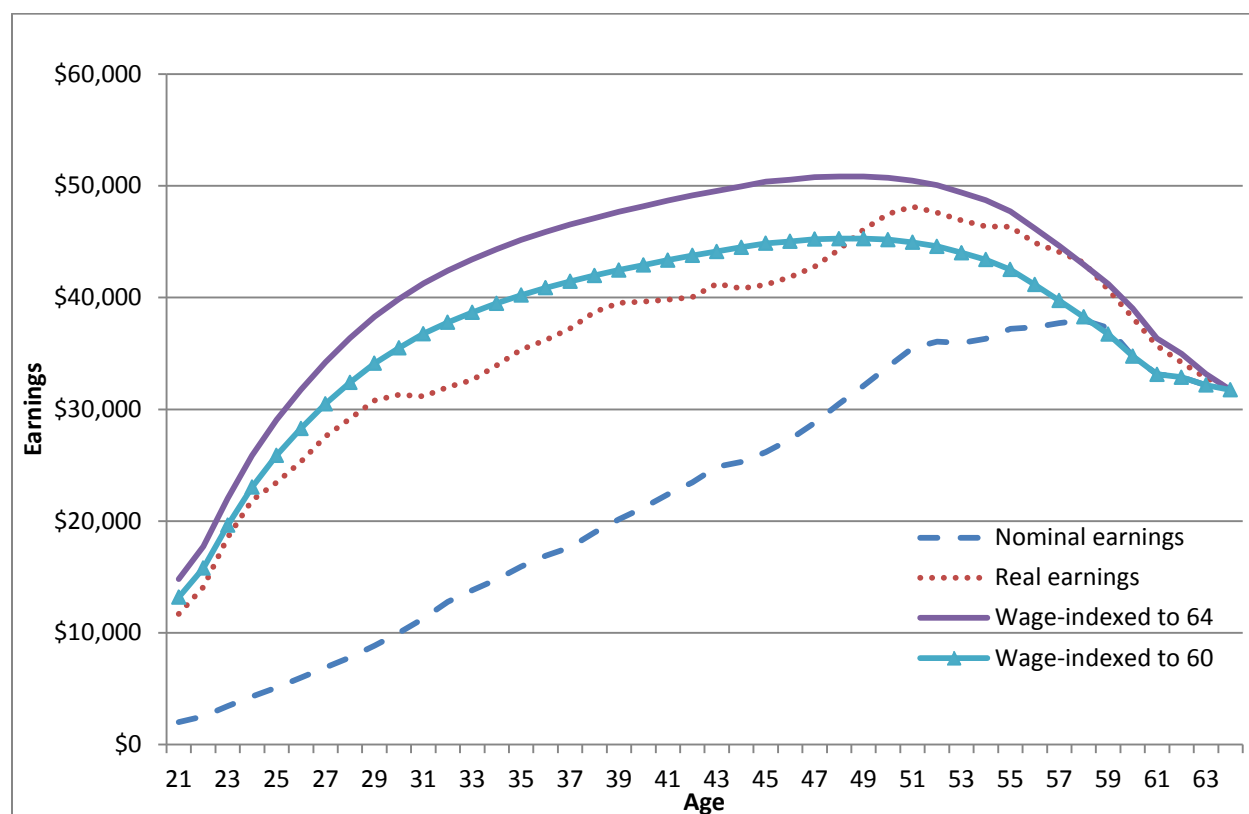
Figure 2 shows four sets of earnings:

- First, earnings in nominal dollars. These are the figures the employee would see on his or her paycheck and the nominal earnings that would be posted on the worker's earnings record and Social Security benefit statements;
- Second, earnings adjusted for inflation, calculated using the Bureau of Labor Statistics' consumer price index for urban wage and clerical workers (CPI-W), the price index used in calculating annual Social Security Cost of Living Adjustments.
- Third, earnings indexed to economy wide wage growth through age 60. This process multiplies nominal earnings at a given age by the ratio of the Average Wage Index (AWI) at age 60 by the AWI in the year the earnings occur. The average of the highest 35 years of wage-indexed earnings is termed the Average Indexed Monthly Earnings (AIME),<sup>2</sup> and the earner's Social Security benefit is a progressive replacement of the AIME.
- Fourth, earnings indexed to the AWI through age 64, the year prior to the claiming of retirement benefits.
- In addition to the earnings measures shown in Figure 2, the earnings immediately preceding retirement, such as earnings in the final year prior to benefit claiming (age 64) or an average of earnings in the several years prior to retirement, are also frequently used in calculating replacement rates.

Each of these measures of pre-retirement earnings can be used to calculate replacement rates, justified using varying rationales and producing varying results. The earnings histories shown in Figure 2 are displayed for the worker's full career. In practice, replacement rates relative to lifetime earnings are generally calculated using the average of the highest 35 years from the series. The Social Security replacement rate figures advocated by Goss et al (2014) are based upon average earnings wage indexed to the year prior to benefit claiming (the topmost line in Figure 2). This wage series produces the highest

average measured pre-retirement earnings and thus the lowest measured replacement rates for Social Security retirement benefits.

**Figure 2: Comparison of the Estimated Nominal Earnings Level to the Indexed Earnings Level at Various Ages for Social Security’s Hypothetical Medium Worker born in 1949**



Source: Calculated by the authors using the specifications presented in Michael Clingman and Kyle Burkhalter, “Scaled Factors for Hypothetical Earnings Examples under the 2012 Trustees Report Assumptions,” *Actuarial Note* (Social Security Administration, 2012), no. 2012.3, found on August 9, 2013 at: <http://www.socialsecurity.gov/OACT/NOTES/ran3/index.html>; the real wage was calculated using the consumer price index for all urban wage and clerical workers at: <http://www.ssa.gov/oact/STATS/cpiw.html>

Yet, in the context of a life cycle approach in which individuals seek to smooth consumption between work and retirement, it is unclear what the wage-indexed measure of pre-retirement earnings represents. When a worker enters a grocery store to buy food, an auto shop to purchase tires for the car, or a department store to buy clothes, he or she does not spend wage-indexed dollars but real dollars. When economists compare the dollars that consumers spend over time they index them by changes in a consumer price index to put them on a constant purchasing power basis. It is a consumer’s purchasing power that defines their achievable standard of living. Thus, measuring replacement rates relative to wage-indexed earnings understates the ability of Social Security benefits to replace pre-retirement

consumption just as measuring replacement rates relative to nominal pre-retirement earnings would overstate the adequacy of Social Security benefits.

The use of final earnings or real average earnings in a replacement rate calculation is at least roughly consistent with a life cycle approach in which individuals judge their post-retirement standard of living with reference to their standard of living prior to retirement. The use of a wage-indexed replacement rate denominator, by contrast, is more reminiscent of a so-called “relative income hypothesis,” which preceded the life cycle model in the economics literature and has been largely superseded by it. The relative income hypothesis argues that individuals gauge their consumption to that of those around them, in the sense of “Keeping up with the Joneses.” (Duesenberry, 1949) As Goss et al. (2014, p. 3) state, replacement rates based on wage-indexed earnings “effectively equates earnings levels over time relative to the standard of living of workers of the day. As the standard of living rises over time, using wage indexed career-average earnings brings the average up to date to the standard of living at the end of career.” This reference to “*the* standard of living” is useful from a retirement planning perspective only if we assume that the *individual’s* standard of living – meaning his or her consumption – rises in line with the national standard of living, as represented by growth of average wages. There is very little in the standard life cycle approach to retirement planning that would lead one to conclude that individual consumption over the life cycle rises in line with the average earnings of all workers of all ages in the economy. Goss et al. (2014) present no theory, data or research that would lead one to conclude otherwise.

We are not the first to highlight conceptual issues with regard to replacement rates. For instance, Boskin and Shoven (1987, p. 115) note that wage indexed averages “greatly overstate the average absolute real level of earnings; [wage indexed] career average replacement rates have a relative income component embedded in them.” Steuerle, Spiro and Carasso (2000, p. 1) highlight the different denominators that can be used in replacement rate calculations, as well as the effect of wage-indexing prior earnings. Wage indexing, they say,

reflect[s] growth that goes beyond improvements in the cost of living—they reflect improvements in the standard of living. However, many retirees may be satisfied just to maintain their ability to purchase: They want the same purchasing power they’ve had all along. If this is the case, replacement rates could be derived from individual wages adjusted for inflation instead of wage growth. Since prices usually rise more slowly than wages, this would result in lower past wages and higher replacement rates.

Rettenmaier and Saving (2006) raise similar points, arguing that replacement rates relative to inflation-adjusted pre-retirement earnings are a more appropriate measure.

Likely in response to the recent discussion of replacement rate methodology, the Congressional Budget Office (2014) in its most recent analysis of the Social Security program began publishing replacement rates relative both to wage-indexed earnings, its previous practice, and to earnings adjusted for inflation. The CBO projects, for the average individual born in the 1980s, a Social Security replacement of 48 percent of wage-indexed earnings and 64 percent of earnings indexed to inflation.<sup>3</sup> With regard to the methodological debate, the CBO stated that “Indexing earnings to prices better captures the real amount of resources available to a worker over his or her lifetime, whereas indexing earnings to wages may overstate those amounts.”

McDonald and Moore (2011), a survey of replacement rate methodology published by the Society of Actuaries, characterize basing replacement rates on wage-indexed earnings as an “alternative approach” that is not the most appropriate for measuring retirement income adequacy:

Another aspect of defining the denominator is how to account for the fact that it will be measured at a different time than the numerator (the former is before retirement and the latter is after retirement). Most studies express the numerator and denominator in constant dollars using the consumer price index. An alternative method is to use wage indexation, which is the approach traditionally taken by the U.S. Social Security Administration (SSA, 2004). Using a consumer price index compares an individual’s retirement income to the absolute level of pre-retirement consumption he/she actually experienced, while using a wage index also incorporates a comparison to the consumption of currently working generations. For most purposes, replacement rates are used to evaluate whether retirees’ own consumption falls after retirement, rather than to make intergenerational comparisons, and for this reason, some form of price indexation is appropriate (McDonald and Moore, 2011, p. 10).

In the case of the medium scaled earner, this intergenerational comparison is true not merely conceptually but quantitatively. As is detailed in Section 2, the earnings of the medium earner are calibrated so that that average of the highest 35 years of wage-indexed earnings closely approximates the AWI in the year in which the medium earner claims benefits. Thus, despite Goss et al.’s (2014) statement that their figures “help answer the question ‘how much of my pre-retirement income will my retirement income replace?,’” it is more accurate to state that the replacement rate derived from wage-indexed earnings for the medium earner compares benefits for a newly-retired worker today to the average wages of workers in the

economy today. As is discussed in Section 5, this measure is not uncommon in other countries but differs fundamentally from a replacement rate as conventionally understood in the United States as we discuss in more depth later.

Wage-indexing of pre-retirement earnings does not merely produce a general distortion of the purchasing power of individuals' pre-retirement earnings. It can also introduce perceived differences from cohort-to-cohort generated either by the changing age-earnings composition of the workforce or by changes in the rate of wage growth relative to inflation or interest rates. Differences in the size of relative age cohorts of workers can introduce changes in the growth of average wages that have no material bearing on the well-being of any particular cohort of workers. For instance, the influx of a relatively large cohort of younger, lower-paid workers could reduce the growth of average wages, even if no individual workers are earning less than their age-earnings profile would predict. These effects will filter through to the average wage series used to index pre-retirement earnings and calculate replacement rates. While much of this effect may be offset by the fact that Social Security benefits are themselves calculated based on the wage-indexed average of pre-retirement earnings, others forms of retirement income are not. For instance, Butrica, Smith and Iams (2012), using SSA's MINT model, measure total retirement income replacement rates for different sets of birth cohorts relative both to the wage-indexed and the price-indexed average of career earnings. For the so-called Depression Babies (born 1926-1935) the median household's replacement rate as of age 67 is estimated at 109 percent of CPI-indexed earnings and 95 percent of wage-indexed earnings (a ratio of 1.15). For the later GenX cohort (born 1966-1975) the projected replacement rate also is 110 percent of CPI-indexed earnings but only 84 percent of wage-indexed earnings (a ratio of 1.31). This fall in wage-indexed replacement rates is interpreted by some (including the authors of the study) as indicative of declining retirement preparedness, despite the fact that the more substantively important CPI-indexed replacement rates are holding steady.

To summarize, at a quantitative level, the problem with OACT's replacement rate figures is that they reference financial advisors' figures that are calculated relative to final earnings while their replacement rates are calculated relative to wage-indexed average earnings. At the conceptual level, the problem is that their approach is applying a relative income model while implying that results are consistent with a life cycle model. Resolving both issues is important to supplying policymakers and individuals preparing for retirement with meaningful and understandable information regarding the adequacy of Social Security retirement benefits.

### 3. Development of current SSA OACT replacement rate calculations

One explanation for OACT's approach to calculating replacement rates is that it is simply applying an outmoded economic model to its calculation of replacement rates. Goss et al (2014), for instance, makes little reference to a life cycle approach or consumption smoothing while explicitly endorsing a relative income outlook. Alternately, the goal might be, as in some European countries, to compare the well-being of retirees to that of contemporaneous workers.

But a better explanation of the measurement of replacement rates using a wage-indexed denominator may be more prosaic. In good part, the approximately 40 percent replacement rate for a worker's whose average career earnings equal the average wage index published by SSA is a matter of historical accident.

Prior to 2002, OACT measured replacement rates as financial advisors do, relative to earnings immediately preceding retirement. However, it did so using stylized earnings patterns that did not resemble those of typical workers, (Munnell and Soto 2005). In response to these concerns, OACT generated hypothetical workers with a more realistic lifetime age-earnings profiles. However, SSA altered its replacement rate methodology and calibrated the earnings of its hypothetical workers with the explicit intent of maintaining the average 40 percent replacement rate that was calculated using the outmoded pre-2002 methodology. The subsequent arguments and calculations, regardless of their merit, may be seen as *ex post* defenses of a replacement rate methodology that came about for different reasons.

Through the year 2000, OACT calculated replacement rates by comparing benefits at age 65 – then the normal retirement age – “as a percentage of earnings in the 12-month period preceding retirement (Social Security Trustees, 2009, p. 182).” These replacement rates were calculated for a stylized medium “steady earner” who worked from age 22 through 64 and whose annual salary equaled the economy-wide average wage each year of the career. For this steady earner, the Social Security replacement rate as measured by Social Security's actuaries was around 40 percent. That 40 percent figure is worth recalling, as it is the one constant in OACT's replacement rate calculations.

However, SSA's steady earners “bore little relation to reality,” say Munnell and Soto (2005, p. 10). They note:

Young workers, for example, typically earn less than middle - age or older workers, reflecting their modest levels of job tenure and skill. As workers age, their earnings tend to rise in line with

their increased experience and ability. At around age 50, earnings tend to decline as skills erode or workers reduce their hours.

OACT itself noted that “the steady earnings pattern is not realistic for computing benefit levels under some proposals,” in particular proposals that incorporated defined contribution personal retirement accounts. (Nichols et al., 2001, p. 12)

To address these issues, in 2001 OACT used administrative earnings data to create “scaled earners” with more realistic age-earnings profiles. The Trustees adopted these scaled earners for illustrating replacement rates beginning in their 2002 report, stating “Scaled-earnings cases are now generally being used instead of steady-earnings cases because they more accurately illustrate the differences in benefit levels under the wide variety of reform proposals considered in recent years” (Social Security Trustees, 2002, p. 178).

But these scaled earners introduced a problem of their own: replacement rates relative to final earnings would rise from the approximately 40 percent calculated for steady earners to around 56 percent. The size and direction of such a change obviously would have created significant controversy for the agency, in terms both of altering statistics it had generated for decades and of the broader policy debate over the appropriate level of Social Security benefits.

Such a controversy was prevented by changes in SSA’s methods for calculating replacement rates and calibrations of the earnings of its stylized workers that were designed to and resulted in replacement rates for the updated scaled workers replicating those measured for the now-outdated steady earners. This process followed several steps, each of which served to reduce measured replacement rates by several percentage points until the goal of maintaining comparability with pre-2002 figures was achieved.

The first step altered the denominator of the replacement rates calculation from the final year of earnings to the average of the highest 35 years of career earnings, with each year of earnings indexed to economy-wide wage growth through the year prior to benefit claiming. For the medium scaled earner, average earnings wage-indexed to age 64 are about 33 percent higher than final earnings. For real-world individuals drawn from the SSA’s Benefits and Earnings Public Use File, average wage-indexed earnings are 15 to 20 percent higher than final earnings across all but the top 20 percent of the earnings distribution.<sup>4</sup> In either case, the use of average earnings wage-indexed to age 64 produces significantly lower measured replacement rates than final earnings for most retirees.

Goss et al (2014, p. 2) state that the use of wage-indexed lifetime earnings is “entirely consistent with the formulas for computing benefit levels under current law based on career average earnings levels.” Not entirely: the Social Security benefit formula wage indexes earnings through age 60 to calculate Average Indexed Monthly Earnings (AIME). The SSA replacement rates calculation for stylized workers adds an additional five years of wage indexing to the denominator for retirements at the normal retirement age. Since fewer years of wage indexing lowers the average value, replacement rates calculated relative to the AIME would be higher than those calculated relative to average earnings indexed to age 65.

Second, the annual earnings of the scaled earners were calibrated to reproduce the benefits received by the previous steady earners. As the actuarial note explaining the new methodology stated:

To maintain comparability with the hypothetical steady worker cases that have been used in the past, earnings for the *scaled* workers were adjusted to produce equivalent Social Security retirement benefit levels. For each earnings level, (low, medium, high), year of birth, and family grouping, the earnings of the worker with the *scaled* earnings pattern is multiplied by that constant factor which produces the same AIME (and, consequently, the same Social Security retirement benefit) as the corresponding worker with steady earnings (Nichols et al, 2001, p. 3).

In other words, while the *shape* of the scaled earners’ age-earnings profile was at least roughly derived from administrative data, the *level* of earnings is calibrated to reproduce the benefits of the previous steady worker examples.<sup>5</sup>

The factor values used to calibrate the scaled earners’ earnings to match the benefits of the previous hypothetical steady earners have not been disclosed. Clingman and Nichols (2004, p.2) note that the Primary Insurance Amount (PIA) of the medium scaled worker was at approximately the 59<sup>th</sup> percentile of PIAs for actual individuals claiming benefits in 2003. This figure is obviously above the median, implying that the hypothetical earner would have higher lifetime earnings and, due to Social Security’s progressive benefit structure, a lower replacement rate than a beneficiary with median earnings. Yet this worker is labeled a “medium earner.”

Moreover, the PIA is the benefit to which an individual is entitled based upon his or her own earnings. But as of 2012, 19 percent of retired workers also received a supplementary spousal or widow(ers) benefit (Social Security Administration 2012, Table 5G.3 and Table 5.A1). The vast majority of these dually-entitled beneficiaries are women: as 2012, 37 percent of female retired worker beneficiaries also were entitled to an auxiliary benefit (Social Security Administration 2012, Table 5G.2). For the average dually-

entitled retired worker beneficiary in 2012, the total monthly benefit of \$1,128 was 78 percent higher than the individual's own retired worker benefit of \$634 (Social Security Administration 2012, Table 5G.2). For all retired worker beneficiaries in 2012, the inclusion of auxiliary benefits raises total monthly benefits by approximately 8 percent.

These issues become more important when considering replacement rates by gender. Clingman and Nichols (2004, p.2) note that the PIA of the medium scaled earner lies at the 83<sup>rd</sup> percentile of PIAs for all female retired worker beneficiaries claiming in 2003 and the 78<sup>th</sup> percentile of non-dually entitled females. Once spouse and widow benefits are included, it is likely that medium scaled earner has benefits that are higher than – and a replacement rate lower than – roughly nine of ten women. On the other hand, the same actuarial memo notes that the medium scaled earner has a PIA higher than 37 percent of male retired workers claiming benefits in 2004. For males, who rarely receive auxiliary benefits, PIAs are a reasonable representation of benefit levels. A larger number of male retired workers appear to have PIAs that are closer to the scaled “high earner.”

Similar issues arise when earnings data are examined. Au et al (2004, p. 20), using Health and Retirement Study data matched to Social Security administrative earnings records, find that “Even after restricting the HRS sample to respondents with substantial work histories, the medium scaled profile is 28 percent above HRS actual median earnings, implying a lifetime difference of more than \$150,000 (\$1992)” Since the Social Security benefit formula pays a progressive replacement of pre-retirement earnings, they state (pp. 20-21) “One would also anticipate that benefit replacement rates for hypothetical profiles would also be much lower than actual replacement rates for actual workers.” Mitchell and Phillips (2006, p.43), using the same data, find replacement rates (measured relative to the AIME) for the scaled medium earner are roughly 3 percentage points lower than those calculated for fully-insured individuals earning median wages drawn from Social Security earnings records. From a distributional point of view, it simply is not clear what the medium scaled earner represents.

It is neither inaccurate nor misleading to describe the process by which OACT developed its current procedure for calculating replacement rates as formulating a question to which “40 percent” is the answer. If the replacement rate figures currently published by OACT correctly describe the adequacy of current law Social Security benefits they do so purely by chance, as they derive directly from pre-2002 methods which, in Munnell and Soto's (2005) terms, “bore little relation to reality” and were for this reason abandoned.

## 4. Moving from Concept to Measurement

In this section we analyze replacement rates for new beneficiaries in 2004 using the Benefits and Earnings Public-Use File, 2004, released by the Social Security Administration in 2005. These at times are contrasted with figures recently calculated by SSA OACT for new beneficiaries in 2011. These calculations show that replacement rates are highly dependent upon what is being measured, who it is being measured for, and when the measurement takes place.

Goss et al (2014) analyze different approaches to measuring Social Security replacement rates using new claimants of retirement benefits during 2011. The intent of their study is to show that replacement rates measured using financial advisors' "final earnings" denominator are consistent with the method using career-average earnings indexed to the year prior to benefit claiming. In addition, Goss et al also measure replacement rates relative inflation-adjusted career earnings. They find that a median replacement rate of 38.8 percent of wage-indexed lifetime earnings and 44.4 percent of inflation-indexed career earnings. At the 25<sup>th</sup> percentile, Social Security benefits replaced 49.3 percent of average of the highest-35 years of wage-indexed earnings and 56.3 percent of inflation-indexed earnings. When replacement rates were calculated relative to the "last five years of non-zero earnings" (actually earnings from years two through six prior to retirement, indexed either to wages or inflation), the results were more consistent with each other and closely comparable to the hypothetical earner at the median given comparable retirement ages (Goss et al, p. 5). This latter result is likely specific to the time period in which Goss et al analyze replacement rates, as in the economic slowdown leading up to 2011 wages and prices grew at about the same rate. In a more typical period in which wages had grown more rapidly than prices, such as the late 1990s, these results would not have been so consistent with each other, nor would they have both been comparable to the replacement rates for the hypothetical medium earner calculated using career-average wage-indexed earnings.

As discussed in Section 3, Goss et al's analysis (2014) does not include all retirees receiving Social Security nor does it include all benefits paid to those retirees. They limit their analysis to individuals who qualify for benefits based upon their own earnings records and count only benefits paid based upon the individual's own earning record. Thus, retirees who receive spouse and widow benefits based entirely upon their spouse's earnings record are not included. As of 2012 there were roughly 2.2 million individuals receiving retirement benefits based only on a spouse's earnings and 3.9 million receiving widow benefits in a similar fashion (Social Security Administration 2012, Table 5G.3).. Similarly, for individuals who do qualify for retirement benefits based upon their own earnings, Goss et al (2014)

include only the benefits payable to retirees based upon their own earnings, excluding any auxiliary benefits received. Thus, dually-entitled beneficiaries who receive a supplemental spouse or widow benefit are credited only with the benefit paid off their own earnings record.

For women in particular this choice understates benefits received in retirement. For female retirees of all ages in 2012, excluding auxiliary benefits paid to dually-entitled, spouse-only or widow-only beneficiaries reduces total benefits by approximately one-third. (Authors' calculations from Social Security Administration 2012, Tables 5G.3 and 5F.1.) For new claimants the reduction in benefits counted toward replacement rates would be smaller, as women increasingly claim widow benefits as they age. Nevertheless, at all ages this is a meaningful difference. Similarly, Goss et al.'s (2014) methodology reduces the number of female beneficiaries whose replacement rates are calculated by around 25 percent. Since the female beneficiaries excluded are predominantly lower-earning individuals, this will tend to lower the replacement rates measured under their methodology. Some of these individuals may have made substantial contributions to Social Security, as an individual can contribute for up to 10 years without qualifying for benefits, so excluding them is not entirely a matter of eliminating infinite replacement rates.

A number of studies, including Butrica, Smith and Iams (2012) and Biggs and Springstead (2008), examine a fuller range of Social Security benefits and beneficiaries. These studies use SSA's Modeling Income in the Near Term (MINT) microsimulation model to analyze retirement incomes. Butrica, Smith and Iams (2012) include all retirees, including those who transferred from the Disability Insurance program, while Biggs and Springstead (2008) include all non-disabled retirees. Relative to the considering only "retired worker" beneficiaries and solely the benefits attributable to their own work histories, including all retirees and all benefits paid to them would increase replacement rates (measured relative to the AIME) for the median earner by roughly 7 percentage points, with larger increases for lower earners and smaller increases for high earners, who are most likely to qualify for and to receive benefits solely on their own earnings record. (Biggs and Springstead, 2008). It seems appropriate to include all retirees and all benefits paid to them in analyzing the adequacy of retirement benefits provided by Social Security. Individuals planning for retirement do not make narrow distinctions between the types of benefits Social Security pays to retirees. Someone saving for retirement might count on their spouse being able to collect widow benefits once they are deceased; likewise, a non-working spouse might consider the availability of spousal benefit as part of their choice to remain outside the paid workforce.

Ideally, replacement rates would be calculated on a household (or “shared”) basis, as in Butrica, Smith and Iams (2012) and Biggs and Springstead (2008).<sup>6</sup> If spouses share earnings and benefits, then the replacement rate for the household is more economically meaningful than the replacement rates paid to either spouse alone. Moreover, calculating replacement rates on a shared basis eliminates the incidence of infinite replacement, which can occur when replacement rates are calculated at the individual level. Unfortunately, neither the administrative data used by Goss et al. (2014) nor the data we employ allow for the linking of spousal earnings and benefits.

The administrative data that Goss et al. (2014) used in their replacement rate analysis of Social Security claimants in 2011 have not been released by the Social Security Administration for public use. Instead, we use a sample of beneficiaries and their earnings records from the Benefits and Earnings Public-Use File, 2004, released by the Social Security Administration in 2005. This file contains information about beneficiaries of the OASDI program from Social Security’s Master Beneficiary Record (MBR) file. In December 2004, the MBR included records for roughly 47 million OASDI beneficiaries. Data in the Benefits and Earnings Public Use File are an extract from the MBR consisting of a 1 percent random, representative sample of beneficiaries in December 2004, resulting in a sample of approximately 470,000 records.<sup>7</sup>

One theme of this article is that different replacement rates reported in different studies often result from the different ways the concept is measured. But changing economic conditions also may play a role. Relative to earlier cohorts of beneficiaries, those claiming in 2011 exhibited higher relative employment and earnings in the year immediately preceding retirement. At the same time, this took place in an economic environment in which earnings for the workforce as a whole grew unusually slowly. Particularly for replacement rates based on the final 5 years of earnings, these factors could be important: higher labor force participation and wages in the year preceding benefit claiming would increase final earnings. Yet because the marginal return paid to near-retirees is extremely low, these additional earnings are unlikely to have led to significant extra benefits in retirement (Reznik, Weaver and Biggs, 2009). These factors would tend to reduce final-earnings replacement rates relative to other cohorts of beneficiaries. Slower growth of the AWI in the recession years preceding 2011 would have only a limited effect on benefits, because wages in the AIME are indexed only through age 60. However, slower wage growth in these years could reduce the average of pre-retirement earnings, when they are wage-indexed through the year prior to benefit claiming. This would tend to increase replacement rates calculated for this cohort of beneficiaries. While the overall effects are ambiguous, this reinforces the point that we should not expect that replacement rates for real-world individuals be stable from year to year.

Like Goss et al., we restrict our analysis to individuals who qualified for a retirement benefit based on their own earnings record, leaving a sample of approximately 280,000 cases.<sup>8</sup> Thus, this sample pool does not count spouse-only or widow-only retirees, nor does it include the formerly disabled. We further limit the analysis to those born in 1931 and after to ensure that all earnings records were complete and decipherable for the required calculations.<sup>9</sup> This reduces the analysis file to 149,000 individuals receiving retired worker benefits at the end of 2004.

The retirees are split by AIME into ten equal groups (or deciles), with AIME groupings shown in Exhibit 2.<sup>10</sup> Exhibit 2 also shows the separate distributions of beneficiaries for those who were singly or dually-entitled to benefits. The singly-entitled receive benefits entirely upon the basis of their own lifetime earnings record while dually-entitled individuals also receive a supplemental spouse's or widow's benefit, almost always tied to their spouse's earnings record.

**Exhibit 2: Social Security Beneficiaries at the End of 2004 with Their AIME Levels at Retirement Wage-Indexed to 2004 Levels and the Relative Distribution by Single or Dual Entitlements**

AIME decile	AIME range	Single entitlements	Dual entitlements
1	Up to \$637	4.79%	37.67%
2	\$638 to \$1,048	6.28	29.78
3	\$1,049 to \$1,512	8.30	19.03
4	\$1,513 to \$2,019	10.61	6.75
5	\$2,020 to \$2,561	11.25	3.37
6	\$2,562 to \$3,152	11.50	2.05
7	\$3,153 to \$3,760	11.72	0.86
8	\$3,761 to \$4,405	11.83	0.28
9	\$4,406 to \$5,151	11.85	0.18
10	\$5,152 or more	11.87	0.04
Observations		125,419	23,595

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Source: Authors' tabulations of the Social Security Administration's *Benefits and Earnings Public-Use Files, 2004* found at: <http://www.ssa.gov/policy/docs/microdata/earn/>.

Exhibit 2 makes clear that individuals with dual entitlements reside predominantly in the lowest own lifetime earnings deciles, while those with single entitlements are predominantly higher earners. The small number of dually-entitled retirees in the upper portion of the lifetime earnings distribution are almost certainly widows or widowers. With a high AIME in their own right, these retirees could not qualify for a spousal benefit while their spouses were alive.

Exhibit 3 breaks out the retirees receiving benefits at the end of 2004 by single or dual entitlement and then by whether beneficiaries had careers of more or less than 35 years of covered earnings. It takes 35 years of covered earnings to have a full earnings record for averaging purposes. Those with fewer years have their earnings records filled in with zeros in calculating their 35-year-career average earnings. From the point of view of Social Security's progressive benefit formula, such an individual is identical to one who worked 35 years at a lower annual wage.

**Exhibit 3: Percentages of People Receiving Retired Worker Benefits at the End of 2004 by AIME Deciles Single and Dual Entitlements and Years of Covered Earnings**

AIME decile	Singly entitled		Dually entitled		Total
	Less than 35 years	35+ years	Less than 35 years	35+ years	
1	39.1%	1.2%	58.5%	1.2%	100.0%
2	45.0%	7.9%	41.1%	6.0%	100.0%
3	45.5%	24.3%	21.2%	8.9%	100.0%
4	40.6%	48.7%	5.3%	5.4%	100.0%
5	27.8%	66.9%	1.6%	3.7%	100.0%
6	16.5%	80.3%	0.7%	2.6%	100.0%
7	9.8%	88.8%	0.2%	1.2%	100.0%
8	4.7%	94.9%	0.0%	0.4%	100.0%
9	2.4%	97.3%	0.0%	0.2%	100.0%
10	1.4%	98.5%	0.0%	0.1%	100.0%
Total	23.3%	60.9%	12.9%	3.0%	100.0%

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Source: Authors' tabulations of the Social Security Administration's *Benefits and Earnings Public-Use Files, 2004* found at: <http://www.ssa.gov/policy/docs/microdata/earn/>.

From Exhibit 3, it is clear that time in the workforce is a strong determinant of lifetime earnings. Retired workers at the lower end of the career-average earnings spectrum overwhelmingly have less than full careers: more than 97 percent of the bottom decile, 86 percent of the second decile and two-thirds of the third decile had less than 35 years of covered earnings. Among singly-entitled beneficiaries, 56 percent of those with less than 35 years of covered earnings were in the bottom three AIME deciles; for dually-entitled beneficiaries with less than a full career, 94 percent were in the bottom three AIME deciles. While only 3 percent of the beneficiaries were dually-entitled with 35 or more years of their own covered earnings and only 4 percent of them were in the bottom decile, 50 percent fell into the second or third deciles of the AIME distribution.

The data do not permit us to calculate average work hours, but it is likely that many of the full-career workers with low AIMEs and dual entitlements were part-time workers over much of their careers. From the fourth decile and higher, the majority of beneficiaries had 35 or more years of covered earnings and, from the seventh decile and higher, it was over 90 percent.

These figures raise an important point, which is that replacement rates calculated at the individual level are most meaningful for retirees who have relatively full working careers. The replacement rate is designed to measure whether a retiree is able to replicate his or her pre-retirement standard of living. But retirees who have relatively few years of earnings or who worked part-time for much of their career are unlikely to have provided for themselves solely based upon their earnings. A spouse's earnings, government benefits, or other income sources likely play that role, but this information is not collected by the SSA and hence not available for analysis.

We calculate Social Security replacement rates for retirees receiving retired worker benefits at the end of 2004 using five different definitions of preretirement earnings. The results include all retired-worker beneficiaries with 10 or more years of covered earnings and include all benefits received by these beneficiaries. The results are shown in Exhibit 4. The first column reports replacement rates calculated relative to the inflation-indexed average of own non-zero earnings in the five years before benefits were claimed. The second column uses the same years of own earnings as the first column, except these earnings are wage-indexed to the AWI in the year prior to benefits claiming. The third column calculates replacement rates relative to the average of the own highest 35 years of CPI-W indexed earnings. The fourth column measures the Average Indexed Monthly Earnings used to calculate the PIA for beneficiaries, where own wages are indexed to the AWI in the year the worker turns 60.<sup>11</sup> The right-hand column is the average of the highest 35 years of own wage-indexed earnings, using the average wage index in the last year before benefits are claimed. This latter measure corresponds to the average earnings used by Social Security actuaries to estimate earnings replacement rates in Goss et al. and in pre-2014 Social Security Trustees Reports.

**Exhibit 4: Median Estimated Social Security Replacement Rates for Social Security Beneficiaries Based on Actual Benefits to Representative Sample of Beneficiaries at the End of 2004**

AIME deciles	Average of last 2-6 years positive earnings		Average of highest-35 years of earnings indexed to		
	CPI-indexed	AWI-indexed	Year prior to claiming, by CPI-W	Age-60 AWI	Year prior to claiming, by AWI
1	73.8	67.4	125.9	116.3	112.0
2	58.6	54.1	83.6	78.3	74.4
3	49.5	46.2	62.1	57.4	55.5
4	46.1	43.4	52.1	48.1	46.5
5	44.5	41.8	47.1	44.1	42.0
6	42.8	40.4	43.2	40.4	38.5
7	41.8	39.4	40.4	37.6	35.9
8	37.3	35.4	37.8	34.9	33.5
9	30.9	29.1	34.2	31.7	30.3
10	27.3	25.5	33.3	33.8	30.1
Median	43.7	41.1	45.2	42.3	40.3

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Source: Authors' tabulations of the Social Security Administration's *Benefits and Earnings Public-Use Files, 2004* found at: <http://www.ssa.gov/policy/docs/microdata/earn/>.

The results in Exhibit 4 indicate that, as expected, replacement rates calculated using own earnings indexed to the AWI in the last year before retirement tend to be lower than measures that inflation-index earnings or than earnings wage indexed only to age 60, as the Social Security benefit formula does. For the median earner, replacement rates calculated using inflation-indexed measures of preretirement earnings are only about 2.5 percentage points higher than those developed using earnings wage-indexed to the year prior to retirement, but the spread is considerably larger than the 0.5 percentage point difference that Goss et al. (2014) found. As noted earlier, this results because of the relatively low growth of the AWI in the years preceding 2011, the year in which Goss et al.'s sample claimed benefits. By contrast, we examine a sample of retirees of all ages as of 2004, meaning that many worked during an earlier period when real wage growth was more rapid between when workers turned age 60 and the year before they claimed their Social Security benefits.

The 45.2 percent median replacement rate developed using the average of the high-35 years of CPI-indexed earnings shown here corresponds closely with the 44.4 percent median reported by Goss et al. for the 2011 claimants. The replacement rate based on the highest 35 years of CPI-indexed earnings in Exhibit 4 is 12.2 percent (4.9 percentage points) higher than the replacement rate derived using the

average of the highest 35 years of wage-indexed earnings. The replacement rates based on the AIME used to calculate benefits roughly split the difference in the wage-indexed results derived using the method used by the Social Security actuaries to derive them and the price-indexed rates.

Exhibit 5 compares a variety of replacement rates based on the highest-35 years of either price-or wage-indexed for three different subsets of the beneficiaries included in Table 3. The first two columns of replacement rates in Exhibit 5 include all workers who receive benefits based solely upon their own earnings, and thus exclude the dually-entitled beneficiaries in the prior table. The middle two columns include all the beneficiaries in Exhibit 4 who had at least 35 years of covered earnings, even if dually-entitled. The right-hand two columns include only retirees who had at least 35 years of covered earnings and whose benefits were based entirely on their own earnings records, but their benefits and replacement rates were recalculated under the assumption that they had not claimed benefits until they reached normal retirement age. Normalizing benefit claiming at the normal retirement age is important because target replacement rates are generally higher for individuals who retire later and lower for those who retire early.<sup>12</sup> (McGill, et al. 2010, p. 233.)

In every instance, the replacement rates based on price-indexed earnings are higher across the AIME distribution than their counterparts based on AWI indexation. For the median singly-entitled worker, the replacement rate for price-indexed earnings is 11.8 percent (5.7 percentage points) higher than those based on the AWI indexation. For the median long-career worker the difference was 12.2 percent (4.9 percentage points) based on their actual retirement age. If these long-career workers had actually claimed benefits at their normal retirement age, the difference at the median would have been 12.2 percent (5.9 percentage points).

**Exhibit 5: Replacement Rates of Alternative Groups of Retired Worker Beneficiaries using Either the Highest-35 Years of Price- or Wage-Indexed Earnings as the Denominator**

AIME deciles	All singly entitled retired workers		All retired workers with 35 + years earnings		Singly entitled workers at NRA with 35+ years earnings	
	CPI indexed	AWI indexed	CPI indexed	AWI indexed	CPI indexed	AWI indexed
1	107.5	94.0	102.3	91.5	106.4	94.5
2	91.8	81.8	77.9	71.2	87.9	79.6
3	72.6	64.9	59.4	54.4	71.4	63.6
4	62.3	55.7	51.5	46.2	62.1	55.3
5	56.2	50.3	46.8	41.8	56.2	50.0
6	52.2	46.6	43.1	38.4	52.2	46.5
7	49.3	44.2	40.4	35.8	49.3	44.1
8	46.3	41.5	37.8	33.4	46.3	41.5
9	42.0	37.9	34.1	30.3	42.1	37.9
10	37.4	34.0	33.3	30.1	37.4	34.0
Median	54.2	48.5	45.0	40.1	54.2	48.3

Source: Authors' tabulations of the Social Security Administration's *Benefits and Earnings Public-Use Files, 2004* found at: <http://www.ssa.gov/policy/docs/microdata/earn/>.

The two right-hand columns in Exhibit 5 provide a useful comparison to the hypothetical earners who, until 2014, were used to calculate replacement rates for the annual Social Security Trustees Reports. Exhibit 5 figures suggest that the typical worker who works a reasonably full career, claims at the normal retirement age, and receives a benefit based upon his or her own earnings receives a considerably higher replacement rate by either a wage- or price-indexed measure of career average earnings than the medium scaled earner example suggests. The median replacement rate received by these long-career employees is 48.3 percent of average wage-indexed earnings, versus the roughly 40 percent rate that is commonly understood to be received by the scaled medium earner. Relative to the inflation-adjusted average of lifetime earnings, a more economically plausible measure in the life cycle context, the typical replacement rate for a long-career employee receiving benefits based on his or her own earners and claiming at the full retirement age is 54.2 percent.

As noted above, replacement rates are a short-hand measure designed to help individuals planning for retirement to save sufficiently to provide for a smooth standard of living across their life span. No replacement rate measure can perfectly capture all of the detail of a full life cycle analysis and thus none

of the measures presented here can be described as “right.” But the 40 percent replacement rate figures that were until recently presented in the Social Security Trustees Reports are on one extreme of a range of plausible values, have significant analytical weaknesses in how they model earnings, and have the weakest relationship to the life cycle approach that replacement rates should seek to approximate.

## 5. International References

Goss et al. (2014) state that “For national pension plans, the well-established best practice is to compute benefit replacement rates using the career-average wage-indexed earnings levels as the point of reference (the denominator).” They further state that their approach is consistent with the “generally accepted international standard for computing benefit replacement rates for national pension plans.” This claim is both right and wrong.

Some international organizations do calculate replacement rates in ways that match the results of using career-average wage-indexed earnings. But what these organizations are measuring differs qualitatively from a replacement rate as commonly understood in the United States. And in some cases these organizations are clear about the distinction.

For purposes of clarity, it may be helpful to distinguish between two types of replacement rates, drawing upon Mitchell and Phillips (2006):

- *American-style replacement rates*: these measure a retiree’s income as a percentage of *that retiree’s* previous earnings and thus represent the degree to which the retiree can maintain his or her pre-retirement standard of living.
- *European-style replacement rates*: these measure retirees’ incomes in a given year as a percentage of workers’ incomes in that same year, and thus compares retirees’ standard of living to that of working-age members of society.

Mitchell and Phillips (2006) state that the ratio of pension benefits to average wages “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.” But, Mitchell and Phillips, note “Historically in the United States, policy makers have tended to prefer a replacement rate measure tied to workers’ own past earnings.”<sup>13</sup>

While SSA’s actuaries describe their figures as American-style replacement rates that compare retirement benefits to pre-retirement earnings, in reality the SSA OACT figures are European-style replacement rates

which compare benefits paid to retirees today with the wages earned by workers today. This should be clear from prior sections detailing the evolution of Social Security earnings replacement rate calculations: the medium steady earner prior to 2002 had annual earnings equal to the AWI; thus, the replacement rate for the medium steady earner directly compared that worker's benefit to the average economy wide wage in the year prior to retirement. Since the methodology for calculating replacement rates relative to the wage-indexed average earnings of the scaled earners was designed explicitly to maintain the results generated using the steady earners, the relationship of benefits for a medium scaled earner to the AWI was maintained. This is easily demonstrated with data from Table V.C7 of the 2014 Trustees Report, which includes annual benefit amounts for the hypothetical scaled earners retiring in a given year along with the annual wages paid to workers in that year. To illustrate, the stylized medium earner retiring in 2014 receives an annual benefit of \$19,477; the average wage paid to workers in 2014 is estimated at \$46,787. Divide the two figures and get 41.6 percent, roughly equal to the 41.1 percent replacement rate published by Clingman et al. (2014) that purports to compare the medium earner's benefits to his or her own *pre-retirement* earnings.<sup>14</sup> It is questionable how to interpret as a "replacement rate" a calculation that compares one individual's income in retirement to a different individual's working-age earnings, given that there is no pretense that the former income is designed to or does replace the latter.

Yet a number of examples exist of international organizations measuring European-style replacement rates. For instance, as an institution, the OECD (2005) explicitly defines the replacement rate as "The ratio of an individual's (or a given population's) (average) pension in a given time period and the (average) income in a given time period," making no claim that the replacement rate is an individual-level measure that should be judged alongside financial advisors' benchmarks. The World Bank uses a similar approach in Forteza and Ourens (2009), as does the International Monetary Fund (IMF) in Clements et al. (2013).

Goss et al (2014, p. 2) point to a single OECD publication that *describes* its replacement rates as being measured relative to pre-retirement earnings, but this publication – like others from the OECD, IMF and World Bank – in fact compares benefits paid to today's retirees to the incomes of today's workers. The OECD's "Pensions at a Glance" series, which dates to 2005, calculates replacement rates using a "steady earner" approach identical to the method that used by OACT prior to 2002. That is, the report calculates replacement rates under the assumption that "workers earn the same percentage of economy-wide average earnings throughout their career, meaning that their individual earnings track the assumed growth in economy-wide earnings. In this case, lifetime average revalued earnings and individual final earnings are

identical” (Queisser and Whitehouse, 2005, p. 43) and, as such, are subject to the same concerns regarding a lack of realism that caused SSA to abandon the steady earner method more than a decade ago.

However, it appears likely that the OECD “Pensions at a Glance” series adopted the steady earner method for reasons of practicality. One of that publication’s principal purposes is to compare the generosity and progressivity of different national pension systems. For that purpose, the steady earner approach suffices: if one nation’s plan pays a higher European-style replacement rate than another nation’s, it is likely to pay a higher American-style replacement rate as well. Likewise, if one nation pays more progressive European-style replacement rates – say, as in “Pensions at a Glance,” by comparing replacement rates for a steady worker at half the average national wage to one at 1.5 times the average national wage – it is likely to pay more progressive American-style replacement rates as well.

Indeed, Whitehouse – one of the two principal authors of the “Pensions at a Glance” series – is aware that a method allowing for ordinal comparisons does not necessarily allow us to judge the adequacy of benefits from an individual perspective. He states in Whitehouse (2000, p. 19) that replacement rates in that study (which for an average wage earner produce results identical to those in “Pensions at a Glance”) represent “the ratio of elderly incomes to non-elderly or population incomes. This of course differs from individual replacement rates, which are measured against the pre-retirement incomes or earnings of an individual pensioner.” While for comparing pension generosity this method is sufficient, it cannot tell us whether a given program is generous *enough*. “The final and most complex issue is interpreting the magnitude of replacement rates: what does it mean for living standards if we say that pensioners enjoy an average of 80 per cent of the population income?” (Whitehouse 2000, p.19).

From a life cycle perspective, it is difficult to interpret what European-style replacement rates represent because it does not capture the principal goal of retirement planning, which is to allow a retiree to maintain his own consumption rather than to match the consumption of working-age individuals. Indeed, in a life-cycle framework European-style replacement rates can lead to counterintuitive results: if earnings grow more quickly from one cohort to the next, the incomes of retirees will fall relative to those of workers even if those retirees saved adequately to replicate their own pre-retirement standard of living. Likewise, slower cohort-to-cohort earnings growth would improve retirement security as measured by European-style replacement rates, again without reference to retirees’ ability to maintain their standard of living.

The problem facing a study such as “Pensions at a Glance” is practical: even in countries such as the United States, data necessary to accurately calculate replacement rates relative to beneficiaries’ true pre-

retirement earnings is rarely available. Indeed, the most recent publicly-available U.S. data is a decade old. In many countries such data would be entirely unavailable. In a precursor OECD report published in 2001, OECD analysts noted that:

A main objective of retirement income systems is to protect people against drops in their income when they retire. A true measure of success would require an examination of panel data to examine how the income and wealth of specific individuals rose, or fell, as they moved into retirement and into later life. Such data do not yet exist at the international level (Hicks, et al., 2001, p. 22).

Because they did not have the data to measure benefits relative to pre-retirement earnings, the OECD in Hicks, et al. (2001, p.22) developed a set of “quasi-replacement rates” which compared the “disposable income of people in the 10 years after the normal retirement age of 65” with that of people ages 51 to 64 and 41 to 50. Similarly, the World Bank in Forteza et al (2009, pp.3-4) states that it compares average benefits to average contemporaneous wages “to build a database of social security indicators that can be used to assess the design of the systems and that allow for cross-country comparisons” (Forteza and Ourens, 2009, pp. 3-4). Yet, for research confined to a single country, where administrative data on career earnings are more commonly available, there seems little reason not to use it.

In a study released subsequent to the current debate over replacement rate measurements, the OECD (2014) expanded the range of replacement rates it calculates and more explicitly defined its view of the interpretation of each type of calculation. OECD (2014) calculates replacement rates relative to three denominators. Final earnings prior to retirement, the OECD notes, are the most common approach but are highly variable and do not necessarily represent the full career earnings of the retiree. Inflation-adjusted career earnings, the OECD notes, produce replacement rates that are “in line with the consumption smoothing assumption of the life-cycle model when assuming that people are interested in replacing lifetime income in purchasing power terms.” Finally, the OECD says, “The use of average wage indexing equates earnings levels over the career relative to the standard of living of workers at the time of retirement.” Thus, while the OECD is SSA OACT’s principal citation, the OECD’s most recent analysis supports the view that inflation-indexed replacement rates are most consistent with the dominant life cycle approach to retirement planning and that wage-indexed replacement rates effectively compare the incomes of retirees to those of contemporaneous workers.

A number of national-level studies focusing upon pension benefits in a retirement adequacy framework use American-style replacement rates measured relative to pre-retirement earnings. For instance, the

United Kingdom's Department for Work and Pensions measures replacement rates relative to average earnings for those years in work between age 50 and State Pension age (United Kingdom Government, 2013, p. 11). MacDonald et al. (2012) calculate replacement rates for New Zealand relative to "gross final earnings." Rothman and Bingham (2004) of the Australian Treasury measure replacement rates using four variants of final earnings.<sup>15</sup> Similarly, Price and Suryadi (2011) use the Australian Treasury Department's RIMHYPO model, which uses stylized earnings patterns similar to Social Security's hypothetical scaled earners. This study measures replacement rates relative to final earnings preceding retirement. Statistics Canada measures replacement rates relative to earnings between ages 55 and 57 (Ostrovsky and Schellenger 2009 and Horner, 2011). Similarly, Canada's Library of Parliament states:

The replacement rate, a basic concept in retirement planning, is the ratio between people's income after retirement and the income they earned at the end of their career, a time when employment earnings are usually at their highest. A 70 percent replacement rate is considered a reasonable goal, although some analysts recommend higher or lower targets (Leonard, 2011, P. 5).

Nivakoski (2014) calculates replacement rates for Irish retirees relative to inflation-indexed pre-retirement earnings.

Thus, the more important issue is not whether other countries or international organizations measure replacement rates similarly to SSA OACT. Some do, while others do not. It is that the replacement rate figures that previously were published in the Social Security Trustees Reports do not represent what most readers think they represent, and thus they may incorrectly shape perceptions of retirement income adequacy and Social Security policy. Replacement rates that compare pension benefits to the average economy-wide wage at the time have little relevance for individuals planning their retirement and certainly cannot be judged relative to financial advisors' targets or a life cycle approach that references beneficiaries' pre-retirement earnings.

## **6. Conclusions**

Replacement rate calculations represent a rule of thumb measure that sacrifices a certain amount of rigor in favor of usability and understandability. But a replacement rate guideline need not be inconsistent with a broader life cycle approach and further research should be expended in developing replacement rates that will be usable approximations of what a life cycle model might predict in terms of optimal saving. For instance, a replacement rate calculated relative to inflation-indexed average lifetime earnings, with

adjustments for household size and the number of children, might come reasonably close to capturing what a life cycle model would recommend.

The replacement rate figures that were published in the Trustees Reports from 2002 through 2013 and in Goss et al. (2014) appear to be an example of path-dependency in public policy: once a statistic is calculated and publicized, maintaining the statistic itself gains precedence over improving the methodology for generating such statistics. Prior to 2002, OACT calculated replacement rate figures using hypothetical workers whose earnings patterns, in Munnell and Sass's (2005) terms, "bore little relation to reality." But the 40 percent replacement rate figure calculated for that hypothetical earner was literally the one constant as new, more realistic hypothetical earners were developed. Current research from OACT, while using administrative data on real beneficiaries, also seems constructed to maintain a figure calculated decades earlier.

In light of this discussion, we make three recommendations. First, if replacement rates are to be published by the Social Security Trustees or by SSA, the method of calculation and the meaning of the resulting figures should be clearly explained. In our view, Social Security benefits as a percentage of average pre-retirement earnings adjusted for inflation is the most meaningful measure from a life cycle perspective and probably the most understandable to a working-age individual preparing for retirement. Financial advisors might prefer a measure based upon final earnings for consistency with their own calculations but such rates might be misleading for a general population where many workers' earnings tend to decline toward the end of their careers. For consistency with prior figures published by SSA, replacement rates relative to wage-indexed earnings might be maintained. For accuracy, however, these figures should be labeled as comparing benefits for newly-entitled workers to the Average Wage Index. But there is no practical or substantive reason why replacement rates relative to wage-indexed career average earnings should be the sole published measure of Social Security benefit adequacy and many reasons why they should not be.

Second, published replacement rate figures should be calculated based upon actual beneficiaries rather than using stylized hypothetical earners. While the use of stylized earners was understandable in the distant past, when computing power was more limited, SSA's Office of Policy has been publishing real-world replacement rate figures based upon administrative data for more than two decades (Grad 1990) and SSA OACT published replacement rates from administrative data as far back as the 1970s (Nichols, 1977).

Third, replacement rates figures should be calculated on a household basis, which are more meaningful than individual-level replacement rates for judging the adequacy and distribution of Social Security benefits. Greater attention also should be paid to the replacement rates received by different types of households and to the distribution of replacement rates within households with similar lifetime earnings. SSA's Office of Retirement and Disability Policy (ORDP), which has developed analyses in this area (Butrica et al, 2012), could be well positioned to explore this direction.

The replacement rate figures calculated by SSA are widely publicized. And, given the widespread use of replacement rate calculations in financial planning, figures calculated by the SSA would, if accurate, be of assistance to individuals making decisions regarding how much to save and how long to work. As well, policymakers require accurate information regarding the adequacy of Social Security benefits for different types of beneficiaries.

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<sup>1</sup> Legislative proposals to expand Social Security benefits have been made by Sen. Tom Harkin (“The Strengthening Social Security Act”), Senators Mark Begich and Patty Murray (“The Retirement and Income Security Enhancements Act”), Rep. John Larson (“The Social Security 2100 Act of 2013”) and Rep. Gwen Moore (“The Social Security Enhancement and Protection Act.”).

<sup>2</sup> Earnings occurring after age 60 are entered into the AIME calculation in nominal dollars.

<sup>3</sup> Both figures are calculated relative to the highest 35 years of pre-retirement earnings.

<sup>4</sup> Final earnings are here measures as the inflation-adjusted average of positive earnings in the five years prior to benefit claiming.

<sup>5</sup> SSA OACT is not specific regarding how the shape of the age-earnings profile is generated, saying only that “one set of raw scaled factors is initially developed using earnings from the Continuous Work History Sample (CWHs). An adjustment is made to these raw factors for ages 62 and over to account for the select nature of these workers who continue working at such ages.” Clingman and Nichols (2004, p.2)

<sup>6</sup> SSA’s Office of Retirement and Disability Policy is distinct from SSA’s actuarial arm and often uses different data and methods to conduct its analyses. Because household composition changes over time, the “shared” approach used in many SSA policy studies splits earnings or benefits between spouses (if any) in any years in which the individual being studied is married, but does not split earnings in years in which the individual is unmarried.

<sup>7</sup> Found at: <http://www.ssa.gov/policy/docs/microdata/earn/>.

<sup>8</sup> This restriction eliminates individuals receiving a disability benefit, those receiving a spousal benefit only, children of disabled or diseased workers entitled to benefits, and widows or widowers receiving benefits without having qualified for them on the basis of their own earnings records.

<sup>9</sup> This was done for two reasons. First, we wanted to include only individuals whose benefits were determined using average indexed monthly earnings which would include all persons born from 1917 onward, but the historical annual earnings records were not provided for all these workers. Second, the earnings records show individual annual earnings for each year from 1951 through 2003 plus aggregate earnings for the years 1937 through 1950. We were interested in evaluating alternative measures of lifetime earnings along the lines used in deriving the Average Indexed Monthly Earnings used to calculate benefits or to derive the sorts of replacement rate measures that the Social Security actuaries regularly publish.

<sup>10</sup> To allow for comparability between birth cohorts, each individual’s AIME is wage-indexed to 2004 before AIME deciles are calculated.

<sup>11</sup> Earnings occurring after age 60 are not wage indexed but included in the average in nominal terms.

<sup>12</sup> The explanation for this result is that an individual who retires later could save less (and consume more) during his working years, and thus would need a higher retirement income relative to his pre-retirement earnings to maintain the same level of consumption.

<sup>13</sup> Mitchell, Olivia S., and John WR Phillips., 2006, “Social Security Replacement Rates for Alternative Earnings Benchmarks.” *Benefits Quarterly*. Fourth Quarter, pp. 37-47.

<sup>14</sup> Michael Clingman, Kyle Burkhalter, and Chris Chaplain. “Replacement Rates For Hypothetical Retired Workers.” Office of the Chief Actuary, Social Security Administration. Actuarial Note Number 2014.9, July 2014.

<sup>15</sup> See Rothman and Bingham (2004). The measures include: average income over full retirement/last year work; first 10 years of retirement/final 10 years of work; first 5 years of retirement/final 5 years work; and first year of retirement/final year of work.