Alternate Measures of Replacement Rates for Social Security Benefits and Retirement Income

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Summary

Discussions of retirement planning and Social Security policy often focus on replacement rates, which represent retirement income or Social Security benefits relative to preretirement earnings. Replacement rates are a rule of thumb designed to simplify the process of smoothing consumption over individuals' lifetimes. Despite their widespread use, however, there is no common means of measuring replacement rates. Various measures of preretirement earnings mean that the denominators used in replacement rate calculations are often inconsistent and can lead to confusion.

Whether a given replacement rate represents an adequate retirement income depends on whether the denominator in the replacement rate calculation is an appropriate measure of preretirement earnings. This article illustrates replacement rates using four measures of preretirement earnings: final earnings; the constant income payable from the present value (PV) of lifetime earnings (PV payment); the wage-indexed average of all earnings prior to claiming Social Security benefits; and the inflation-adjusted average of all earnings prior to claiming Social Security benefits (consumer price index (CPI) average).

The article then measures replacement rates against a sample of the Social Security beneficiary population using the Social Security Administration's Modeling Income in the Near Term (MINT) microsimulation model. Replacement rates are shown based on Social Security benefits alone, to indicate the adequacy of the current benefit structure, as well as on total retirement income including defined benefit pensions and financial assets, to indicate total preparedness for retirement.

The results show that replacement rates can vary considerably based on the definition of preretirement earnings used and whether replacement rates are measured on an individual or a shared basis. For current new retirees, replacement rates based on all sources of retirement income seem strong by most measures and are projected to remain so as these individuals age. For new retirees in 2040, replacement rates are projected to be lower, though still adequate on average based on most common benchmarks.

Introduction

Individuals and policymakers both rely on the concept of replacement rates, which express retirement income as a percentage of preretirement earnings. Individuals use replacement rates as a rule of thumb in retirement planning. Policymakers use various replacement rate measures to analyze Social Security benefit adequacy under the current benefit schedule

versus those that might be provided under alternate policies.

However, confusion exists regarding the use of replacement rates. Specifically, while the numerator in the replacement rate equation is easy to isolate—either total retirement income in the case of retirement planning or periodic Social Security payments in the case of policy discussions—there is no consensus on the proper way to measure preretirement earnings.

As a result, personal planning and policy discussions often mix different measures of preretirement earnings, which can lead to false conclusions about current or potential replacement rates (Steuerle, Spiro, and Carasso 2000). Specifically, it is commonly accepted that a replacement rate of roughly 70 percent is adequate for retirement income from all sources, and Social Security benefits typically account for a replacement rate of roughly 40 percent. However, the 70 percent replacement rate recommended by many financial advisors is generally measured relative to earnings *immediately preceding retirement*, but Social Security replacement rates are measured relative to a *wage-indexed average of lifetime earnings*. It is risky to draw conclusions based on replacement rates calculated using different denominators. To help clarify measures of replacement rates this article presents four alternative measures of preretirement earnings:

- *Final earnings:* the average of real earnings in the 5 years prior to claiming Social Security benefits.
- *Present value (PV) payment:* a constant real payment spanning working years derived from the present value of lifetime earnings. The PV is the value, on a given date, of a past or future series of payments.
- *Wage-indexed average earnings:* a wage-indexed average of all earnings prior to claiming Social Security benefits, similar to the average indexed monthly earnings (AIME) used in calculating Social Security benefits.
- *Real average earnings (consumer price index (CPI) average):* the inflation-adjusted average of all earnings prior to claiming Social Security benefits.

All measures are then analyzed using the Social Security Administration's (SSA's) Modeling Income in the Near Term (MINT) microsimulation model. Replacement rates are measured only on a pretax basis, as MINT does not model income taxes.

Replacement rates are calculated for Social Security beneficiaries aged 64–66 in the year 2005. Rates are calculated separately for Social Security benefits alone and for total retirement income, which includes Social Security benefits, employer sponsored pensions, personal savings, and other sources. These calculations are repeated for the same birth cohort in the year 2020 to show the succession of replacement rates over the course of retirement and for beneficiaries aged 64–66 in 2040 to show projected replacement rates for future retirees.

This article

- provides background on replacement rate measurements, proposes alternative denominators for the replacement rate calculation, discusses recommended replacement rates for total retirement income, and examines how retirement ages and Social Security spousal benefits can affect replacement rates;
- analyzes individual and shared Social Security replacement rates for new Social Security beneficiaries using SSA's MINT model;
- analyzes replacement rates based on total retirement income;
- discusses how replacement rates may change over the course of retirement;
- analyzes projected replacement rates for new Social Security beneficiaries in the year 2040; and
- reviews and concludes.

Background on Replacement Rates

Retirement income adequacy is a relative measure. No single dollar amount is correct for every retired individual or couple at every time; rather, households are best served with different real retirement income levels, balancing income in retirement with consumption patterns established during working years. Individuals planning for retirement and government pension programs both use the replacement of a portion of preretirement earnings, rather than a simple dollar amount, to project retirement income needs. This portion, or percentage, is called a replacement rate. The formula for computing Social Security retirement benefits replaces prior income progressively, such that lower earners generally receive a higher replacement rate than do higher earners.

Replacement rates express retirement income as a percentage of preretirement earnings, where retirement income is the numerator and preretirement earnings

are the denominator. The numerator can signify either total retirement income or a selected component, such as the Social Security benefit. Preretirement earnings are also subject to alternative definitions, further discussed below. Replacement rates are used both for individual financial planning and for policy analysis.

A replacement rate of less than 100 percent of preretirement earnings may be enough to maintain the preretirement standard of living, as the cost of living can decline significantly in the transition from work to retirement. For instance, retirees pay lower taxes because there is an advantageous tax treatment of Social Security benefits; the need to save for retirement is reduced or eliminated; work-related expenses such as clothing, commuting, or meals outside the home decline; mortgages are often fully paid off; and children have completed college and left the home (Schieber 1998). However, new costs can arise in retirement, particularly costs associated with health care. Rising Medicare premiums and out-of-pocket health care costs can introduce considerable uncertainty regarding optimal replacement rates for future retirees (Caplan and Brangan 2004; Skinner 2007).

Defining the Denominator

Even though the numerator of the replacement rate calculation is relatively easy to determine, there is no consensus on the proper denominator to represent preretirement earnings. Multiple measures of preretirement earnings have been used to calculate replacement rates, with potentially confusing results. Consider the following statement, which summarizes conventional wisdom on replacement rates and Social Security benefits:

> While Social Security replaces about 40 percent of the average worker's pre-retirement earnings, most financial advisors say that you will need 70 percent or more of pre-retirement earnings to live comfortably. (SSA 2008, 7)

This view of recommended retirement income, and the amount typically supplied by Social Security, is widely shared. This conclusion is not troubling, in that Social Security was not designed to be the sole source of retirement income.

The difficulty with this statement is that the 70 percent replacement rate recommended by financial advisors is measured relative to final earnings, while the 40 percent Social Security replacement rate is measured relative to the AIME. That is to say, the two replacement rate figures use different denominators, and as a result, cannot be directly compared.[1]

Moreover, it is not clear whether final earnings or the AIME is the best denominator to use in calculating replacement rates. To avoid confusion and to find the best possible measures for replacement rates, it is helpful to consider the merits of the alternative measures of preretirement earnings that can be used in replacement rate calculations, and for such calculations to be clear on which measure is used.

Final Earnings. In most cases, replacement rates are measured relative to final earnings, meaning earnings in the year or years immediately preceding retirement. As the Government Accountability Office (2001, 2003) notes, "Generally, [the replacement rate] is calculated as the ratio of retirement income in the first year of retirement to household income in the year immediately preceding retirement." The Greenspan Commission of the early 1980s also defined replacement rates on the basis of earnings immediately preceding retirement (National Commission on Social Security Reform 1983),[2] and for many years, replacement rates printed in the annual Social Security Trustees Report were measured relative to final earnings.

There are several advantages to measuring replacement rates relative to final earnings. First, the use of final earnings is a relatively easy rule of thumb for individuals and financial planners to follow, especially for individuals who can easily predict how their earnings will trend.[3] Second, many defined benefit pension plans are calculated on a final salary basis. Third, a final wage replacement rate indicates the degree to which an individual's consumption possibilities may change as he or she retires from work. Thus, final earnings replacement rates can be useful in projecting retirement behavior, in which individuals who are employed but eligible for retirement benefits can choose between the earnings they receive at work and the benefits they could receive by retiring.[4]

Final earnings are the measure most often used as the denominator to calculate replacement rates. However, they are an imperfect measure in several respects. First, final earnings are particularly volatile. In addition to normal periods of unemployment, many individuals reduce their work hours or leave the labor force entirely prior to claiming Social Security benefits. To smooth the volatility of earnings in a single year some studies use an average of a number of years prior to retirement; Grad (1990), for instance, averages earnings over the 5 years prior to claiming benefits.

While not perfect, this approach is superior to relying on a single year of earnings to calculate replacement rates, and is used in this article.

Second, final earnings are not necessarily representative of the worker's lifetime earnings, which better reflect total consumption possibilities. Although annual earnings can vary considerably from year to year, the life cycle/permanent income hypothesis used by economists holds that individuals seek to smooth consumption evenly between years (Modigliani and Brumberg 1954; Ando and Modigliani 1963; Friedman 1957). Thus, a retired worker's earnings immediately prior to retirement may not be representative of his or her consumption at that time, even if it is preretirement consumption rather than earnings that retirement income seeks to replace. However, final earnings may be a useful denominator for very low earners without the means to borrow or invest to smooth consumption over the life cycle. In such cases, consumption roughly equals earnings and therefore final earnings may be the appropriate value to use in replacement rate calculations.

Present Value (PV) Payment. The premise of a life cycle approach to measuring preretirement income is that, rather than feast or famine, individuals will seek to consume roughly the same amount in each period of life. More precisely, in each period individuals will consume an amount equal to a steady payment based on the present value (PV) of their lifetime earnings.[5]

For this reason, we calculate a measure we term PV payment. It is equal to a steady, inflation-adjusted payment running from age 21 through the age of retirement, derived from the present value of the individual's earnings during those years. While not fully consistent with the life cycle approach, which would smooth earnings over the individual's entire adult life, including retirement, PV payment allows for replacement rate calculations that are methodologically comparable to other standard approaches.

PV payment is calculated as follows:

$$PVpayment = \frac{PVr(1+r)^n}{(1+r)^n - 1}$$

where PV equals the present value of lifetime earnings discounted at the interest rate earned by the Social Security trust funds, r equals the real annual interest rate,[6] and n equals the number of years between entering the labor force and claiming benefits.

To illustrate, assuming a 3 percent real interest rate, a medium-wage worker entering the workforce in 2006 at age 21 and retiring at age 63 would have lifetime earnings with a present value of approximately $1 million.[7] That $1 million would provide a constant annual payment of roughly $42,200 (in 2006 dollars) for each year of retirement. Out of this $1 million would come taxes, retirement savings, and employment costs; consequently, true consumption would be lower. For that reason, a replacement rate of less than 100 percent would be adequate to smooth consumption in retirement. Moreover, recommended replacement rates would vary based on tax liabilities and other costs, so it is difficult to construct a single rule that could be applied across the board. Nevertheless, PV payment provides a more thorough evaluation of lifetime earnings than the other three measures.

Wage-Indexed Average Earnings. SSA does not currently calculate replacement rates relative to final earnings. As reported in the Performance and Accountability Report, SSA (2004) defines replacement rates as "the ratio of the retired worker's benefit based on his or her own earnings to his or her own average indexed monthly earnings." In calculating the average indexed monthly earnings, or AIME, past earnings are first wage-indexed to age 60.[8] That is, earnings in a past year are multiplied by the ratio of economy-wide average earnings at age 60 to average earnings in the year in which the earnings took place. For example, if a worker retiring at age 62 in 2006 earned the average wage of $5,472 in 1968, those wages would be indexed to $35,010, the average wage in 2004 (when the beneficiary turned 60).[9] From these wage-indexed earnings years, the highest 35 are averaged and then the earnings are expressed as a monthly figure.

In recent years, SSA has reported replacement rates relative to the AIME using two approaches: actual work histories and stylized workers with varying earnings levels. Replacement rates based on stylized workers appear in the annual Trustees Report. Stylized workers with low, medium, and high earnings retiring at age 65 in 2006 had replacement rates of 56 percent, 41 percent, and 35 percent respectively, as reported in the 2006 Trustees Report.[10] Replacement rates based on actual work histories appeared most recently in SSA's 2004 Performance and Accountability Report (PAR) and are calculated using the 1 percent Continuous Work History Sample of Social Security earnings and benefits records. These replacement rates are calculated for individuals who become entitled to benefits based on their own earnings records. Only

the individuals' earned benefits are included in these calculations; auxiliary benefits are omitted. Based on the latest published data, in 2003 the median replacement rate was 41 percent, which is close to the rate for the stylized medium earner. Rates varied by sex, with men receiving median replacement rates of 36 percent and women receiving replacement rates of 50 percent (SSA 2004, 128).

Measuring replacement rates relative to the AIME has the merit of using a statistic that SSA already calculates. In addition, it includes a greater portion of lifetime earnings than the final earnings measure. An AIME denominator also has the advantage of continuity with past SSA figures.[11]

However, the AIME as a denominator has several shortcomings. First, it includes only the 35 highest years of earnings. This high-35 restriction increases its value relative to a full measure of lifetime income and thereby reduces replacement rates measured against it. Therefore, we base our modified AIME measure, what we will call a wage-indexed average, on all earnings prior to claiming Social Security benefits. In further contrast to the statutory AIME calculated by SSA, we compute the wage-indexed-average earnings for all Social Security beneficiaries in our sample. Because the other measures in this article are not dependent on each beneficiary being eligible for a Social Security retirement benefit based on their own work record, this helps ensure our wage-indexed average can be compared with alternative replacement rate calculations.

However, even with these modifications, a wage-indexed average will still raise other issues, namely that it overstates real earnings level in past years. Imagine an individual who earned the average wage in every year of his life. Assuming he retired at 65, his wage-indexed average would be higher in real terms than all but 4 years of earnings throughout his lifetime. Thus, a wage-indexed average of an individual's lifetime earnings may not be representative of the consumption possibilities open to that individual. Boskin and Shoven (1987) argue 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."

Although the life cycle approach does not argue for replacing a wage-indexed average of prior earnings, alternate economic theories are more sympathetic to wage-indexed measures. A relative income approach, such as that described by Duesenberry (1949), argues that individual consumption is a function of current income and past peak income. In effect, individuals wish for their consumption to keep up with increases throughout the population, producing consumption rising roughly along with wages. While the relative income approach was overtaken by the life cycle/permanent income hypothesis in the 1950s, some economists argue that it better describes consumption patterns in practice (Frank 2002, 2005).

Likewise, the "buffer-stock" theory of saving, in which younger individuals consume less than the life cycle hypothesis predicts to buffer against uncertain future income, may argue for a wage-indexed denominator. The buffer-stock theory predicts consumption patterns that more closely resemble those when individuals wish to smooth the wage-indexed average of lifetime earnings.[12] This approach might particularly apply to low earners, who when young are often unable to borrow against future earnings.

Nevertheless, the wage-indexed average calculation is complex and poorly understood by the public and, as noted above, lacks a compelling rationale under the dominant life cycle/permanent income economic theory. Thus the wage-indexed average may not be ideal for individual retirement planning.

Real Average Earnings (CPI Average). The fourth measure is the inflation-adjusted average of lifetime earnings. Boskin and Shoven (1987) and Rettenmaier and Saving (2006) advocate the CPI-indexed average of lifetime earnings. CPI-indexed average earnings avoid many of the problems of final earnings and wage-indexed earnings. Relative to the AIME and to final earnings, the inflation-indexed average of lifetime earnings may better capture the real level of resources available for consumption over a worker's lifetime.[13] In addition, real earnings levels are more easily understood by ordinary individuals than are wage-indexed earnings. As such, they are perhaps better suited for computing and conveying replacement rates. Note, though, that the CPI average of lifetime earnings fails to account for the *timing* of earnings over a worker's lifetime. A worker whose earnings peaked early in life would have higher consumption possibilities than a worker with the same real lifetime earnings whose earnings peaked later in life. The former worker could invest a portion of his early wages, earning interest, to provide higher consumption later. The PV payment measure better accounts for the timing of earnings over an individual's lifetime.

Other Factors Affecting Replacement Rates

The inclusion of microsample results from the MINT model requires the discussion of additional factors that can affect realized replacement rates. The MINT model matches Social Security earnings records to data from the Survey of Income and Program Participation (SIPP). The richness of the MINT data set, relative to calculations using stylized workers, requires that additional life factors be put into context. In particular, MINT takes realistic account of marriage patterns and retirement ages, variables that are relevant to auxiliary benefits and changes to benefits. Both auxiliary benefits and early retirement will alter reported replacement rates when measured against an actual population versus stylized work histories.

The replacement rates reported in the Social Security Trustees Report and used in other discussions generally refer to single individuals who retire at age 65. While such a stylized example is easy to understand, in many cases these examples would not accurately reflect the lifetime earnings or condition of a typical Social Security–covered worker in retirement.

Most Americans are married at the time of retirement. Social Security can offer spousal benefits to these couples, as well as to divorced spouses whose marriages lasted at least 10 years. A spouse generally receives benefits based either on his or her own earnings, or on half the benefit payable to his or her spouse, whichever is higher.[14] For a single-earner couple, total benefits—and thus, total replacement rates—could be up to 50 percent higher than those based on individual earnings alone. For most couples the impact of spousal benefits is significantly smaller, as the lesser-earning spouse is entitled to some benefits under his or her own earnings, and the net effect of spousal benefits is merely the difference between the two. Moreover, differences in earnings between spouses are expected to diminish over time, reducing the effect of spousal benefit payments. Nevertheless, a large proportion of the population is eligible for spousal benefits, and such benefits could have a significant positive effect on their replacement rates.[15]

In addition, Social Security offers benefits to survivors. A surviving spouse is generally entitled to the greater of either his or her own earned benefit or the deceased spouse's benefit. This can increase measured replacement rates relative to an individual's preretirement earnings if his or her beneficiary status changes upon the death of a spouse.

While spousal benefits will raise replacement rates, early retirement will lower them, because Social Security benefits are reduced for individuals who claim benefits prior to the full retirement age.[16] As shown below, in 2005 the majority of individuals claimed Social Security benefits prior to the full retirement age, and thus were subject to benefit reductions:

Age at first benefit claim	Percent of claimants
62	56.6
63	8.3
64	9.9
65	19.8
66	1.5
67	0.8
68	0.6
69	0.5
70 or older	2.1

SOURCE: Authors' calculations based on SSA (2006, Table 6.A4).

Although claiming benefits early does not necessarily lower total lifetime benefits, doing so reduces replacement rates. However, lower replacement rates for early retirees do not unambiguously denote a less adequate retirement income. A life cycle approach suggests that individuals spending a greater share of their lives in retirement, either by retiring earlier or living longer, should desire a lower replacement rate. Longer retirements demand a higher saving rate, and thus a lower level of consumption, while working. To match the working-age level of consumption in retirement, the replacement rate should decline relative to gross preretirement earnings (Schieber 1998).

Recommended Replacement Rates for Total Retirement Income

As noted above, a common rule of thumb is that total retirement income—Social Security plus pensions, asset income, and other sources—should replace about 70 percent of preretirement earnings. Financial advisors' recommendations of a 70 percent replacement rate are generally measured against final earnings. However, there is no single authoritative source for 70 percent as the appropriate replacement rate, and indeed recommendations can be higher or lower. Rather, 70 percent appears to be a rough consensus among financial planners and others. Greninger and others (2000) report that four-fifths of financial plan-

ners and educators accepted that a replacement rate of 70 percent to 89 percent of previous earnings was appropriate, with mean and median recommendations of 74 percent and 75 percent respectively. A number of other analyses produce similar recommendations. According to the Teachers Insurance and Annuity Association—College Retirement Equities Fund (TIAA-CREF 2002), "The desired replacement ratio is usually an income equal to 60 percent to 90 percent of an individual's salary during his or her last year of work." Aon Consulting and Georgia State University (2004) recommend an average replacement rate of about 75 percent of final earnings, with low earners requiring replacement rates of close to 90 percent. It is worth noting that even in studies that measure rather than suggest replacement rates, final earnings are the most common measure used in calculating the replacement rate (Grad 1990; Boskin and Shoven 1987; Holden and VanDerhei 2002, 2005; Gustman and Steinmeier 1998, 2002; Martin 2004). This divergence of views highlights the importance of clarifying how replacement rates are calculated.

Myers (1993) estimates that a total replacement rate of 70 percent to 75 percent of final earnings would be appropriate for an average wage worker, with recommended replacement rates of 85 percent to 90 percent of final earnings for the lowest earning workers and 55 percent to 60 percent for workers earning the maximum taxable wage.[17]

Based on a similar analysis of preretirement earnings, taxes, and expenses, Schieber (2004) projects that for workers with no retirement plan, a replacement rate of around 70 percent would maintain preretirement living standards for those retiring at age 65, or slightly over 60 percent for those retiring at age 60. McGill and others (2005) extend Schieber's analysis, with similar conclusions.[18]

Some recommendations for replacement rates have been made relative to measures other than final earnings. For instance, the World Bank recommends a household replacement rate of 78 percent of real average lifetime wages net of taxes and preretirement saving, with a recommended government mandatory replacement rate for individuals of 60 percent to 63 percent.[19] Relative to final earnings, the World Bank (1994) recommends a household replacement rate of 54 percent, with a mandatory individual replacement rate of 42 percent to 44 percent.

Although the above recommendations represent a reasonable summary of existing views regarding appropriate replacement rates at retirement, it is worth noting that financial advisors' approaches to setting retirement goals have been criticized by economists. Kotlikoff (2006) in particular argues that the concept of replacement rates is overly simplistic for retirement planning, and that the recommended replacement rates of 60 percent to 80 percent used by financial advisors and online retirement planners are arbitrary.

Social Security Replacement Rates for New Beneficiaries

This section uses SSA's MINT model to measure replacement rates for Social Security beneficiaries aged 64–66 in the year 2005. MINT matches Social Security earnings records with individual responses to the Census Bureau's SIPP to create a large, comprehensive and detailed database of earnings and other demographic information. The matched data are used to project one's future earnings, marital status changes, disability incidence, date of retirement, Social Security benefit, and other retirement income. In this case, when examining individuals aged 64–66 in 2005, individual earnings prior to 2002 are derived from SSA earnings records; only the earnings after 2002 are projected. The MINT version used here is limited in that it omits information on child recipients of Social Security benefits. In addition, MINT does not include a full range of non–payroll tax information. The current version of the MINT model is calibrated to the projections contained in the 2004 Social Security Trustees Report.[20]

Social Security replacement rates presented here are calculated based on Social Security benefits and earnings subject to Social Security taxes. It should be noted at the outset that Social Security was not designed to be the sole source of income in retirement, and thus in most cases should not be expected to meet the replacement rate targets discussed in the prior section. In the following sections, total retirement income replacement rates are shown, which can be more reasonably compared with target replacement rates for retirement income.

Two sets of results will be presented. First, replacement rates under the various metrics will be calculated for individuals based on quintiles of lifetime earnings. Second, replacement rates will be shown on a shared basis for married couples. Shared replacement rates are a better measure of Social Security benefit adequacy as spouses generally share income and costs as a unit. In addition, shared replacement rates eliminate many seeming outliers in which individuals with little or no

earnings receive extraordinarily high replacement rates based on the receipt of spousal benefits.

Replacement Rates Based on Individual Earnings and Benefits

This section details replacement rates for Social Security beneficiaries aged 64–66 in the year 2005. Analysis here is limited to nondisabled beneficiaries with a benefit start age of 62 or older.[21] This group constitutes the great majority of nondisabled beneficiaries. It does, however, omit retirees who do not qualify for Social Security benefits, and so the results should be seen as representative of the beneficiary population and not the retiree population as a whole. The analysis also omits individuals with earnings in noncovered employment such as state/local government, as MINT does not model the Windfall Elimination Provision and Government Pension Offset (WEP/GPO) that often affect such individuals. Auxiliary benefits are included in calculating these replacement rates. The replacement rate measures are the four discussed above: final earnings indicates the inflation-adjusted average of earnings in the 5 years prior to claiming benefits; PV payment represents a steady payment from age 21 to the age of first benefit claim, based on the present value of lifetime earnings; wage-indexed average reflects the AWI-adjusted average of earnings through age 61;[22] and CPI average indicates the inflation-adjusted average of earnings through age 61.

Table 1 highlights the different measures of replacement rates for individuals aged 64–66 in the year 2005. The median replacement rate relative to final earnings is 64 percent, while the median replacement rate relative to PV payment, the steady payment derived from the present value of career earnings, is 46 percent. The replacement rate for the median earner relative to the wage-indexed average earnings is 47 percent, roughly comparable with other published figures. When measured relative to the CPI-adjusted average of lifetime earnings, replacement rates rise to a median value of 56 percent.

The figures here represent the median replacement rate value for individuals grouped by wage-indexed average earnings quintile. The median replacement rate is used for each quintile rather than the mean replacement rate or the replacement rate of the median earner. The mean replacement rate by earnings quintile would be subject to distortions from outlying values, particularly for the lowest quintile where replacement rates can be extremely high. Likewise, the replacement rate for the median earner would be a single value subject to the individual circumstances of that earner, which may not be representative of the entire earnings quintile. Individuals are sorted by wage-indexed average earnings rather than current income because Social Security benefits are based on lifetime earnings.[23]

As one would expect, individuals with lower lifetime earnings receive significantly higher replacement rates under all measures than higher earning individuals. Measured against final earnings, the median replacement rate for the lowest quintile is infinite, signifying that the median individual in the lowest quintile had no earnings during the 5 years prior to claiming benefits. This should not be unduly surprising, given that low labor force participation is a primary cause of low lifetime earnings. Measured against wage-indexed average earnings, the lowest quintile receives a median replacement rate of 224 percent versus 47 percent for the middle quintile and 34 percent for the highest quintile.

To shed more light on the methods and assumptions used here, these results are compared with individual replacement rates published in SSA's 2004 Performance and Accountability Report (PAR), shown in

Table 1.
Individual median benefit replacement rates by individual lifetime earnings quintile for retired beneficiaries aged 64–66 in 2005 under alternative definitions of preretirement earnings (in percent)

Definition	Lowest	2nd	3rd	4th	Highest
Final earnings	*	82	64	59	40
PV payment	173	63	46	37	34
Wage-indexed average earnings	224	66	47	39	34
CPI average	268	77	56	46	39

SOURCE: Authors' calculations based on Modeling Income in the Near Term (MINT) model.

NOTES: PV = present value; CPI = Consumer Price Index.

* = infinity.

Table 2.
Individual median benefit replacement rates, by average lifetime earnings quintile, under alternative calculation methodologies (in percent)

Calculation	Lowest	2nd	3rd	4th	Highest
MINT [a]	224	66	47	39	34
Performance and Accountability Report [b]	70	50	40	35	30

SOURCES: Authors' calculations based on Modeling Income in the Near Term (MINT) model; 2004 Social Security Administration Performance and Accountability Report, Table IIA.2.

NOTES: These calculation methodologies use differing measures of average lifetime earnings. Thus, replacement rates based on wage-indexed average earnings (MINT) are shown by wage-indexed average lifetime earnings quintiles, and replacement rates based on the AIME (Performance and Accountability Report) are shown by AIME quintiles.

AIME = average indexed monthly earnings.

a. The MINT replacement rate is the Social Security benefit divided by lifetime wage-indexed average earnings for all nondisabled beneficiaries aged 64–66 in 2005.

b. The Performance and Accountability Report replacement rate is the Social Security benefit divided by the AIME amount for new retirees qualified for benefits based on their own earnings records in 2003.

Table 2. Several differences are immediately apparent. First, the median replacement rate from MINT (47 percent) is slightly higher than in the PAR (40 percent). Second, the replacement rate for the lowest earnings quintile in the MINT measure is several multiples higher, at 224 percent, versus 70 percent in the PAR. The PAR figures and MINT figures use reasonably comparable populations: The PAR measures replacement rates for new beneficiaries in 2003; the MINT figures are for individuals aged 64–66 in 2005. Thus, the differences in results arise from differences in how replacement rates are calculated. These differences are worth highlighting.

First, the replacement rate measure used in this article includes Social Security auxiliary benefits, while the PAR measure excludes them. Auxiliary benefits can play a significant role in retirement income adequacy, and policy changes could increase their role in the future. Thus it makes sense to include auxiliary benefits in this context, raising replacement rates across the board. Second, the MINT replacement rate measure is calculated for all nondisabled beneficiaries, but the PAR measure is calculated only for those who are qualified for benefits based on their own earnings records. Qualification for retirement benefits requires 40 quarters—roughly 10 years—of work in covered employment. This population difference accounts for the extremely high replacement rates for the lowest earnings quintile, which would have very low lifetime earnings entered as the denominator in the replacement rate calculation.

While it is appropriate to include auxiliary benefits and to measure as broad a relevant population as possible, these important measurement differences highlight why caution should be exercised in interpreting any replacement rate figures based solely on individual earnings and benefits, particularly those for very low earners. As noted above, very high replacement rates for the lowest earners often reflect auxiliary benefits paid to spouses, widows, or widowers who had little or no lifetime earnings of their own. For beneficiaries aged 64–66 in 2005, MINT estimates that only 22 percent of those in the lowest lifetime earnings quintile received retirement benefits based entirely on their own earnings records. Nearly two-thirds of this group received spouse-only benefits, meaning they did not have sufficient earnings to be eligible for their own retired worker benefits. Prior to retirement, these individuals likely subsisted on the earnings of a spouse, yet these earnings are not included in replacement rate calculations focusing on individuals. In addition, low-wage workers often pay little or no net taxes and may be eligible for a number of government transfer programs. These transfers could increase their consumption while working and their consequent need for consumption replacement in retirement. Thus, spouses who do not work outside the home and single low-wage workers have the potential to consume 100 percent or more of their earnings prior to retirement, making retirement replacement rate calculations problematic.

Some of these issues cannot be resolved, particularly as the MINT model does not capture the value

of preretirement income taxes and income transfers. However, other issues can effectively be addressed by analyzing replacement rates for a couple, who share income and consumption expenditures, rather than for an individual. For that reason, replacement rates measured on a shared basis are presented below as a more relevant method of judging retirement income adequacy.

Replacement Rates Based on Shared Spousal Earnings and Benefits

In practice, couples tend to share resources, meaning that the burden of payroll taxes and the benefits of Social Security payments fall equally on both members even if their wage earnings are very different. Thus, measuring replacement rates only on an individual level can give a distorted view of the total effects of Social Security.

To account for this, replacement rates are recalculated here on the basis of a married couple's shared resources. The shared resource calculation divides taxes or benefits evenly between spouses for all years in which they are married. It goes beyond a simple examination of workers and spouses in a given year by incorporating the earnings effects of changes in marital status throughout life. Under the shared resources approach, for instance, replacement rates for a widow who did not work outside the home would reflect the earnings her husband contributed while he was alive. Likewise, the shared resources measure can account for multiple marriages and divorces and the benefit entitlements these marriages may produce.[24]

Table 3 shows replacement rates calculated on a shared resource basis for individuals aged 64–66 in 2005. The shared replacement rate compares the individual's shared benefit with the individual's shared preretirement earnings. Note that while members of a couple will generally have the same shared benefit, they may have very different shared lifetime earnings if they were not married to each other throughout their working years. The median replacement rate for the middle earnings quintile is 69 percent based on final earnings, 42 percent when based on the PV payment, 45 percent based on the wage-indexed average, and 53 percent when based on the CPI average of lifetime earnings.

Shared resource replacement rates decline as lifetime earnings rise, although more slowly than under the individual measure. Median replacement rates for the lowest earnings quintile are significantly lower under the shared resource approach, ranging from 62 percent to 137 percent depending on the denominator used.[25] This reduction in replacement rates occurs because the denominators now include part of the lifetime earnings of current and former spouses. Likewise, replacement rates for the highest earnings quintile increase, as the shared resource measure incorporates the lower earnings and relatively generous benefits paid to the spouses of high earners. In general, the shared resource measure compresses the distribution of replacement rates across earnings levels. Examining replacement rates on a shared resource basis effectively eliminates many of the outliers found in the analysis of rates for individuals.

Replacement Rates Based on Total Retirement Income

In addition to Social Security benefits, the MINT model projects total retirement income. Estimates of total retirement income can be used to assess overall retirement preparedness. In making such calculations, however, somewhat different methods are used from those applied solely to Social Security replacement rates.

First, the numerator of total retirement income used in this analysis includes shared Social Security benefits, defined benefit (DB) pensions, earnings from current employment, income from financial assets,

Table 3.
Median shared benefit replacement rates, by shared lifetime earnings quintile for retired beneficiaries aged 64–66 in 2005 under alternative definitions of preretirement earnings (in percent)

Definition	Lowest	2nd	3rd	4th	Highest
Final earnings	137	77	69	52	42
PV payment	62	47	42	40	36
Wage-indexed average earnings	70	52	45	41	36
CPI average	82	60	53	48	42

SOURCE: Authors' calculations based on Modeling Income in the Near Term (MINT) model.

NOTES: PV = present value; CPI = consumer price index.

and co-resident income (income from nonspousal household members). Income from financial assets is calculated based on an assumed annuitization of 80 percent of total financial assets.[26] The effects of the Social Security retirement earnings test are modeled where appropriate.[27]

Second, the shared lifetime earnings denominator for each of the four replacement rate measures includes earnings in excess of the Social Security taxable maximum. These additional earnings sources are included because they can be saved while working to furnish income in retirement. Likewise, the quintiles in Table 4 include earnings above the current law taxable maximum.[28]

Total retirement income replacement rates as estimated by MINT for individuals aged 64–66 in 2005 are shown in Table 4. Total income replacement rates are generally high relative to standard rules of thumb. The median replacement rate relative to final earnings is 185 percent; relative to PV payment, the constant real amount payable from the present value of shared earnings between age 21 and retirement is 98 percent. Relative to wage-indexed average earnings, the median total retirement income replacement rate is 106 percent. The median replacement rate relative to the CPI-indexed average of lifetime earnings is 124 percent.

As these outcomes are quite high and include almost all major sources of income with the exception of noncash government transfers and implicit rent, it is important to note the roles of different income components. Table 5 shows the percentage of total income supplied by each income source, broken down by quintiles of total wage-indexed lifetime earnings. Overall, Social Security benefits provide about 40 percent of total income for nondisabled beneficiaries aged 64–66 in 2005. Asset income and DB pensions provide approximately 25 percent and 10 percent of total income, respectively. Earnings provide an additional 20 percent of total retirement income, and co-resident income provides around 5 percent for the typical individual. SSI payments are relevant only for those in the bottom quintile of lifetime earnings.

These proportions allow for approximations of different replacement rate measures based on different income sources. For instance, one might wish to omit co-resident income and earnings, as these may not continue throughout retirement. As they make up

Table 4.
Median shared total retirement income replacement rates, by shared lifetime earnings quintile for retired beneficiaries aged 64–66 in 2005 under alternative definitions of preretirement earnings (in percent)

Definition	Lowest	2nd	3rd	4th	Highest
Final earnings	381	210	185	161	143
PV payment	160	111	98	108	115
Wage-indexed average earnings	176	120	106	112	112
CPI average	204	141	124	130	130

SOURCE: Authors' calculations based on Modeling Income in the Near Term (MINT) model.

NOTES: PV = present value; CPI = consumer price index.

Table 5.
Composition of total retirement income, by shared lifetime earnings quintile for retired beneficiaries aged 64–66 in 2005 (percentage distribution)

Income source	All	Lowest	2nd	3rd	4th	Highest
Social Security	39	47	43	41	35	29
Earnings	20	16	22	19	20	25
DB pensions	10	8	9	11	11	12
Asset income	25	19	20	25	31	31
Co-resident income	5	9	6	4	3	3
SSI	0	1	0	0	0	0

SOURCE: Authors' calculations based on Modeling Income in the Near Term (MINT) model.

NOTES: Sums may not equal 100 due to rounding.

DB = defined benefit; SSI = Supplemental Security Income.

roughly 25 percent of total retirement income, one could multiply median replacement rates in Table 4 by 0.75 to arrive at approximate replacement rates provided by the combination of Social Security, DB pensions, assets, and SSI. By this measure, the median value would fall to 163 percent relative to final earnings, and to 92 percent, 96 percent, and 114 percent relative to PV payment, wage-indexed average, and CPI average, respectively.

The results in Table 4 point to somewhat higher income adequacy for current retirees than many suppose. Under these measures, the median income for an individual aged 64–66, excluding current earnings and nonspousal co-resident income, exceeds his or her average working-age earnings by almost one-quarter. Retirement income is also significantly higher than earnings in the 5 years immediately preceding retirement. It should be noted that significant dispersion in benefits and replacement rates can exist even for Social Security beneficiaries with the same lifetime earnings. In particular, the relative earnings between spouses can alter eligibility for and generosity of Social Security spousal benefits, which can significantly affect total benefits.

Because of the dispersion of replacement rates, it is informative to measure the percentage of the sample that exceeds a target replacement rate. The National Retirement Risk Index (NRRI) projects that a household would need total retirement income to replace between 67 percent and 81 percent of wage-indexed average earnings, depending on its income (Munnell, Webb, and Delorme 2006). Out of caution, a benchmark of 80 percent of wage-indexed average earnings, toward the high end of this range, is used; then the percentage of individuals who fall short of this level is measured. Among individuals aged 64–66 in 2005, around 17 percent would have total retirement income replacement rates below 80 percent of wage-indexed average earnings. Individuals in the lowest and second lowest quintiles of shared wage-indexed average earnings are at greatest risk of absolute deprivation; among them, 16 percent and 12 percent, respectively, would have total income replacement rates under 80 percent.

While these figures are helpful, they overestimate the population failing to reach the NRRI's target replacement rates for three reasons. First, as noted above, the NRRI indicates that many individuals would be adequately prepared with a replacement rate as low as 67 percent, but we count anyone below 80 percent as at-risk. Second, the NRRI definition of retirement income includes the annuitized value of all financial assets, while the MINT calculations annuitize only 80 percent. And third, the NRRI definition of retirement income includes the imputed rent on housing equity, but MINT calculations do not.

Still, the percentage of retirees who are at risk may rise in the future, owing to changes in the Social Security benefit formula, the coverage and generosity of private pensions, and increases in health care costs.

Replacement Rates at Older Ages

After retirement, replacement rates change as an individual ages. Table 6 replicates the replacement rate calculations shown in Table 4 but uses MINT model projections of retirement income for the same birth cohorts at ages 79–81. For purposes of comparison, the population is restricted to those collecting Social Security benefits as of ages 64–66 in 2005; in addition, individuals are grouped into the same lifetime earnings quintile they occupied in Table 4, even if a declining population due to mortality would have shifted them to other quintiles.

Perhaps unexpectedly, total income replacement rates at ages 79–81 are somewhat higher than at

Table 6.
Median shared income replacement rates, by shared total earnings quintile for retired beneficiaries aged 79–81 in 2020 under alternative definitions of preretirement earnings (in percent)

Definition	Lowest	2nd	3rd	4th	Highest
Final earnings	481	205	199	176	153
PV payment	150	105	103	109	124
Wage-indexed average earnings	171	117	110	113	123
CPI average	201	136	129	133	142

SOURCE: Authors' calculations based on Modeling Income in the Near Term (MINT) model.

NOTES: Includes earnings above the Social Security taxable maximum wage cap; for clarity, individuals are grouped into the same lifetime earnings quintile they occupied in 2005, even if declining population due to mortality would have shifted them to other quintiles.

PV = present value; CPI = consumer price index.

ages 64–66. For instance, median replacement rates relative to wage-indexed average earnings rise from 106 percent to 110 percent. Replacement rates fall for lower earners and rise for higher earners, but these changes are slight. To provide context, projected real median monthly income changes little over time ($2,423 in 2005 and $2,477 in 2020), but smaller household sizes cause poverty rates to decline slightly from roughly 2.5 percent to 2.2 percent.[29]

A number of factors could affect replacement rates over the course of retirement. Some factors could reduce replacement rates, including lower earnings from employment, declining assets, and the lack of inflation protection in annuities or DB pension payments.

However, other factors could increase replacement rates. For instance, Social Security payments could rise for individuals switching from retirement benefits based on their own earnings to widow or widower's benefits derived from a higher-earning spouse.[30] Likewise, asset income could rise, as some retirees are net savers and others could inherit sums from a deceased spouse. Moreover, if women have higher replacement rates and lower mortality than men, they could make up a greater proportion of a given birth cohort as it ages through retirement. In this case, individual replacement rates may not rise, but average replacement rates could increase as men with lower replacement rates leave the sample.

These results differ from those presented in Butrica (2007), where replacement rates decline through retirement. Using the MINT model to analyze the 1926–1939 birth cohorts, Butrica shows a median replacement rate of 105 percent of wage-indexed earnings at age 67, falling to 90 percent by age 80.[31] By contrast, the median replacement rate relative to wage-indexed average earnings for the middle quintile of lifetime earners in our analysis is 106 percent among beneficiaries aged 64–66 in 2005, rising to 110 percent by 2020 when these individuals would be aged 79–81. This disparity of 20 percent in typical replacement rates at age 80 again highlights the importance of clearly defining how replacement rates are calculated.

In Butrica, the replacement rate is calculated as the ratio of income at a given age to shared lifetime earnings, defined as the wage-indexed average of shared earnings from ages 22 through 62, indexed to the age of analysis.[32] Although values for the younger retiree are similar between the two analyses, the difference in the denominator used in the two studies could cause small changes in individual outcomes. The denominator in this analysis most similar to Butrica's is wage-indexed average earnings. However, our wage-indexed average earnings measure is indexed to age 60; Butrica's denominator is indexed to the year of analysis, in this case, age 67. An additional 7 years of wage indexing would increase the denominator by over 7 percent, assuming 1 percent real wage growth; this would reduce replacement rates by roughly 3 percentage points. Overall, these factors may offset, but it is worth bringing them to attention. Other factors that could generate different replacement rates include variations in sample size, how the replacement rates are computed or shown for those with no lifetime earnings, and how the lifetime earnings quintiles are distributed, to name just a few.

More important are the measurement differences that produce the decline in replacement rates through age 80 in Butrica's analysis. In our analysis, the replacement rate denominator is calculated once and its inflation-adjusted value does not change between ages 64–66 and 79–81. Thus, changes in replacement rates are driven entirely by changes in incomes. In Butrica's analysis, the average of earnings between ages 22 and 62 is, in effect, wage indexed to the age of analysis.[33] Thus, between ages 67 and 80 the denominator increases by $(1+g)^{13}$, where g represents average real wage growth in the intervening years. The geometric mean annual increase in real wage growth for the 13 years between 67 and 80 for the 1926–1939 birth cohorts averaged 1.31 percent, based on data from the Social Security Trustees Report. The effect of wage indexing on the replacement rate denominator alone would be sufficient to reduce a 106 percent replacement rate to approximately 90 percent, but other factors surely also affected replacement rates between 67 percent and 80 percent. In other words, even if retirement income were constant in real terms throughout retirement, the denominator used in Butrica would imply declining replacement rates.

The replacement rate used in Butrica at age 80 is less a measure of retirement income relative to pre-retirement earnings than it is a comparison of retiree income to the earnings of contemporaneous workers. While comparisons of pension benefits to average economy-wide wages are sometimes used to analyze the relative well-being of retirees and workers, they seem less useful in evaluating the income adequacy of individual retirees. These results indicate again that although replacement rates are helpful tools for measurement and planning, careful attention must be given to how replacement rates are defined and applied.

Table 7.
Median shared benefit replacement rates, by lifetime earnings quintile for retired beneficiaries aged 64–66 in 2040 under alternative definitions of preretirement earnings (in percent)

Definition	Lowest	2nd	3rd	4th	Highest
Final earnings	91	61	55	52	38
PV payment	73	50	44	39	33
Wage-indexed average earnings	65	45	39	34	29
CPI average	79	54	48	42	35

SOURCE: Authors' calculations based on Modeling Income in the Near Term (MINT) model.

NOTES: PV = present value; CPI = consumer price index.

Table 8.
Median shared total retirement income replacement rates, by total shared lifetime earnings quintile for retired beneficiaries aged 64–66 in 2040 under alternative definitions of preretirement earnings (in percent)

Definition	Lowest	2nd	3rd	4th	Highest
Final earnings	209	144	131	121	176
PV payment	137	104	96	98	119
Wage-indexed average earnings	121	91	84	88	102
CPI average	146	110	100	106	124

SOURCE: Authors' calculations based on Modeling Income in the Near Term (MINT) model.

NOTES: PV = present value; CPI = consumer price index.

Replacement Rates for Future Retirees

For reference, we project replacement rates for future retirees using MINT model projections of future earnings, marital patterns, savings and wealth accumulation, and other factors. Tables 7 and 8 provide projected shared Social Security and total retirement income replacement rates for individuals aged 64–66 in the year 2040. These are calculated in the same manner as the figures for 2005.

These projected replacement rates allow for two comparisons. First, on the methodological end, it is interesting to note that while the PV payment measure produces lower median Social Security replacement rates than the wage-indexed average earnings measure in 2005 (42 percent versus 45 percent), in 2040 the opposite is true: the projected median replacement rate using PV payment as the denominator is 44 percent, versus 39 percent for the wage-indexed average.

Second, the 2040 figures provide information on the projected retirement preparedness of the 1974–1976 birth cohorts. Shared Social Security replacement rates for the median earner are somewhat lower using all measures except for PV payment, reflecting declines in benefits owing to scheduled increases in the full retirement age from 65 to 67. For instance, the median replacement rate of benefits relative to the CPI average declined from 53 percent in 2005 to 48 percent in 2040. These declines appear to be relatively uniform across the earnings spectrum. One exception is a large decline in replacement rates relative to final earnings for the bottom earnings quintile, from 137 percent to 91 percent. However, final earnings are more volatile than the other measures, and this decline presumably reflects increased labor force participation later in life among lower earners.

Table 8 shows shared total retirement income replacement rates for individuals aged 64–66 in the year 2040, calculated using the same methods as in Table 4. In contrast with Social Security replacement rates shown in Table 7, which would be only slightly lower than in 2005, total retirement income replacement rates in 2040 are projected to be significantly below those in 2005. This reduction reflects a variety of factors. In addition to declining Social Security replacement rates, which are a component of the total replacement rate, lower participation in relatively generous DB private pensions and longer life spans over which accumulated wealth must be spread contribute to lower overall replacement rates in 2040. In addition,

MINT projects retiree earnings to be lower relative to preretirement earnings in 2040 than in 2005.

It is unclear whether these reductions denote inadequate retirement incomes, given there is no definitive standard of replacement rate adequacy. Median replacement rates relative to the wage-indexed average in all earnings quintiles are above 80 percent, a standard that is often mentioned, and in all earnings quintiles, median retirement income exceeds 100 percent of the CPI average of earnings during working years. That being said, 39 percent of beneficiaries aged 64–66 in 2040 would have total income replacement rates below 80 percent of wage-indexed average earnings. About 28 percent of those in the lowest lifetime earnings quintile would have replacement rates below 80 percent. Regardless of whether 80 percent is an appropriate target replacement rate and wage-indexed earnings are an appropriate denominator in the replacement rate calculation, these figures show a projected decline in retirement adequacy from 2005 through 2040. Additional research is necessary to better judge the adequacy of projected future retirement resources.

Discussion and Conclusions

Replacement rates are a common and useful tool used by individuals and policy analysts to plan for retirement and assess the sufficiency of Social Security benefits and overall retirement income. Different measures of preretirement earnings are used in calculating replacement rates, and comparisons of replacement rates using different denominators can be misleading. This article presents various ways of measuring replacement rates and applies these measures to a sample population of retirees generated though the Social Security Administration's (SSA's) MINT model.

Financial advisors generally measure replacement rates relative to final earnings, while SSA measures replacement rates relative to average indexed lifetime earnings. This difference can lead to inappropriate conclusions about the adequacy of typical Social Security benefit payments. According to the financial advisors' maxim that individuals require a total retirement income equal to 70 percent to 90 percent of earnings immediately preceding retirement, most current Social Security beneficiaries appear to have an adequate income. However, final earnings are a more erratic measure than lifetime earnings, so no strong conclusions should be drawn from this finding. Unfortunately, no current rule of thumb allows for easy calculations of retirement income adequacy relative to lifetime earnings.

This article outlines four alternative measures of preretirement earnings: final earnings, which is the measure used by most financial advisors; the wage-indexed average of lifetime earnings, which is the measure generally used by SSA; the inflation-indexed average of lifetime earnings, also known as the CPI average; and PV payment, the steady income payable from the present value of lifetime earnings. Replacement rates calculated using these four earnings measures are applied to Social Security beneficiaries aged 64–66 in SSA's MINT model in 2005. The replacement rate provided by a given level of retirement income can differ significantly based on the measure of preretirement earnings to which it is compared.

Several conclusions can be drawn from these results. First, measuring replacement rates is far from straightforward, and different replacement rate measures can result in widely different indicators of retirement income adequacy. Measured replacement rates will differ based on whether preretirement earnings are measured immediately preceding retirement or on a lifetime basis; whether earnings are discounted for inflation, wage growth, or market interest; whether earnings are capped at the Social Security payroll tax ceiling; whether they are combined with the earnings of a spouse; and other factors. Different calculations may be relevant to different circumstances and so the concept of a single "replacement rate" may be simplistic. In any case, it is most important that replacement rates be defined explicitly to avoid confusion between different replacement rate measures.

Second, Social Security pays higher average replacement rates to those with lower lifetime earnings, although there is significant dispersion of replacement rates within groups with similar lifetime earnings. The distribution of replacement rates by lifetime earnings level is narrowed significantly when viewed on the basis of shared rather than individual income, signifying that a significant portion of Social Security's redistribution flows within married couples rather than between married couples of different lifetime earnings levels.[34]

Third, total retirement income replacement rates for beneficiaries aged 64–66 in 2005 compare favorably with the benchmarks established by the World Bank and are projected to remain so as these individuals age. Although there are reasons for concern about future retirees, whose replacement rates are projected to decline owing to Social Security policy changes,

changes in the use and terms of private pensions, and other factors, the replacement rates for current retirees are surprisingly strong.

While replacement rates are not the most sophisticated means of measuring retirement income adequacy, because of their simplicity it appears inevitable that replacement rates will remain common measurements both for individuals conducting their own retirement planning and for policymakers judging the adequacy of Social Security benefit payments. For this reason it is important to examine current and potential replacement rate measures critically. Continued research into replacement rates may improve their utility in these important roles.

Notes

[1] An additional question is whether the earnings denominator should include earnings above the Social Security taxable maximum amount or earnings from non-Social Security–covered employment. This article uses earnings in excess of the taxable maximum from Social Security–covered employment in calculating total retirement income replacement rates, but uses only earnings from covered employment up to the cap for calculating Social Security benefit replacement rates.

[2] See Appendix 1, available at http://www.ssa.gov/history/reports/gspan16.html.

[3] For instance, workers in a larger organization promising long-term employment may easily be able to predict future wages, while individuals changing employers or fields may have more difficulty.

[4] This "work or retirement" choice is relevant particularly for workers with defined benefit pensions, where it is generally difficult to continue work in the same job while receiving retirement benefits.

[5] This smooth consumption path is based on the assumption that the marginal utility of consumption is declining, meaning that the last unit of consumption in a period produces less utility than the first. If so, then shifting an additional unit of consumption from a period of higher to lower consumption tends to maximize the marginal utility of consumption in each period, and thus maximize the summed utilities of periodic consumption over the individual's lifetime. More precisely, the life cycle model predicts that individuals will seek to smooth the *marginal utility* of consumption rather than simply the *level* of consumption. Thus, for instance, retirees may choose to consume more when relatively young, as their better health status would better enable them to enjoy consumption activities such as travel and recreation. However, consumption smoothing is often used as a simplifying device and should not affect the basic results shown here.

[6] The real interest rate is used to produce a real payment amount; the nominal payment is assumed to increase annually at the rate of inflation.

[7] The medium wage earnings pattern is derived from Clingman and Nichols (2007).

[8] Earnings past age 60 are not indexed.

[9] Historical values for the average wage index are available at http://www.ssa.gov/OACT/COLA/awiseries.html.

[10] Technically, the replacement rates in the Trustees Reports do not use an AIME-based denominator because earnings are wage-indexed to the year prior to retirement instead of age 60. Thus, small differences exist between these rates and those that would be found using an AIME-based denominator. Also note that the stylized medium earner is in the 57th percentile of the lifetime earnings distribution and thus has slightly higher earnings than the median worker in the population. (The low- and the high-scaled workers are at the 27th and 82nd percentiles of the earnings distribution.) See Clingman and Nichols (2007).

[11] Through the 2000 Social Security Trustees Report, replacement rates were measured relative to final earnings, defined as earnings in the 12 months prior to claiming benefits. Illustrative replacement rates were calculated for low-, medium-, and high-earning individuals earning a steady 45 percent, 100 percent, and 160 percent of the average wage, respectively, along with an individual earning the maximum taxable wage annually. In 2001, the Report began illustrating benefits and replacement rates using stylized "scaled earners," whose age-earnings profile better fits the inverted-U shape commonly found in practice. See Clingman and Nichols (2007). As the low-, medium-, and high-scaled earners were designed to have the same AIMEs as the steady-wage illustrative workers, the replacement rates for scaled workers relative to average indexed wages would be very similar to those for similar constant wage workers relative to final earnings.

[12] See Carroll (1996), especially Figure V.

[13] It should be noted, however, that a CPI-indexed measure of lifetime earnings relates only to measures of benefit adequacy and is not related to current policy debates over the desired rate of growth of initial benefits between succeeding cohorts (often referred to as a debate between "wage indexing" and "price indexing"). Lifetime earnings, whether measured as a wage- or price-indexed average, will grow over time at the rate of wage growth and thus retirement benefits replacing a given percentage of lifetime earnings would grow at the same rate. The policy debate over wage and price indexing asks whether initial retirement benefits should continue to rise with wage growth from cohort to cohort.

[14] The Social Security benefit formula is gender-neutral and spousal benefits can be paid to either a husband or a wife. In the great majority of cases, however, the recipient of spousal benefits is the wife.

[15] In the MINT model, slightly less than 60 percent of nondisabled female beneficiaries in 2005 receive some form of spousal or widow benefit either as a supplement to their own worker benefit or as their only benefit. When looking at only those age 65 in the 2005 population, this percentage drops to about 44 percent. The proportion of women expected to claim benefits only from their own record is projected to increase in future years as benefit entitlement more closely reflects the increase of women in the workforce. Changes in marital composition, such as increasing numbers of never-married individuals and divorced individuals married for less than the 10-year requirement for spousal benefits, would also reduce the role of auxiliary benefits in future years.

[16] The full retirement age was 65 through most of Social Security's history. In 2000 it began to be adjusted upward, generally in 2-month increments, eventually to age 67. A full retirement age above 65 lowers replacement rates relative to a full retirement age of 65, regardless of actual retirement age. For the individuals used in the MINT analysis, the full retirement age is 65 and 2 months.

[17] Myers also calculates "net replacement rates" under current law for workers of various earnings levels retiring at 65 in 1990, taking into account federal and state taxes and working expenses. He finds that for the lowest earners, Social Security will "take care of the full economic needs of very low earners reasonably well," while for middle-wage earners, Social Security benefits provide substantial but not total retirement income (Myers 1993, 211).

[18] McGill and others (2005) use a stylized earnings pattern wherein real wages rise until age 55 then remain constant in real terms thereafter.

[19] In the context of replacement rates, the World Bank uses the term "household" to include individuals in addition to the retired worker and spouse. Because the MINT data used in this article do not include children, we avoid the use of the term "household" except when generally applicable or when it may appear in source materials. For the purposes of comparison, we define a household as comprising a married couple or a single retired beneficiary.

[20] Additional information on the MINT model can be found in Toder and others (2002).

[21] Analysis is limited to the nondisabled, as calculating replacement rates based on the truncated lifetime earnings of disabled individuals could skew the results.

[22] As Social Security benefits are calculated under current law, an individual does not technically have an AIME unless he or she has qualified for benefits by attaining 40 quarters of covered employment. The AIME figure here is calculated for all individuals in the MINT population, not merely for those who become fully insured based on their own earnings.

[23] Additionally, sorting by lifetime earnings rather than current income avoids distortions in total retirement income replacement rates. In those cases, individuals who increase their current income through employment would both raise their replacement rates as well as their placement in the overall income distribution.

[24] Thus, the shared resource measure differs from a household or married-couple measure in that the shared measure effectively tracks individuals and couples over the course of their lives while a typical household measure examines them at one point.

[25] The method of calculating replacement rates relative to the final 5 years of earnings merits attention. Individuals with no earnings in the 5 years immediately prior to claiming benefits would have an infinite replacement rate. To avoid infinite values while retaining such individuals in the population, these individuals are assigned replacement rates equal to the highest replacement rate of any individual in their lifetime earnings quintile. This method should not affect stated median values except in the case where the median value is infinite.

[26] To the degree that individuals consume assets at different rates, realized replacement rates at ages 64–66 would differ; those who consumed their assets more quickly would have higher replacement rates early in retirement but lower rates in later years, while those who consumed their assets more slowly would have lower replacement rates at ages 64–66 and higher replacement rates later. In general, individuals appear to reduce their consumption somewhat as they enter retirement; see Hurd and Rohwedder (2003).

[27] Slight differences may exist between the modeling of the retirement earnings test in MINT and its application in real life. In practice there are sometimes delays in the reporting of earnings and discrepancies between projected and realized earnings.

[28] Note that the population used throughout this article excludes individuals with earnings from employment not covered by Social Security, such as certain state and local government employees.

[29] Poverty rates as measured in the MINT model tend to be somewhat lower than official poverty statistics, as the SIPP data used in building the MINT model include more asset income than do official poverty measures.

[30] In these cases, replacement rates could rise even if household income declined because the household size was reduced. Whether the surviving spouse's economic well-being rises or falls depends on the change in total income relative to the change in the cost of living and for an individual relative to a couple.

[31] Strictly speaking, Butrica measures the median replacement rates as the mean value of the 40th to 60th percentiles of replacement rates.

[32] Earnings in this context include earnings above the Social Security payroll tax ceiling, consistent with our analysis of total retirement income.

[33] To see this, note, for example, that Butrica's replacement rate for age 80 (R80) can be written as follows: R80 = I80 / (KSAIME * E80), where I80 is the respondent's nominal shared income at age 80, E80 equals the average earnings in the economy in the year the respondent turns age 80, and KSAIME is the average *ratio* of the respondent's shared earnings to economy-wide average earnings from age 22 through age 62. In the denominator, the average ratio of the respondent's shared earnings is multiplied by economy-wide earnings in the year the respondent turns age 80.

[34] On this point, see Gustman and Steinmeier (2001).

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