Social Security and Marginal Returns to Work Near Retirement

by Gayle L. Reznik, David A. Weaver, and Andrew G. Biggs

Using the Social Security Administration's MINT (Modeling Income in the Near Term) model, this paper calculates the marginal returns to work near retirement, as measured by the increase in benefits associated with an additional year of employment at the end of an individual's work life. With exceptions for certain population subgroups, the analysis finds that marginal returns on Social Security taxes paid near retirement are generally low. The paper also tests the effects on marginal returns of a variety of potential Social Security policy changes designed to improve incentives to work.

Summary

Using the Social Security Administration's MINT (Modeling Income in the Near Term) model, which matches Survey of Income and Program Participation (SIPP) data with Social Security earnings records, this paper calculates the marginal return in Social Security benefits on the contributions paid during an additional year of employment at the end of an individual's work life. Although Social Security is roughly neutral with regard to the age at which individuals claim benefits, it is not so with regard to additional work at older ages. The paper finds that marginal returns on Social Security taxes paid near retirement are generally low. Men tend to receive low returns for extending employment at the end of their work life because Social Security benefits are based on the highest 35 years of earnings, so that work years beyond 35 add little or nothing to final benefits. However, the results vary among subgroups; for example, men with low lifetime earnings have relatively high returns. Women often receive low returns on their own contributions because many receive spousal benefits in addition to their own benefits. In the future, however, as women's lifetime earnings rise, the auxiliary benefit structure will play a smaller role in overall incentives, and marginal returns will rise. The paper also tests the effects on marginal returns of a variety of potential Social Security policy changes designed to improve incentives to work.

Introduction

In recent years, numerous studies have analyzed the rates of return on Social Security contributions, and how average returns evolve over time as demographic factors affect the program's financing. A variety of means have been used to assess if beneficiaries "get their money's worth" under Social Security, including the internal rate of return (IRR) on accumulated contributions, the net present discounted value of benefits and taxes, and the ratio of the discounted present values of benefits to taxes.[1] Social Security is primarily a pay-as-you-go program that transforms taxes from current workers to benefits for current retirees, survivors, and the disabled. As such, the steady-state implicit rate of return paid by the program will equal the growth of aggregate wages, roughly equal to labor force growth plus real wage growth.[2] Even though future wages are projected to grow at rates roughly equal to those in the past, declining fertility is projected to lead to slower labor force growth, reducing average returns payable to future participants.[3]

These studies are of interest, yet their applicability is limited in important ways. Low returns for present and future Social Security participants are principally a function of changing demographics, generous payments to past participants, and the relatively low risk profile of the Social Security benefit structure. Once these factors are accounted for, there is little that can be done to alter risk-adjusted

average returns going forward (Geanakoplos, Mitchell, and Zeldes 1998).

Although average returns on Social Security have been the subject of much literature, far less attention has been paid to the program's marginal return, defined as the return paid on a small increment of additional earnings and contributions. This is puzzling, given that marginal returns *can* be altered through policy changes, even when the average returns payable by the program stay the same. Moreover, the marginal return is more relevant to work and retirement decisions than the average return, and is thus significant to analysts and policymakers examining Social Security's effect on the retirement decision.

As average life expectancies have increased, the average age at which individuals claim Social Security benefits has declined. The average age of new Old-Age, Survivors, and Disability Insurance (OASDI) beneficiaries for men has fallen from 68.4 in 1955 and 65.7 in 1965 to 63.7 in 2004 (Social Security Administration [SSA] 2006, Table 6.B5). Early claiming of Social Security benefits implies significant reductions in monthly payments throughout the beneficiary's retirement. For example, for persons born in 1937 or earlier, benefits claimed at the earliest eligibility age of 62 are reduced 20 percent. The reductions for early retirement are higher for later birth cohorts because of changes in Social Security's full retirement age (FRA) (the early retirement reduction reaches 25 percent for the 1943–1954 birth cohorts and 30 percent for the 1960 and later birth cohorts).[4]

Some analysts are concerned that individuals are not saving sufficiently on their own to provide for adequate retirement income given both longer life spans and the reduced Social Security benefits that early claiming can produce. This is particularly so given the prospects of rising retiree health care costs.[5] Although efforts are under way to encourage personal saving through simplified investment processes (such as life-cycle funds) and default participation in retirement savings plans, to date it is unclear how successful these efforts will be.

In that context, many argue that it would be sensible for individuals to spend additional years in the workforce prior to retiring. Longer work lives result not only in higher Social Security benefits, but also in a longer period in which individuals are adding to rather than subtracting from retirement savings and in a shorter retirement period over which savings would be expended. Butrica, Smith, and Steuerle (2006) conclude that an additional 5 years in the labor force would raise total retirement income for an individual with median lifetime earnings by roughly 60 percent; for an individual in the lowest earnings quintile, total retirement income would almost double, increasing 98 percent.

A number of public policies could encourage delayed retirement, including changes to health care and private pension policies. However, it is worth considering the role of the Social Security program in encouraging or discouraging additional work for individuals eligible to claim benefits. The Social Security payroll tax is the largest tax borne by many workers, and Social Security benefits constitute the largest source of income for a significant number of retirees.[6]

For that reason, the Social Security tax and benefit structure can have important effects on incentives to participate in the labor force. These incentives are expressed through the marginal return on taxes paid into Social Security and may be particularly important for individuals near retirement, to whom the option of leaving the workforce is often available. Several factors influence marginal returns, including the type of benefit an individual receives in retirement, the individual's work history, and program rules.

In this paper, the second section, which follows, provides details on the Social Security benefit formula; the third section provides details on the rate of return measures used; the fourth section details the results of analysis using SSA's MINT model; and the fifth and sixth sections discuss how marginal returns may change over time under current law and under several potential policy changes to the current tax and benefit schedules. The last section concludes with a summary of the results and further discussion.

The Social Security Benefit Formula

Retired-worker benefits, the most common type of benefits paid under the program, are calculated using an average of the worker's 35 highest years of earnings.[7] The benefit formula replaces a larger portion of preretirement earnings for workers with lower average earnings and a smaller portion for those with higher earnings. For example, the basic benefit formula for a worker who first becomes eligible to receive benefits in 2009 is:

(a) 90 percent of the first $744 of average indexed monthly earnings; plus

(b) 32 percent of average indexed monthly earnings over $744 through $4,483; plus

(c) 15 percent of average indexed monthly earnings over $4,483.[8]

The basic benefit, called the primary insurance amount (PIA), is the amount paid if benefits are claimed at FRA. This amount is adjusted annually for inflation so that benefits maintain their purchasing power throughout a person's retirement years.

As noted above, benefit payments are adjusted for individuals who claim benefits before or after reaching FRA. These adjustments are roughly actuarially neutral on average, meaning that the present value of expected lifetime benefits for the typical individual would not change according to the age at which benefits are initially claimed. This aspect of the Social Security program improves incentives to delay claiming relative to systems in other countries with no actuarial adjustments. Gruber and Wise (1997) highlight the contrast between the U.S. program and those in other countries, noting that incentives to delay claiming are weaker where there are no such adjustments. Our own work using the MINT model tends to confirm that the age at which Social Security benefits are first claimed has little average impact on lifetime benefits.

Social Security also pays spouse and survivor benefits based on the earnings records of current, former, or deceased spouses. A married person, or a divorced person who was married to the worker for at least 10 years, can receive a benefit equal to 50 percent of the spouse's or ex-spouse's PIA (and a survivor can receive up to 100 percent) if benefits are claimed at the FRA. This paper refers to these as auxiliary benefits. Some individuals are dually entitled under Social Security, meaning they have earned a retired-worker benefit based on their own earnings but are also entitled to an auxiliary benefit that is higher. In these cases, the total benefit paid is equal (or approximately equal) to the spouse or survivor benefit.

Social Security program rules are gender-neutral but the different earnings patterns of men and women can imply different marginal returns from Social Security. Women tend to have shorter work histories and are more likely to receive auxiliary benefits, which flow to the lower-earning spouse in a couple. These two factors affect their marginal returns in opposite ways. Among those receiving a worker benefit from Social Security, marginal returns generally increase for individuals with shorter work histories because additional earnings are more likely to be used in the benefit formula. This would tend to produce higher marginal returns for women, as men's work histories more often exceed the 35 years used to calculate Social Security benefits. On the other hand, receiving full or partial auxiliary benefits depresses marginal returns because auxiliary benefits are based on a current, former, or deceased spouse's earnings record rather than one's own. Thus, recipients of auxiliary benefits are less likely to receive higher benefits in exchange for additional contributions to the program.

Rate of Return Measures

Earnings determine taxes paid into the program[9] and benefits received by workers, spouses, and survivors. The link between earnings, taxes, and benefits has given rise to discussions of "money's worth" in the Social Security program, one measure of which is the real internal rate of return (IRR).[10] The IRR is the real annual interest (or discount) rate at which the present discounted value of taxes paid is equal to the present value of benefits received. It can be compared to the interest paid on an investment or a bank account. In most cases, the IRR is measured over an individual's lifetime.

This paper examines three IRR measures: lifetime shared, marginal, and incremental. These measures are defined below. The Results section of this paper focuses on marginal IRRs because they assess work incentives near retirement, but we also include some information on the other two measures to provide context to the discussion.

The lifetime shared IRR considers taxes paid over the working life relative to lifetime benefits received. This measure captures average returns (the most common focus in the literature) and is used to analyze the relative treatment of different individuals under the Social Security benefit formula. Under this measure,

taxes and benefits are shared between spouses. The shared approach is based on the idea that couples tend to share taxes and benefit payments equally. Thus in each year a couple is married, the shared approach attributes half of earnings and half of benefits received to each individual.[11]

The marginal IRR considers taxes paid and benefits received based on an additional unit of work. This measure can be used to analyze incentives to remain in the workforce toward the end of a working lifetime. For each individual in the MINT sample population, a simulated year of earnings was added at the end of the individual's work life (in the year after the last year of actual or projected earnings).[12] The individual's simulated earnings for this additional year equal the average of his or her non-zero earnings over the preceding 5 years.[13] We calculate an IRR from these additional earnings and contributions, and any additional individual or auxiliary benefits generated from them.

The marginal IRR focuses on work incentives toward the end of the work life. An individual who works an additional year but receives no additional benefits would have a marginal IRR of −100 percent. This could happen if the individual's additional year of earnings is not in the highest 35 years of earnings, so that it would not enter the benefit formula, or if the individual receives auxiliary benefits in each year of retirement. For others, the marginal IRR would depend, among other things, on the PIA formula factors (the 90 percent, 32 percent, and 15 percent factors of the basic benefit formula) that are relevant. For example, replacement rates are higher for low earners, so additional earnings could have relatively large effects on retirement benefits. Likewise, an additional year of work might entitle an otherwise ineligible individual to benefits; this could produce a very high marginal IRR.

Incremental IRRs offer a perspective that includes aspects of both the lifetime and marginal IRR measures. As with the marginal IRR, the incremental measure seeks to capture work incentives. It differs, however, in that it encompasses the individual's entire career. Specifically, the incremental IRR is the discount rate at which the taxes paid over an individual's working life equal the benefits he or she would receive over and above any potential auxiliary benefits the individual could have received based on another person's earnings record had the individual not worked. This measure can be used to analyze incentives to enter the workforce over an entire career, relative to other options such as unpaid work. An individual's

auxiliary benefits are not linked to his or her work history and taxes paid; rather, they are based on the earnings of a current or former spouse. The incremental IRR subtracts these potential or actual auxiliary benefits from the benefit stream in retirement. For example, an individual who pays any taxes into the system over his or her career (but not enough to be eligible for benefits based on that work) and receives auxiliary benefits for each year in retirement would generally have an incremental IRR of −100 percent.

Calculated marginal or incremental returns can often be very different from those received on a lifetime basis. An incremental or marginal IRR of −100 percent would indicate additional earnings led to additional taxes but no additional benefits. Negative values between 0 percent and −100 percent indicate some additional benefits were generated, but that the return on taxes was negative. Positive IRR values can be thought of as the interest rate earned on taxes paid. For reference, the projected interest rate on the Social Security trust funds is 3.0 percent above inflation in the version of MINT used in this paper.[14] A return at this rate is sometimes referred to as being "actuarially neutral" or "actuarially fair."[15]

It is important to note that the marginal and incremental IRRs assess work incentives, but not necessarily the generosity or fairness of benefits relative to taxes. For example, an auxiliary beneficiary may receive an "adequate" benefit from Social Security and may have paid little or no taxes. Such a person may have faced low incentives to work from Social Security, but may nevertheless have been treated generously by the program. The lifetime shared IRR assesses the latter point for such an individual and others in the Social Security system.

Results

The MINT microsimulation model, which matches SIPP data and Social Security earnings records, contains thousands of individual work histories based on sample data and projections about the future. In MINT, individuals work, marry, divorce, retire, and eventually die. MINT calculates benefits based on individuals' own earnings, as well as auxiliary benefits based on earnings of household members.[16]

The analysis samples include individuals aged 62–65 in 2005 and, separately, individuals aged 62–65 in 2035. For the incremental and marginal IRRs, individuals who make no payroll tax contributions over their careers, or who are projected never to receive benefits from Social Security, are excluded from the analysis.

Analogous restrictions are imposed for the lifetime IRRs, but shared taxes and benefits are used.[17] We also exclude individuals who ever received disability benefits from Social Security, as these individuals are presumed to be unable to remain in the workforce. Finally, for the marginal IRRs, an additional restriction is to exclude persons whose last positive year of earnings occurred in the year prior to death.[18]

Lifetime Shared IRRs

For reference, we first present lifetime shared IRRs, which show the discount rate at which lifetime taxes paid and benefits received (on a shared basis between spouses) are equal. Table 1 presents lifetime shared IRRs by sex, number of years worked, and the present value of lifetime earnings. The median lifetime shared IRR for the sample of individuals aged 62–65 in 2005 is 3.5 percent, with women having somewhat higher values (median of 4.2 percent) than men (median of 2.6 percent). A sizable majority of women (79.0 percent) have IRRs of at least 3 percent (the projected real rate of return on Social Security Trust Fund assets), compared with 41.0 percent of men. Lifetime shared IRRs are higher for persons with shorter work histories and lower lifetime earnings, reflecting the progressivity of the benefit formula and the availability of auxiliary benefits.

Marginal IRRs

Table 2 presents marginal IRRs. For the 2005 sample, the median marginal return is −49.5 percent.[19] This is well below the median figure for the lifetime shared IRRs, illustrating an important point about discussions of returns under Social Security. For the sample of individuals aged 62–65 in 2005, lifetime earnings on average generate an actuarially fair return, but earnings late in life do not.[20] Marginal IRRs differ for men and women; men in 2005 have a median marginal IRR of −22.2 percent while the median value for women is −100 percent. Marginal IRRs do not follow a clear pattern by levels of lifetime earnings: From the lowest earnings quintile to the highest, marginal IRRs equal −23.4 percent, −60.9 percent, −97.9 percent, −55.2 percent, and −35.4 percent, respectively. Thus, marginal IRRs tend to be least negative for individuals at the bottom and the top of the earnings distribution.

Analyzed relative to time in the workforce, marginal returns are lowest for those with less than 10 years of covered work, almost all of whom receive returns of −100 percent. This is because nondisabled individuals with less than 10 years of earnings generally cannot qualify for benefits based on their own earnings records. Median marginal returns are −100 percent for individuals with less than 20 years of earnings, improve to −37.1 percent for individuals with 20 to 29 years of earnings, and reach −32.7 percent for those with 30 or more years of earnings.

For 34.9 percent of men the marginal IRR is −100 percent. In other words, for roughly one-third of men, an additional year of earnings and tax payments at the end of the work life results in no increase in benefits. About 52 percent of women have marginal IRRs of −100 percent. A low marginal return could occur because of a full and substantial work history, such that earnings at late ages do not replace years with low or zero earnings in the benefit formula, or because of the receipt of auxiliary benefits in each year of retirement. The primary cause of low returns for men is a full and substantial work history, whereas auxiliary benefits play a more important role for women.

For the 2005 sample, 10.1 percent of individuals would receive a marginal return of at least 3 percent, taken to indicate an actuarially fair or more than fair return. For such individuals, the incentive to work an additional year would be relatively strong. Women are somewhat more likely to receive a return of at least 3 percent than are men (10.4 percent versus 9.7 percent). Actuarially fair or more than fair marginal returns are most common among individuals in the lowest lifetime earnings quintile, 22.9 percent of whom would receive marginal returns of 3 percent or more. This is presumably because of both the progressive nature of the benefit formula and the very high marginal return one would receive upon first becoming entitled to benefits after earning the required minimum of 40 quarters (roughly 10 years) of employment.

Because rates of return are often thought of in terms of "interest," the negative median IRR values reported in Table 2 may be difficult to interpret intuitively. Another measure of money's worth—marginal benefit/tax ratios—may provide some additional perspective on the value of work near retirement. The marginal benefit/tax ratio is calculated by comparing the present value of benefits generated by an additional year of work to the present value of taxes paid in that year of work. A ratio of benefits to taxes equal to 1 signifies that the marginal internal rate of return would be equal to the trust fund interest rate used in calculating these present values.

Table 3 presents marginal benefit/tax ratios for individuals aged 62–65 in 2005. The median marginal benefit/tax ratio for the total population is 2.5 percent.

Table 1.
Social Security's lifetime shared internal rate of return (IRR), by sex, years worked, and earnings quintile, for individuals aged 62–65 in 2005

Sex, years worked, and earnings quintile	Weighted sample size (thousands)	Lifetime shared IRR (%)						Percent of workers with IRR of -100%	Percent of workers with IRR ≥ 3%
		Mean	10th percentile	25th percentile	Median	75th percentile	90th percentile		
Total									
Total	8,451	2.6	-0.8	2.0	3.5	4.6	5.8	0.2	61.3
Sex									
Women	4,521	4.0	1.5	3.3	4.2	5.2	6.6	0.1	79.0
Men	3,930	0.9	-2.9	0.6	2.6	3.6	4.6	0.4	41.0
Years of covered work									
0–9	426	6.2	2.5	4.2	5.3	7.3	10.5	0.0	87.3
10–19	811	4.4	1.0	3.8	4.9	6.2	9.2	0.4	83.1
20–29	1,078	3.6	0.8	3.1	4.3	5.4	6.8	0.1	76.7
30 or more	6,135	1.9	-1.3	1.6	3.2	4.1	5.0	0.2	53.9
Present value lifetime shared covered earnings quintiles									
Lowest	1,687	4.8	0.8	3.6	5.1	6.8	9.5	0.2	80.8
2nd	1,690	3.2	0.0	2.7	4.0	5.0	5.9	0.2	71.0
3rd	1,692	2.2	-0.5	2.2	3.6	4.4	5.1	0.4	64.1
4th	1,690	1.4	-1.9	1.5	3.1	4.0	4.4	0.3	54.0
Highest	1,692	1.2	-1.8	0.9	2.5	3.3	3.9	0.0	36.6
Sex and years of covered work									
Women									
0–9	375	6.5	3.1	4.3	5.3	7.3	9.9	0.0	90.9
10–19	610	4.7	2.2	3.9	4.9	6.0	8.3	0.1	86.4
20–29	793	4.4	1.5	3.5	4.5	5.5	6.9	0.0	82.1
30 or more	2,742	3.4	1.2	3.0	3.9	4.7	5.7	0.1	74.8
Men									
0–9	51	4.4	-8.6	2.4	4.6	10.1	11.5	0.0	60.8
10–19	201	3.4	-3.1	2.5	4.7	6.6	10.2	1.3	72.9
20–29	285	1.4	-2.0	1.7	3.6	4.7	5.9	0.3	61.6
30 or more	3,393	0.6	-2.8	0.5	2.4	3.4	4.1	0.3	37.0
Sex and present value lifetime shared covered earnings quintiles									
Women									
Lowest	993	6.3	2.9	4.6	5.8	7.5	10.1	0.0	89.8
2nd	1,041	4.4	2.2	3.8	4.6	5.4	6.4	0.0	85.4
3rd	964	3.4	1.2	3.3	4.2	4.8	5.4	0.1	79.2
4th	854	2.9	1.0	2.8	3.7	4.3	4.7	0.2	71.6
Highest	669	2.4	0.6	2.5	3.3	3.9	4.2	0.0	61.9
Men									
Lowest	694	2.7	-1.7	2.3	4.1	5.4	7.8	0.4	67.7
2nd	649	1.4	-1.8	1.3	2.9	3.9	4.5	0.4	48.0
3rd	728	0.6	-2.7	0.9	2.7	3.6	4.2	0.8	44.2
4th	837	-0.2	-5.3	0.0	2.4	3.3	3.9	0.4	36.0
Highest	1,023	0.4	-2.9	0.0	1.9	2.8	3.3	0.0	20.1

SOURCE: Authors' calculations using Modeling Income in the Near Term (MINT).

NOTES: Sample consists of nondisabled individuals aged 62–65 in 2005, with covered work in the past.

Lifetime shared IRR is based on all benefits paid off the earnings record.

Table 2.
Social Security's marginal internal rate of return (IRR) for one additional year of work before retiring, by sex, years worked, and earnings quintile, for individuals aged 62–65 in 2005

Sex, years worked, and earnings quintile	Weighted sample size (thousands)	Marginal IRR (%)						Percent of workers with IRR of -100%	Percent of workers with IRR ≥ 3%
		Mean	10th percentile	25th percentile	Median	75th percentile	90th percentile		
Total									
Total	7,613	-52.2	-100.0	-100.0	-49.5	-4.2	3.1	44.5	10.1
Sex									
Women	4,226	-58.4	-100.0	-100.0	-100.0	-5.7	3.3	52.2	10.4
Men	3,387	-44.5	-100.0	-100.0	-22.2	-3.3	2.9	34.9	9.7
Years of covered work									
0–9	350	-97.5	-100.0	-100.0	-100.0	-100.0	-100.0	97.6	1.2
10–19	769	-54.3	-100.0	-100.0	-100.0	-0.8	9.7	53.2	20.1
20–29	1,018	-49.0	-100.0	-100.0	-37.1	-0.2	5.0	42.9	14.9
30 or more	5,475	-49.6	-100.0	-100.0	-32.7	-4.6	2.3	40.2	8.4
Present value lifetime shared covered earnings quintiles									
Lowest	1,521	-45.6	-100.0	-100.0	-23.4	2.1	8.4	41.8	22.9
2nd	1,523	-53.2	-100.0	-100.0	-60.9	-3.5	2.9	45.8	9.9
3rd	1,521	-57.5	-100.0	-100.0	-97.9	-7.6	1.2	49.7	6.5
4th	1,523	-54.0	-100.0	-100.0	-55.2	-7.0	1.3	45.0	6.0
Highest	1,524	-50.7	-100.0	-100.0	-35.4	-7.1	0.0	40.3	5.2
Sex and years of covered work									
Women									
0–9	316	-97.3	-100.0	-100.0	-100.0	-100.0	-100.0	97.3	1.3
10–19	592	-64.9	-100.0	-100.0	-100.0	-9.2	6.2	62.8	12.9
20–29	756	-58.4	-100.0	-100.0	-100.0	-4.6	3.5	51.8	10.9
30 or more	2,562	-52.1	-100.0	-100.0	-47.7	-3.7	3.4	44.3	10.8
Men									
0–9	34	-100.0	-100.0	-100.0	-100.0	-100.0	-100.0	100.0	0.0
10–19	178	-19.2	-100.0	-52.8	1.4	8.8	22.1	21.4	44.2
20–29	262	-21.8	-100.0	-25.9	-2.2	3.5	7.8	17.2	26.5
30 or more	2,913	-47.4	-100.0	-100.0	-27.2	-5.5	1.1	36.6	6.3
Sex and present value lifetime shared covered earnings quintiles									
Women									
Lowest	909	-57.5	-100.0	-100.0	-100.0	-0.3	7.4	54.4	19.2
2nd	972	-59.7	-100.0	-100.0	-100.0	-5.4	3.0	54.2	10.1
3rd	895	-63.8	-100.0	-100.0	-100.0	-12.8	0.8	57.2	7.0
4th	807	-58.5	-100.0	-100.0	-100.0	-8.5	1.5	50.8	7.2
Highest	644	-49.9	-100.0	-100.0	-33.5	-3.5	1.9	40.9	6.9
Men									
Lowest	612	-27.9	-100.0	-92.6	-5.9	3.7	9.8	23.0	28.4
2nd	552	-41.6	-100.0	-100.0	-22.2	-1.4	2.7	30.9	9.4
3rd	626	-48.4	-100.0	-100.0	-28.8	-4.2	1.2	39.0	5.7
4th	717	-48.9	-100.0	-100.0	-30.1	-6.1	0.3	38.5	4.8
Highest	880	-51.3	-100.0	-100.0	-37.3	-8.8	-2.3	39.8	4.0

SOURCE: Authors' calculations using Modeling Income in the Near Term (MINT).

NOTES: Sample consists of nondisabled individuals aged 62–65 in 2005, with covered work in the past.

The added year of earnings is calculated as the average of the previous 5 years of earnings, excluding years with zero earnings. "Years of covered work" does not include the added year of earnings.

Marginal IRR is based on all benefits paid off the earnings record.

Table 3.

Social Security's marginal benefit-to-tax ratio for one additional year of work before retiring, by sex, years worked, and earnings quintile, for individuals aged 62–65 in 2005

Sex, years worked, and earnings quintile	Weighted sample size (thousands)	Benefit/tax ratio (%)						Percent of workers with ratio < 0%	Percent of workers with ratio of 0%	Percent of workers with ratio ≥ 100%
		Mean	10th percentile	25th percentile	Median	75th percentile	90th percentile			
Total										
Total	7,629	24.9	0.0	0.0	2.5	42.8	99.5	7.2	41.3	9.9
Sex										
Women	4,239	24.4	0.0	0.0	0.0	42.6	102.7	7.2	47.1	10.2
Men	3,390	25.4	0.0	0.0	9.4	43.2	97.3	7.2	34.1	9.5
Years of covered work										
0–9	350	-0.3	0.0	0.0	0.0	0.0	0.0	2.1	95.5	0.9
10–19	776	58.7	0.0	0.0	0.0	64.2	192.8	4.1	47.4	19.3
20–29	1,023	32.5	0.0	0.0	7.0	62.2	118.7	8.2	35.1	14.1
30 or more	5,480	20.3	0.0	0.0	6.0	41.2	90.5	7.8	38.2	8.3
Present value lifetime shared covered earnings quintiles										
Lowest	1,525	57.2	0.0	0.0	21.1	89.0	169.6	4.7	38.4	22.0
2nd	1,526	24.5	0.0	0.0	1.9	51.1	97.5	7.8	41.1	9.6
3rd	1,526	14.2	0.0	0.0	0.0	32.2	78.0	7.7	46.4	6.6
4th	1,525	16.1	0.0	0.0	0.8	30.0	74.6	7.6	42.1	6.0
Highest	1,526	12.3	0.0	0.0	3.6	29.2	61.5	8.1	38.6	5.3
Sex and years of covered work										
Women										
0–9	316	-0.3	0.0	0.0	0.0	0.0	0.0	2.3	95.0	1.0
10–19	595	40.5	0.0	0.0	0.0	16.2	133.7	3.7	56.6	12.6
20–29	761	19.4	-0.8	0.0	0.0	40.3	104.6	10.0	42.3	10.7
30 or more	2,566	25.2	0.0	0.0	4.5	51.0	105.0	7.7	40.4	10.7
Men										
0–9	34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0
10–19	181	118.7	0.0	17.1	76.9	160.3	253.2	5.3	17.2	41.5
20–29	262	70.5	0.0	19.2	51.3	97.6	162.8	2.9	13.9	24.0
30 or more	2,913	15.9	0.0	0.0	6.5	34.4	76.1	7.8	36.2	6.3
Sex and present value lifetime shared covered earnings quintiles										
Women										
Lowest	910	45.4	0.0	0.0	0.0	67.0	159.0	5.5	49.7	18.7
2nd	974	19.5	0.0	0.0	0.0	49.7	99.9	7.8	47.5	10.0
3rd	900	15.3	0.0	0.0	0.0	29.2	79.3	7.5	52.0	7.1
4th	809	21.8	0.0	0.0	0.0	30.8	83.6	6.7	45.8	7.2
Highest	646	18.3	0.0	0.0	5.7	38.8	82.4	8.8	37.7	6.9
Men										
Lowest	615	74.8	0.0	0.0	49.8	107.5	178.4	3.7	21.6	26.9
2nd	552	33.3	0.0	0.0	17.1	54.2	96.1	7.8	29.8	8.9
3rd	626	12.6	0.0	0.0	5.4	34.1	77.5	8.0	38.5	5.9
4th	717	9.7	0.0	0.0	3.7	29.3	65.3	8.7	37.8	4.7
Highest	880	7.9	0.0	0.0	2.3	23.9	43.8	7.6	39.2	4.1

SOURCE: Authors' calculations using Modeling Income in the Near Term (MINT).

NOTES: Sample consists of nondisabled individuals aged 62–65 in 2005, with covered work in the past.

The added year of earnings is calculated as the average of the previous 5 years of earnings, excluding years with zero earnings. "Years of covered work" does not include the added year of earnings.

Marginal benefit/tax ratio is based on all benefits paid off the earnings record.

This signifies that the typical individual would receive 2.5 cents of additional benefits back from an additional dollar of taxes. By multiplying this ratio by the current payroll tax rate (12.4 percent), it is possible to decompose the tax rate into two parts: contributions upon which actuarially fair benefits are paid and pure taxes. Thus, at the median, about 0.3 percent of taxable earnings near retirement can be thought of as contributions and about 12.1 percent as taxes.[21]

For women, the median marginal benefit/tax ratio is zero while for men it is higher at 9.4 percent. This difference is analogous to the difference in marginal IRRs between men and women in 2005 (the median marginal IRR for men was less negative than for women). Other findings reported in Table 3 are qualitatively similar to those reported for marginal IRRs.

Incremental IRRs

Table 4 presents results regarding incremental IRRs, which measure the effect of earnings on benefits over and above the auxiliary benefits that could be received without working. The median incremental IRR is −1.5 percent. Men have a higher median incremental IRR (0.8 percent) than women (−7.5 percent). Persons with fewer years of work in covered employment have lower incremental IRRs; such persons are more likely to draw auxiliary benefits. Overall, 35.9 percent of women and 3.4 percent of men have an incremental IRR of −100 percent. Most of these are individuals who are projected to receive auxiliary (spouse and/or survivor) benefits in every year of retirement from the current system.

The median incremental IRR (−1.5 percent) falls between the median lifetime shared IRR (3.5 percent) and the median marginal IRR (−49.5 percent). Together these results indicate that, in terms of overall generosity, the system provides approximately actuarially fair returns, but potentially presents significant work disincentives, particularly near retirement.

Changes to Marginal Returns Over Time

The preceding section discussed rates of returns for some recent retirement-age cohorts (aged 62–65 in 2005). We now turn our attention to future retirees to examine how changes in Social Security and underlying demographic and economic factors will affect rates of return.

Social Security's benefit formula is expected to undergo only one significant change in coming years: the scheduled increase of the FRA. We examine

individuals aged 62–65 in 2035, whose FRA will be 67.[22] The increase of the FRA will reduce retirement benefits across the board and at every margin, including the margin for individuals nearing retirement, on which this paper concentrates.

However, larger changes to marginal returns may result from changes in the Social Security population. Specifically, it is expected that women's lifetime earnings will draw closer to those of men. As a result, marginal returns for women will more closely resemble men's, and for similar reasons. As their earnings increase, women are more likely to experience both marginal returns reductions (by virtue of having greater than 35 years of covered earnings) and marginal returns increases (by virtue of receiving benefits based entirely on their own earnings, rather than auxiliary benefits based on a spouse's higher earnings).

Although median lifetime Social Security returns decline from 3.5 percent in 2005 to 2.8 percent in 2035 (not shown in tables) because of increases in the FRA, marginal returns improve, from a median value of −49.5 percent in 2005 to a median of −16.1 percent in 2035 (Table 5). The largest improvements are for women, whose median returns rise from −100 percent to −15.0 percent. Returns for men rise by a smaller amount, from −22.2 percent to −17.1 percent.

Table 6 shows projected marginal benefit/tax ratios for individuals aged 62–65 in 2035. Consistent with the rise in marginal IRRs over time, marginal benefit/tax ratios are projected to be higher in 2035 than in 2005. The median ratio of 11.7 percent indicates that typical individuals could expect to receive 11.7 cents in lifetime benefits back from an additional dollar of taxes paid at the end of their working life. Alternatively, this ratio indicates that the marginal implicit tax rate would be 10.9 percentage points of the 12.4 percent payroll tax, while the remaining 1.5 percentage points could be considered a contribution on which benefits would be repaid at the trust fund bond interest rate. In 2035, marginal benefit/tax ratios are projected to be more equal between the sexes, at 12.1 percent for women and 11.3 percent for men. This reflects the fact that differences between men's and women's lifetime earnings patterns are projected to diminish over time.

A principal reason for the increase in marginal returns between 2005 and 2035 appears to be the rising parity between men's and women's earnings. As women's earnings rise, either through higher wage rates or increased time in the workforce, the negative effect of spousal benefits on marginal returns will be less prevalent.[23] As more women collect benefits based

Table 4.
Social Security's incremental internal rate of return (IRR), by sex, years worked, and earnings quintile, for individuals aged 62–65 in 2005

Sex, years worked, and earnings quintile	Weighted sample size (thousands)	Incremental IRR (%)						Percent of workers with IRR of -100%	Percent of workers with IRR ≥ 3%
		Mean	10th percentile	25th percentile	Median	75th percentile	90th percentile		
Total									
Total	8,090	-22.7	-100.0	-16.1	-1.5	1.5	2.9	20.6	8.9
Sex									
Women	4,277	-39.3	-100.0	-100.0	-7.5	-0.7	2.4	35.9	7.9
Men	3,813	-4.0	-7.4	-1.8	0.8	2.1	3.0	3.4	10.0
Years of covered work									
0–9	350	-100.0	-100.0	-100.0	-100.0	-100.0	-100.0	100.0	0.0
10–19	772	-44.1	-100.0	-100.0	-11.6	-0.6	5.0	41.3	15.9
20–29	1,032	-32.4	-100.0	-100.0	-6.3	0.6	3.8	28.4	13.3
30 or more	5,936	-13.6	-100.0	-5.7	-0.4	1.6	2.8	11.9	7.7
Present value lifetime shared covered earnings quintiles									
Lowest	1,612	-31.6	-100.0	-100.0	-1.4	3.0	4.9	30.7	24.9
2nd	1,609	-29.2	-100.0	-100.0	-2.4	1.4	2.8	27.2	7.7
3rd	1,619	-24.1	-100.0	-19.9	-2.0	1.4	2.5	21.9	4.9
4th	1,638	-19.5	-100.0	-11.3	-1.8	1.2	2.3	16.5	3.5
Highest	1,611	-9.0	-18.4	-4.4	-0.6	1.1	2.1	6.7	3.4
Sex and years of covered work									
Women									
0–9	316	-100.0	-100.0	-100.0	-100.0	-100.0	-100.0	100.0	0.0
10–19	585	-53.2	-100.0	-100.0	-76.0	-4.1	1.2	49.2	7.3
20–29	765	-40.0	-100.0	-100.0	-11.5	-3.2	1.6	34.7	7.4
30 or more	2,611	-28.6	-100.0	-100.0	-4.1	0.4	2.8	25.6	9.1
Men									
0–9	34	-100.0	-100.0	-100.0	-100.0	-100.0	-100.0	100.0	0.0
10–19	187	-15.5	-100.0	-7.8	2.3	5.1	9.5	16.6	42.9
20–29	268	-10.6	-100.0	-2.2	1.9	3.5	4.7	10.6	30.4
30 or more	3,324	-1.9	-6.0	-1.6	0.8	2.0	2.8	1.1	6.6
Sex and present value lifetime shared covered earnings quintiles									
Women									
Lowest	940	-46.3	-100.0	-100.0	-15.4	1.0	4.5	44.4	17.3
2nd	992	-44.5	-100.0	-100.0	-11.4	-1.2	2.0	41.4	6.2
3rd	901	-42.0	-100.0	-100.0	-10.1	-2.0	1.2	38.2	3.9
4th	824	-36.7	-100.0	-100.0	-7.8	-1.5	1.2	32.1	4.1
Highest	620	-19.8	-100.0	-10.8	-2.9	0.2	1.8	16.2	7.0
Men									
Lowest	672	-11.1	-100.0	-2.1	2.1	3.7	5.1	11.7	35.4
2nd	617	-4.5	-6.3	-1.4	1.0	2.3	3.0	4.4	10.3
3rd	718	-1.7	-5.2	-0.8	1.2	2.2	2.8	1.4	6.1
4th	814	-2.0	-6.8	-1.9	0.6	1.8	2.4	0.6	2.8
Highest	991	-2.3	-6.9	-2.2	0.2	1.3	2.1	0.8	1.1

SOURCE: Authors' calculations using Modeling Income in the Near Term (MINT).

NOTES: Sample consists of nondisabled individuals aged 62–65 in 2005, with covered work in the past.

Incremental IRR is based on all benefits paid off the earnings record.

Table 5.
Comparing birth cohorts: Social Security's marginal internal rate of return (IRR) for one additional year of work before retiring, by sex, years worked, and earnings quintile, for individuals aged 62–65 in 2005 and 2035

Sex, years worked, and earnings quintile	Marginal IRR (%)				Percent of workers with IRR of -100%		Percent of workers with IRR ≥ 3%	
	Mean		Median					
	2005	2035	2005	2035	2005	2035	2005	2035
Total								
Total	-52.2	-40.8	-49.5	-16.1	44.5	32.9	10.1	14.5
Sex								
Women	-58.4	-41.1	-100.0	-15.0	52.2	34.5	10.4	19.0
Men	-44.5	-40.5	-22.2	-17.1	34.9	31.1	9.7	9.4
Years of covered work								
0–9	-97.5	-100.0	-100.0	-100.0	97.6	100.0	1.2	0.0
10–19	-54.3	-40.2	-100.0	-19.0	53.2	39.5	20.1	27.5
20–29	-49.0	-35.7	-37.1	-10.5	42.9	29.3	14.9	19.3
30 or more	-49.6	-40.2	-32.7	-15.2	40.2	31.6	8.4	13.5
Present value lifetime shared covered earnings quintiles								
Lowest	-45.6	-33.2	-23.4	-7.4	41.8	29.8	22.9	26.0
2nd	-53.2	-39.3	-60.9	-13.1	45.8	29.9	9.9	15.8
3rd	-57.5	-43.4	-97.9	-19.1	49.7	34.8	6.5	12.9
4th	-54.0	-44.7	-55.2	-22.2	45.0	34.9	6.0	8.2
Highest	-50.7	-43.5	-35.4	-18.9	40.3	35.3	5.2	9.8
Sex and years of covered work								
Women								
0–9	-97.3	-100.0	-100.0	-100.0	97.3	100.0	1.3	0.0
10–19	-64.9	-45.8	-100.0	-31.4	62.8	43.9	12.9	22.9
20–29	-58.4	-38.8	-100.0	-13.9	51.8	33.6	10.9	18.9
30 or more	-52.1	-39.5	-47.7	-12.8	44.3	32.1	10.8	19.2
Men								
0–9	-100.0	-100.0	-100.0	-100.0	100.0	100.0	0.0	0.0
10–19	-19.2	-29.3	1.4	0.0	21.4	30.8	44.2	36.5
20–29	-21.8	-30.9	-2.2	-4.9	17.2	22.4	26.5	20.0
30 or more	-47.4	-41.0	-27.2	-18.7	36.6	31.0	6.3	7.4
Sex and present value lifetime shared covered earnings quintiles								
Women								
Lowest	-57.5	-36.4	-100.0	-9.7	54.4	34.5	19.2	27.8
2nd	-59.7	-41.9	-100.0	-15.8	54.2	35.0	10.1	22.4
3rd	-63.8	-43.7	-100.0	-18.9	57.2	35.9	7.0	16.2
4th	-58.5	-43.6	-100.0	-22.2	50.8	33.5	7.2	11.9
Highest	-49.9	-40.4	-33.5	-13.9	40.9	33.4	6.9	14.2
Men								
Lowest	-27.9	-28.6	-5.9	-4.7	23.0	23.1	28.4	23.3
2nd	-41.6	-35.5	-22.2	-13.1	30.9	22.4	9.4	6.2
3rd	-48.4	-42.9	-28.8	-22.0	39.0	33.6	5.7	9.0
4th	-48.9	-45.7	-30.1	-25.1	38.5	36.2	4.8	4.5
Highest	-51.3	-46.1	-37.3	-25.8	39.8	36.8	4.0	6.1

SOURCE: Authors' calculations using Modeling Income in the Near Term (MINT).

NOTES: Sample consists of nondisabled individuals aged 62–65 in 2005 and 2035, with covered work in the past.

The added year of earnings is calculated as the average of the previous 5 years of earnings, excluding years with zero earnings. "Years of covered work" does not include the added year of earnings.

Marginal IRR is based on all benefits paid off the earnings record.

Table 6.
Comparing birth cohorts: Social Security's marginal benefit-to-tax ratio for one additional year of work before retiring, by sex, years worked, and earnings quintile, for individuals aged 62–65 in 2005 and 2035

| Sex, years worked, and earnings quintile | Benefit/tax ratio (%) | | | | Percent of workers with ratio < 0% | | Percent of workers with ratio of 0% | | Percent of workers with ratio ≥ 100% | |
| | Mean | | Median | | | | | | | |
	2005	2035	2005	2035	2005	2035	2005	2035	2005	2035
Total										
Total	24.9	29.1	2.5	11.7	7.2	11.8	41.3	29.5	9.9	15.0
Sex										
Women	24.4	35.9	0.0	12.1	7.2	11.5	47.1	29.6	10.2	19.3
Men	25.4	21.2	9.4	11.3	7.2	12.1	34.1	29.5	9.5	9.9
Years of covered work										
0–9	-0.3	3.3	0.0	0.0	2.1	0.0	95.5	99.6	0.9	0.4
10–19	58.7	82.8	0.0	19.4	4.1	10.2	47.4	33.3	19.3	29.3
20–29	32.5	51.9	7.0	29.8	8.2	10.6	35.1	20.0	14.1	20.3
30 or more	20.3	23.7	6.0	11.6	7.8	12.3	38.2	29.0	8.3	13.8
Present value lifetime shared covered earnings quintiles										
Lowest	57.2	69.2	21.1	46.2	4.7	7.2	38.4	26.2	22.0	27.0
2nd	24.5	29.2	1.9	19.6	7.8	11.1	41.1	25.0	9.6	16.1
3rd	14.2	30.5	0.0	8.1	7.7	12.2	46.4	31.7	6.6	13.2
4th	16.1	5.0	0.8	4.0	7.6	15.2	42.1	31.7	6.0	8.4
Highest	12.3	11.8	3.6	4.6	8.1	13.1	38.6	33.0	5.3	10.2
Sex and years of covered work										
Women										
0–9	-0.3	0.0	0.0	0.0	2.3	0.0	95.0	100.0	1.0	0.0
10–19	40.5	57.3	0.0	2.9	3.7	12.8	56.6	37.0	12.6	25.1
20–29	19.4	54.8	0.0	17.2	10.0	10.3	42.3	22.3	10.7	20.1
30 or more	25.2	32.6	4.5	13.9	7.7	11.8	40.4	28.1	10.7	19.3
Men										
0–9	0.0	10.3	0.0	0.0	0.0	0.0	100.0	98.8	0.0	1.2
10–19	118.7	133.6	76.9	62.6	5.3	4.9	17.2	26.0	41.5	37.4
20–29	70.5	47.2	51.3	50.6	2.9	10.9	13.9	16.4	24.0	20.6
30 or more	15.9	14.2	6.5	9.3	7.8	12.7	36.2	29.9	6.3	7.9
Sex and present value lifetime shared covered earnings quintiles										
Women										
Lowest	45.4	66.6	0.0	40.1	5.5	8.9	49.7	29.7	18.7	28.6
2nd	19.5	34.4	0.0	18.2	7.8	10.9	47.5	28.5	10.0	22.9
3rd	15.3	36.4	0.0	7.9	7.5	11.9	52.0	31.5	7.1	16.6
4th	21.8	14.6	0.0	5.8	6.7	15.5	45.8	27.7	7.2	11.9
Highest	18.3	21.5	5.7	8.4	8.8	10.6	37.7	30.5	6.9	14.2
Men										
Lowest	74.8	72.9	49.8	50.0	3.7	4.8	21.6	21.2	26.9	24.7
2nd	33.3	21.7	17.1	22.4	7.8	11.5	29.8	19.9	8.9	6.2
3rd	12.6	23.4	5.4	8.8	8.0	12.5	38.5	32.0	5.9	9.1
4th	9.7	-4.6	3.7	0.0	8.7	15.0	37.8	35.7	4.7	4.9
Highest	7.9	3.6	2.3	0.0	7.6	15.2	39.2	35.0	4.1	6.7

SOURCE: Authors' calculations using Modeling Income in the Near Term (MINT).

NOTES: Sample consists of nondisabled individuals aged 62–65 in 2005 and 2035, with covered work in the past.

The added year of earnings is calculated as the average of the previous 5 years of earnings, excluding years with zero earnings. "Years of covered work" does not include the added year of earnings.

Marginal benefit/tax ratio is based on all benefits paid off the earnings record.

entirely on their own earnings records, the likelihood of experiencing a −100 percent marginal return will decline. In 2005, 44.5 percent of the population experienced −100 percent marginal returns, implying that an additional year of earnings provided no increase in benefits. By 2035, only 32.9 percent will experience −100 percent returns (Table 5). As with the earlier cohorts, women in the 2035 sample are more likely than men to receive −100 percent returns (34.5 percent of women versus 31.1 percent of men).

There is also an increase in the share of individuals receiving actuarially fair or more than fair marginal returns, defined as returns of at least 3 percent above inflation. In 2005, 10.1 percent received returns of 3 percent or more, while in 2035, 14.5 percent are projected to do so.

It should be noted that the figures cited above are based on Social Security's scheduled benefits. However, without preventive legislation, the Social Security Trustees project the trust fund will be exhausted in the 2040s and these scheduled benefits would not be payable. Social Security insolvency would reduce marginal returns in a way similar to an across-the-board benefit reduction. As benefit reductions resulting from insolvency would be uniform, the effects on marginal returns would be roughly uniform as well. To provide perspective on the effects of the solvency issue, we recalculate marginal returns for individuals aged 62–65 in 2035 on the assumption that the combined employee-employer payroll tax is increased by 1.89 percentage points, effective 2005. According to the 2004 Trustees Report, this tax increase would bring the OASDI system into actuarial balance for 75 years (Board of Trustees 2004). The effect of this tax increase on marginal returns, while noticeable, would be modest. The median marginal return would decline from −16.1 percent to −17.2 percent (not shown in tables).

Marginal Returns Under Alternative Policies

A number of policy changes to Social Security have been discussed in the context of improving the program's financing or of encouraging workers to delay retirement. We calculate marginal returns for the 2035 cohorts based on several alternative changes to the Social Security tax or benefit schedules.[24] These potential provisions involve:

*   Computation years, by increasing the number of earnings years in the AIME computation from

35 to 40. This change is designed to increase the impact of earnings beyond the 35th year on retirement benefits.

*   PIA reduction, by reducing benefits for higher-earning individuals; specifically, the 32 percent and 15 percent PIA formula factors would be reduced to 20 percent and 10 percent, respectively.

*   Spousal cap, by limiting spousal benefits to an amount equal to half the PIA paid to the average worker in the cohort.[25]

*   Tax rate, by eliminating the employee share of the Social Security payroll tax for individuals older than age 60.

The policy changes that could be used to strengthen Social Security finances or improve work incentives are hardly exhausted by these examples. However, they do represent a variety of approaches and produce interesting outcomes.

One noteworthy provision not included here would increase both the actuarial reduction factor that lowers benefits for early retirees and the delayed retirement credit paid to individuals who do not claim benefits until after reaching FRA. This provision would encourage delayed retirement to the degree that individuals link their decisions to leave the workforce and to claim benefits. However, the analytical techniques used herein do not examine claiming behavior, and would not capture the complete effects of this provision.

In discussing the incentive effects of these four provisions, it is useful to note the conceptual link between marginal IRRs and effective payroll tax rates. A change in the payroll tax—like a change in the wage rate—would generate both an income and a substitution effect. We expect the substitution effect would dominate and that decreases in effective tax rates (or improvements in IRRs) would encourage work. Also, all of the benefit provisions examined here would lower benefit levels, encouraging work via an income effect. All provisions are analyzed for individuals aged 62–65 in 2035. The results are summarized in Table 7 and discussed below.

Computation years. Increasing the benefit computation period from the highest 35 years to the highest 40 years would increase the median marginal IRR in 2035 from −16.1 percent under scheduled benefits to −11.4 percent. Women's marginal returns would rise from −15.0 percent to −11.7 percent, while for men returns would rise from −17.1 percent to −11.2 per-

Table 7.

Social Security's median marginal internal rate of return (IRR) for one additional year of work before retiring, projected under current benefit schedule and for four alternative policy options, by sex, years worked, and earnings quintile, for individuals aged 62–65 in 2035

Sex, years worked, and earnings quintile	Median marginal IRR (%)				
	Scheduled benefits	Computation years	PIA reduction	Spousal cap	Tax rate
Total					
Total	-16.1	-11.4	-16.8	-13.5	-10.5
Sex					
Women	-15.0	-11.7	-15.5	-10.7	-9.3
Men	-17.1	-11.2	-19.2	-16.4	-11.3
Years of covered work					
0–9	-100.0	-100.0	-100.0	-100.0	-100.0
10–19	-19.0	-19.5	-16.5	-22.8	-11.2
20–29	-10.5	-12.6	-9.2	-4.7	-4.5
30 or more	-15.2	-10.1	-17.1	-13.7	-10.0
Present value lifetime shared covered earnings quintiles					
Lowest	-7.4	-6.6	-10.6	-7.2	0.0
2nd	-13.1	-10.3	-15.2	-10.6	-7.3
3rd	-19.1	-11.0	-19.5	-15.9	-14.9
4th	-22.2	-13.7	-23.8	-18.4	-16.7
Highest	-18.9	-11.9	-20.4	-18.2	-14.1
Sex and years of covered work					
Women					
0–9	-100.0	-100.0	-100.0	-100.0	-100.0
10–19	-31.4	-45.5	-37.0	-100.0	-21.1
20–29	-13.9	-15.6	-11.2	-5.9	-9.3
30 or more	-12.8	-9.5	-13.9	-9.4	-6.8
Men					
0–9	-100.0	-100.0	-100.0	-100.0	-100.0
10–19	0.0	0.9	-2.5	0.0	1.4
20–29	-4.9	-6.8	-7.5	-3.2	-0.8
30 or more	-18.7	-11.2	-21.7	-18.2	-12.4
Sex and present value lifetime shared covered earnings quintiles					
Women					
Lowest	-9.7	-8.7	-12.9	-9.7	-1.4
2nd	-15.8	-11.9	-15.3	-11.2	-8.8
3rd	-18.9	-11.2	-15.2	-10.6	-15.7
4th	-22.2	-14.8	-20.9	-12.1	-15.9
Highest	-13.9	-10.6	-15.6	-10.7	-9.2
Men					
Lowest	-4.7	-4.3	-8.7	-4.0	1.7
2nd	-13.1	-8.0	-14.9	-10.1	-6.7
3rd	-22.0	-9.8	-22.5	-18.8	-14.9
4th	-25.1	-13.1	-28.9	-25.1	-17.6
Highest	-25.8	-13.2	-33.2	-29.4	-20.8

SOURCE: Authors' calculations using Modeling Income in the Near Term (MINT).

NOTES: Sample consists of nondisabled individuals aged 62–65 in 2035, with covered work in the past.

The added year of earnings is calculated as the average of the previous 5 years of earnings, excluding years with zero earnings. "Years of covered work" does not include the added year of earnings.

Marginal IRR is based on all benefits paid off the earnings record.

cent. However, marginal returns for women with relatively few years in the workforce (10 to 29 years of earnings) would be slightly lower under this provision. For individuals with fewer than 35 earnings years, it appears that increasing the denominator in the AIME computation period to 40 provides a slightly smaller increase in the AIME for an additional year of earnings than it would if computed using the current denominator of 35. Thus, the largest improvement in marginal returns may come for individuals who already have longer work histories.

PIA reduction. The PIA reduction would lower marginal IRRs for both men and women. The median marginal return would decline from −16.1 percent to −16.8 percent. The percentage of individuals receiving a marginal return of at least 3 percent (an actuarially fair or more than fair return) would also decline from 14.5 percent under current law to 8.8 percent (not shown in Table 7). Upon consideration, this should not be surprising. The Social Security benefit formula provides for a progressive replacement of lifetime earnings, which implies that returns must decline at the margin. To the degree the benefit formula becomes more progressive, marginal returns will decline further. For that reason, progressive reductions in scheduled benefits might be accompanied by other provisions designed to improve marginal returns for those nearing retirement.

Spousal cap. The cap on spousal benefits would increase median marginal IRRs from −16.1 percent to −13.5 percent. Returns for men would improve slightly, from −17.1 percent to −16.4 percent, while those for women would improve from −15.0 percent to −10.7 percent. Marginal returns would decline for women with 10 to 19 years of earnings, but they would rise substantially—from −13.9 percent to −5.9 percent—for women with 20 to 29 years in the workforce.

Tax rate. The elimination of the employee share of the Social Security payroll tax—6.2 percentage points out of the 12.4 percent total tax—would, as expected, improve marginal returns. Although benefit payments would not be changed, the tax cost of any increase in benefits would be reduced by half. The median marginal IRR would rise from −16.1 percent under current law to −10.5 percent. In addition, the percentage of individuals receiving an actuarially fair or more than fair return would increase from 14.5 percent under current law to 26.2 percent (not shown in Table 7).

Improvements would be relatively uniform across gender and earnings dimensions.

Discussion and Conclusions

Social Security taxes are among the largest that most workers pay, and Social Security benefits are a significant source of income for most retirees. For those reasons, the incentives presented by Social Security's tax and benefit policies can affect decisions about whether and how much to work, and when to leave the labor force and retire. The lifetime shared, marginal, and incremental returns calculated herein quantify some of the ways Social Security exerts such an influence.

Marginal returns, measuring the increase in benefits associated with an additional year of work late in life, are generally far lower than the average returns paid by Social Security. This is due to the progressivity of Social Security's benefit structure, to the inclusion of only 35 years of earnings in calculating benefits, and to the presence of auxiliary benefits, which are based on a spouse's earnings but are reduced based on one's own benefit entitlement.

Incremental returns examine incentives to enter the workforce on a career-long basis. The incremental return here represents the lifetime benefits an individual receives over and above those for which he or she could be eligible based on a spouse's earnings record. To the degree an individual is eligible for auxiliary benefits, his or her Social Security tax could be treated as a "pure tax" upon which no benefits are paid, rather than a contribution for which the individual will receive future benefit payments in return. The degree to which this may affect work incentives depends on the individual's understanding of these incentives, uncertainty regarding future earnings, and other factors.

To that end, it is worth noting that the effects of policy changes on labor force participation depend on a number of factors in addition to changes in the marginal return paid to Social Security. Most of the policy changes examined above, and many more designed to address solvency issues rather than work incentives, would reduce the benefits scheduled to be paid under current law. Such reductions could have an income effect that would tend to increase labor force participation at all ages, as individuals sought to work and save more to make up for the lost Social Security income. Thus, policy changes to Social Security's benefit formula could increase labor force participation even

if marginal returns remain unchanged. The effect of a policy change on labor force participation depends on individuals' sensitivity to such changes, which can differ by age, income, sex, and other factors.

Workers nearing retirement may be more sensitive to changes in the marginal returns to Social Security, as their larger assets, lower family support costs, and availability of Social Security and other pension benefits make leaving the workforce a more viable option than for middle-aged individuals.[26] Using state tax rates as a control variable, Schmidt and Sevak (2006) analyze the labor elasticities of retirement-age individuals. They find that a reduction in the marginal tax rate that would increase the payoff of working by 10 percent would increase labor force participation by 7.9 percent among men and 4.9 percent among women (the extensive margin), and increase hours worked by those already employed by 5.3 percent for men and 3.6 percent for women (the intensive margin). For context, the elimination of the employee share of the Social Security payroll tax discussed above would increase after-tax wages by around 7 percent. These estimated elasticities are larger than those generally held for the workforce as a whole,[27] signifying that near-retirees may be more sensitive to incentives than younger workers.

Although we use marginal returns and marginal benefit/tax ratios as our primary measures, alternate measures may shed additional light on incentives to delay retirement under Social Security. For instance, Lumsdaine, Stock, and Wise (1994) use an option value approach to assess the impact on lifetime Social Security benefits of retirement at different ages. While the option value approach has merit, its strengths are greatest when applied to private defined benefit pension plans, which often have abrupt changes in plan rules, versus Social Security where plan rules tend to apply uniformly over time. Moreover, Lumsdaine, Stock, and Wise focus more on the claiming decision and how it is affected by changes in the retirement age or actuarial adjustments than on how additional work is rewarded under the benefit formula.

Finally, it is important to note that low marginal returns should not be conflated with unfair treatment by the Social Security program. In fact, the opposite may be true. The most likely cause of an individual receiving a marginal return of −100 percent is being the recipient of auxiliary benefits based on a spouse's earnings records. These are benefits in excess of those the individual would be entitled to receive based on his or her own earnings record, and individuals who

receive auxiliary benefits tend to have higher lifetime IRRs than other Social Security beneficiaries. The lifetime IRR remains the best indicator of an individual's overall treatment by the Social Security program, while the marginal and incremental IRRs are more relevant to the work incentives presented to an individual by the program.

Further analysis of marginal returns and related factors may improve the understanding of the current Social Security program. In addition, further analysis may assist policymakers interested in altering the program's incentives for workers to remain in the labor force, particularly later in life.

Notes

[1] See Leimer (1995) for a thorough overview of four different measures employed to assess Social Security money's worth. In a survey of the literature, Leimer (1999, 44) notes that studies have found "in general, the Social Security program has been progressive with respect to income or lifetime earnings…"

[2] See Samuelson (1958) and Aaron (1966); this simplification abstracts from changes in hours worked and other factors.

[3] Although the Social Security Trustees project average wages to grow slightly faster over the period 2008–2080 than from 1960–2006 (1.11 percent versus 1.06 percent), they project the labor force to grow much more slowly (0.48 percent versus 1.69 percent). See Board of Trustees (2008).

[4] The FRA is the age at which a person can receive full Social Security retirement benefits. The FRA is gradually increasing from age 65 to age 67. For persons born in 1937 or earlier, the FRA is 65. For persons born 1943–1954, the FRA is 66. For persons born in 1960 and later, the FRA is 67.

[5] For instance, see Skinner (2007).

[6] Burman and Leiserson (2007) provide an analysis of the relative size of payroll taxes and SSA (2008) offers statistics on the relative importance of Social Security as a source of retirement income.

[7] Earnings prior to age 60 are indexed for wage growth in the economy, but those in the year of attaining age 60 and

after are not indexed. The average is known as AIME, or average indexed monthly earnings.

[8] The dollar thresholds ($744 and $4,483) at which the 90 percent, 32 percent, and 15 percent formula factors change are called "bend points" and are updated automatically each year in proportion to increases in the national average wage. Only earnings up to the maximum taxable amount in each year are used in the basic benefit formula. In 2009 the maximum taxable amount is $106,800 and the maximum benefit for a worker retiring at the full retirement age is $2,323 per month.

[9] The current self-employment tax and the employee plus employer shares of OASDI payroll tax both total 12.4 percent of earnings (up to the maximum taxable earnings).

[10] For further discussion of IRRs and the Social Security program see Nichols and others (2007).

[11] Cohen, Steuerle, and Carasso (2001) and Cohen and Iams (2007) discuss different approaches to accounting for earnings and benefits, including the shared approach.

[12] For our sample, the median age of the last year of earnings is age 65.

[13] Our goal is to simulate the effects of an additional full year of earnings. Thus, we exclude years with no earnings when forming the average. We use a 5-year time frame rather than the last year of observed earnings because the last year may reflect a partial year of earnings (for example, if the individual retired midway through the year). We examined the effect of other approaches, including using earnings from the last year of earnings and using a 5-year average that included zero-earning years. These resulted in lower returns than those reported in this paper, but the results were qualitatively similar. Thus, the results in this paper represent, in some sense, an upper bound on the returns from additional work. Note also that our average is first calculated as a percentage of the average economy-wide earnings. Thus the additional year of earnings accounts for wage growth in the overall economy.

[14] The MINT model used for this analysis is calibrated to the intermediate assumptions of the 2004 Trustees Report. We note that, in the 2008 Trustees Report (Board of Trustees 2008), the projected interest rate on the Social Security trust funds is 2.9 percent above inflation.

[15] See Queisser and Whitehouse (2006). We use the terms actuarially fair or neutral for ease of exposition, but technically such terms would apply to present value calculations that use age-specific mortality probabilities. We use age of death as estimated in the MINT model rather than age-specific mortality probabilities.

[16] Information on the MINT model can be found in Toder and others (2002).

[17] The sample restrictions are similar for each measure. We exclude cases in which no taxes are paid because, depending on the measure, the IRR is not defined.

[18] We also exclude a relatively small number of cases that had multiple IRR solutions, since it is unclear which solution should be used in the analysis.

[19] For the marginal IRR analysis, 23.6 percent of individuals were excluded because of sample restrictions. The percentage in each exclusion category is as follows (the total is greater than 23.6 percent because some individuals met more than one exclusion criteria): 3.7 percent for not having paid payroll tax contributions; 5.9 percent for never having received Social Security benefits; 9.6 percent for being disabled; and 8.3 percent for having the last positive year of earnings occurring in the year prior to death. Almost 5 percent of women (4.9 percent) never paid payroll taxes (as compared with 2.3 percent of men).

[20] However, it is important to note that since earnings late in life have low returns, earlier earnings have higher returns. Therefore, if lifetime returns remain actuarially fair, changes to returns for later earnings would lead to counterbalancing changes to the returns for earlier earnings.

[21] Sabelhaus (2007), using the Continuous Work History Sample (CWHS), found that the payroll tax near retirement was largely a tax for men, but not for women. However, Sabelhaus cautions that, with CWHS data, it is not possible to incorporate the effects of auxiliary benefits. Butrica, Johnson, Smith, and Steuerle (2006) examine the implicit tax rate faced by older workers, taking Social Security and other public and private programs into account. They find high implicit tax rates at late ages.

[22] In the 2005 sample, the FRA is 66 years for individuals aged 62 in 2005 (born in 1943), 65 years and 10 months for individuals aged 63, 65 years and 8 months for individuals aged 64, and 65 years and 6 months for individuals aged 65 (born in 1940). The increase in the FRA from age 65 and 6 months to age 66 for individuals in this sample would on its own tend to reduce marginal returns.

[23] Using MINT, Butrica, Iams, and Smith (2003) document projected changes in earnings and benefits of women. Married women from the 1926–1935 birth cohorts averaged 18 years of work by the time of retirement, whereas those from the late baby boom (1956–1965) birth cohorts averaged 30 years. Also, receipt of auxiliary benefits among these groups (measured at age 67) was projected to decline noticeably: Slightly over half of the beneficiaries in the earlier cohorts received some type of auxiliary benefit compared with only about 27 percent of beneficiaries from the later cohorts.

[24] Even though these policy changes would most likely affect labor force participation and Social Security benefit claiming behavior, we assume, because of the limitations of the MINT model, that the behavior of individuals would not change in response to these policy changes. We first add the additional year of earnings at the end of the work life and then implement the policy change in order to calculate the marginal IRR.

[25] This provision is drawn from a proposal by Jeffrey Liebman, Maya MacGuineas and Andrew Samwick; see Congressional Budget Office (CBO) (2006).

[26] For information on wage elasticities, see CBO (1996).

[27] For instance, see CBO (2007).

References

Aaron, Henry J. 1966. The social insurance paradox. *Canadian Journal of Economics and Political Science* 32(3): 371–374.

[Board of Trustees] Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds. 2004. *2004 Annual report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds.* Washington, DC. Available at www.socialsecurity.gov/OACT/TR/TR04.

———. 2008. *2008 Annual report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds.* Washington, DC. Available at www.socialsecurity.gov/OACT/TR/TR08.

Burman, Leonard E., and Greg Leiserson. 2007. Two-thirds of tax units pay more payroll tax than income tax. Washington, DC: Urban Institute. Available at www.urban.org/publications/1001065.html.

Butrica, Barbara A., Howard M. Iams, and Karen E. Smith. 2003. It's all relative: Understanding the retirement prospects of baby boomers. Washington, DC: Urban Institute. Available at www.urban.org/UploadedPDF/411127_all_relative.pdf.

Butrica, Barbara A., Karen E. Smith, and C. Eugene Steuerle. 2006. Working for a good retirement. Retirement Project Discussion Paper No. 06-03. Washington, DC: Urban Institute. Available at www.urban.org/url.cfm?ID=311333.

Butrica, Barbara A., Richard W. Johnson, Karen E. Smith, and C. Eugene Steuerle. 2006. Implicit taxes and returns to work at older ages. *National Tax Journal* 59(2): 211–234.

Cohen, Lee, C. Eugene Steuerle, and Adam Carasso. 2001. Social Security redistribution by education, race, and income: How much and why. Paper presented at the Third Annual Joint Conference of the Retirement Research Consortium, Washington, DC. Available at www.mrrc.isr.umich.edu/publications/conference/pdf/cp01_carasso.pdf.

Cohen, Lee, and Howard Iams. 2007. Income adequacy and Social Security differences between the foreign-born and U.S.-born. *International Migration Review* 41(3): 553–578.

[CBO] Congressional Budget Office. 1996. Labor supply and taxes. CBO Memorandum. Washington, DC: CBO. Available at www.cbo.gov/ftpdocs/33xx/doc3372/labormkts.pdf.

———. 2006. Long-term analysis of the Liebman-MacGuineas-Samwick Proposal. Washington, DC: CBO. Available at www.cbo.gov/ftpdocs/70xx/doc7041/02-08-LMS_Proposal.pdf.

———. 2007. The effect of tax changes on labor supply in CBO's microsimulation tax model. CBO Background Paper. Washington, DC: CBO. Available at www.cbo.gov/ftpdocs/79xx/doc7996/04-12-LaborSupply.pdf.

Geanakoplos, John, Olivia S. Mitchell, and Stephen P. Zeldes. 1998. Social Security money's worth. NBER Working Paper No. 6722. Cambridge, MA: National Bureau of Economic Research.

Gruber, Jonathan, and David Wise. 1997. Social Security programs and retirement around the world. NBER Working Paper No. 6134. Cambridge, MA: National Bureau of Economic Research.

Leimer, Dean R. 1995. A guide to Social Security money's worth issues. *Social Security Bulletin* 58(2): 3–20.

———. 1999. Lifetime redistribution under the Social Security program: A literature synopsis. *Social Security Bulletin* 62(2): 43–51.

Lumsdaine, Robin L., James H. Stock, and David A. Wise. 1994. Retirement incentives: The interaction between employer-provided pensions, Social Security, and retiree health benefits. NBER Working Paper No. 4613. Cambridge, MA: National Bureau of Economic Research.

Nichols, Orlo, Michael Clingman, Alice Wade, and Chris Chaplain. 2007. Internal real rates of return under the OASDI program for hypothetical workers. Actuarial Note No. 2006.5 (March). Baltimore, MD: Social Security Administration, Office of the Chief Actuary. Available at www.ssa.gov/OACT/NOTES/actnote.html.

Queisser, Monika, and Edward Whitehouse. 2006. Neutral or fair? Actuarial concepts and pension-system design. OECD Social Employment and Migration Working Paper No. 40. Paris: Organisation for Economic Co-operation and Development.

Sabelhaus, John. 2007. What is the effective Social Security tax on additional years of work? Paper presented at the National Tax Association Spring Symposium, Washington, DC.

Samuelson, Paul A. 1958. An exact consumption-loan model of interest with or without the social contrivance of money. *Journal of Political Economy* 66(6): 467–482.

Schmidt, Lucie, and Purvi Sevak. 2006. Taxes, wages, and the labor supply of older Americans. MRRC Working Paper No. 2006-139. Ann Arbor, MI: University of Michigan Retirement Research Center. Available at www.mrrc.isr.umich.edu/publications/papers/pdf/wp139.pdf.

Skinner, Jonathan. 2007. Are you sure you're saving enough for retirement? *The Journal of Economic Perspectives* 21(3): 59–80.

[SSA] Social Security Administration. 2006. *Annual Statistical Supplement to the Social Security Bulletin, 2005.* Washington, DC: SSA. Available at www.socialsecurity .gov/policy/docs/statcomps/supplement/2005/index.html.

———. 2008. *Fast Facts & Figures About Social Security, 2008.* Washington, DC: SSA. Available at www .socialsecurity.gov/policy/docs/chartbooks/ fast_facts/2008/index.html.

Toder, Eric, Lawrence Thompson, Melissa Favreault, Richard Johnson, Kevin Perese, Caroline Ratcliffe, Karen Smith, Cori Uccello, Timothy Waidmann, Jillian Berk, Romina Woldemariam, Gary Burtless, Claudia Sahm, and Douglas Wolf. 2002. Modeling Income in the Near Term: Revised projections of retirement income through 2020 for the 1931–1960 birth cohorts. Washington, DC: Urban Institute. Available at www.urban.org/ publications/410609.html.

Andrew G. Biggs, currently a Resident Scholar at the American Enterprise Institute, was with the Social Security Administration when this paper was written. Gayle L. Reznik and David A. Weaver are with the Office of Retirement Policy, Office of Retirement and Disability Policy, Social Security Administration. Questions about the analysis should be directed to them at 202-358-6239 or 202-358-6252, respectively. For additional copies of this paper, e-mail op.publications@ssa.gov.