

# How Do Individual Social Security Accounts Stack Up? An Evaluation Using the EBRI-SSASIM2 Policy Simulation Model

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Issue Brief

- As the Social Security debate heats up, the unprecedented quantitative analysis available through the EBRI-SSASIM2 Policy Simulation Model will provide policymakers and the public with information necessary for making informed policy decisions. In fact, this type of model was specifically suggested for use in the recommendations regarding research and data in the *Report of the 1994-96 Social Security Advisory Council* (Social Security Advisory Council, 1997).
- This report shows cost, benefit, national saving, and growth projections under five options for reforming the Old-Age and Survivors Insurance (OASI) program. Of these, two are partially privatized (“two-tiered”) options with individual account contributions equal to 5 percent of taxable payroll. One option is modeled under the assumption that, on average, participants invest individual Social Security account balances in a “life-cycle” mix of equities and Treasury bonds, while the other option is modeled assuming 100 percent Treasury bond investment. In addition to the two-tiered options, the report presents projections for three traditional reforms that would bring the current system into financial balance: the first would exclusively raise taxes; the second would raise taxes as well as the normal retirement age (NRA); and the third would reduce benefits only.
- A man and woman of the 1976 birth cohort are modeled because they are part of a cohort whose members would pay transition costs over their entire working lives under the generic two-tiered options modeled in this report. (Transition costs are likely to be spread across a time period at least this long under actual reform proposals.) A man and woman of the 2026 birth cohort are modeled because they are scheduled to pay no transition costs. Thus, results are illustrative of a “worst case scenario” in terms of potential transition burdens for the 1976 cohort and a best case scenario for the 2026 cohort.
- Results indicate that one traditional reform that would cut future Social Security costs is increasing the NRA to age 67 more quickly than under current law and indexing it to longevity thereafter. This reform would allow payroll taxes to be scheduled 9 percent lower after 2025 than those under a system that only increases taxes to fund current-law benefits. By 2070, cost rates under a reform that raises the normal retirement age like this would be 13.4 percent lower than those associated with funding benefit projections under the current system.
- Two highly controversial assumptions have been made in order to model the nontraditional, two-tiered options in this *EBRI Issue Brief*. First, this analysis assumes that a system of individual accounts is administratively feasible. In addition, individual account balances are assumed to be preserved for retirement,

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contrary to the results of legislative activity of recent years that has expanded the potential for nonretirement use of savings in individual retirement accounts (IRAs) and employment-based pensions. If any individual account balances were available for preretirement withdrawals, the benefit projections reported for the two-tiered options in this report would be overestimates. Finally, individual Social Security account balances are assumed to be converted into indexed life annuities at retirement, allowing direct comparison of projected benefits under a partially privatized reform with those of the current system.

- Like the reform that raises the NRA, both two-tiered options would reduce future Social Security costs, but not until the transition costs to a partially privatized system are paid. In the two-tiered reforms modeled here, these costs are projected to equal 5 percent of taxable payroll over 40 years. Until the transition costs are fully paid, the two-tiered options are projected to require 18 percent higher average tax/contribution rates than a reform that raises taxes to maintain the current system.
- To reduce costs over 75 years relative to funding the current system, the traditional defined benefit portion of the Old-Age and Survivors Insurance (OASI) program would be scaled back 70 percent by 2040 under the assumptions used in this study. Largely as a result, annual real average benefits under a two-tiered system, even where a portion of account balances are assumed to be invested in equities, are lower for “average” women of the 1976 birth cohort and “average” men and women of the 2026 birth cohort relative to raising taxes only. Average women of both cohorts could expect to receive between 15 percent and 20 percent lower annual real average benefits under the Two-Tiered Option with Life-Cycle Investment than under a funded current system.
- Average women of both cohorts, like the working poor, are projected to receive lower annual real benefits under both two-tiered options than under a funded current system in part because these groups tend to benefit most from the redistributive nature of the current Social Security program.
- Largely because of transition costs paid from 2000–2040, payback ratios for persons born in 1976 are higher under a reform that funds the current system than under the Two-Tiered Option with Life-Cycle Investment. In contrast, because the 2026 cohort is projected to enter the work force after transition costs have been paid, this cohort is projected to receive significantly higher payback ratios under the Two-Tiered System with Life-Cycle Investment than under a financially balanced current system.
- Although 2026 cohort members pay no transition costs to lower their payback ratios under the Two-Tiered, All Bond Investment option, they also would not get high enough returns on their investments to offset the attendant reduction in traditional OASI benefits. The implication is that while the two-tiered options do not provide higher payback ratios than Raising Taxes Only for the 1976 cohort because of the transition costs scheduled in this analysis, the prospect of higher payback ratios for the 2026 cohort, which pays no transition costs, exists only if the beneficiary invests to some extent in equities.
- In terms of payback ratios and annual real benefits, the results obtained in this analysis indicate that women born in 1976 would be better off under a reform that raises taxes enough to bring the current system into balance or a system that also raises the NRA than under either of the two-tiered options. In terms of final average earnings projections, an average woman born in 1976 is projected to receive \$2,042 more in preretirement earnings under the two-tiered approach that assumes life-cycle investment in equities. However, she is also likely to receive 10.4 percent less in average lifetime earnings plus net benefits under this option than under a reform that increases taxes enough to fund the current system.
- The two-tiered options involve more market risk than the traditional Social Security reform. At the 95<sup>th</sup> percentiles, benefits under the Two-Tiered Option with Life-Cycle Investment could be much larger than benefits under the more traditional reforms. However, at the 5<sup>th</sup> percentiles, benefits under the Two-Tiered Option with Life-Cycle Investment could be nearly as low as those under a system that reduces benefits only to bring the program into balance. Results suggest that from a perspective of policymakers who are more risk averse, adjusted real annual average benefits under the Two-Tiered Option with Life-Cycle Investment are lower than those under more traditional reforms.

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- For some groups, such as the 2026 birth cohort, there may be a tradeoff between higher real average annual benefits under more traditional reforms and higher payback ratios under a two-tiered system, especially when benefits and payback ratios are adjusted for the higher levels of market risk inherent in a two-tiered system. Given the assumptions used in this study, risk-adjusted annual benefits are definitively higher under more traditional reforms such as Raising Taxes Only or Raising Taxes and the NRA, while risk-adjusted payback ratios are generally larger under a two-tiered system for the 2026 cohort even at higher levels of risk aversion.
  - National saving is projected to be approximately 4 percentage points higher by 2040 under the Two-Tiered Option with Life-Cycle Investment than under the more traditional reforms. One explanation is the partially prefunded nature of the two-tiered system. Plus, the additional contributions made to this system through transition taxes also increase national saving, as does the assumption that a portion of prefunded benefits will be invested in equities through life-cycle investing patterns. Theoretically, however, a defined benefit system could also be designed with taxes and policy parameters that would achieve the same level of national saving.
  - As a result of an increase in saving under the two-tiered system modeled in this report, real per capita gross domestic product is projected to be \$3,600 higher by 2070 than under more traditional reforms. In addition, men born in 1976 are projected to receive about \$3,950 more in preretirement earnings under a two-tiered system than under the more traditional reforms, and their female counterparts are projected to receive about \$2,000 more.
  - Under the Two-Tiered Option with Life-Cycle Investment, an average man born in 1976 is projected to receive 7.8 percentage points less in average earnings plus net benefits, and his female counterpart is projected to receive 10.4 percentage points less. However, for the 2026 cohort, highest lifetime average earnings plus net benefits is projected under the Two-Tiered Option with Life-Cycle Investment. The average man of this cohort is projected to receive 1.3 percentage points more in average earnings plus net benefits under the Two-Tiered Option with Life-Cycle Investment than under Raising Taxes Only, whereas the average woman born in 2026 is projected to receive 1.6 percentage points less.

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## Introduction

The need for some type of Social Security reform has been well-documented,<sup>1</sup> and

legislative interest in the issue continues to accelerate.<sup>2</sup> As the Social Security debate heats up, the unprecedented quantitative analysis available through the EBRI-SSASIM2 Policy Simulation Model will provide policymakers and the public with information necessary for making informed policy decisions. In fact, this type of model was specifically suggested for use in the recommendations regarding research and data in the *Report of the 1994–96 Social Security Advisory Council* (Social Security Advisory Council, 1997). This *Issue Brief* is the second produced by EBRI's Social Security Reform Evaluation Research Program and the first in a series of EBRI publications that will present results from the EBRI-SSASIM2 Policy Simulation Model.

Created with the Policy Simulation Group, EBRI-SSASIM2 was designed in consultation with policy experts from the fields of finance, economics, and actuarial science who hold different views on how Social Security should be reformed. Using certain assumptions, the Model is able to closely approximate the program cost and benefit projections calculated by the Social Security Office of the Actuary.<sup>3</sup> In addition, as of the end of Phase III, the Model also offers several additional attributes, including:

- **Flexibility**—While a set of baseline assumptions is available for ease of use, EBRI-SSASIM2 also provides the user with unprecedented flexibility in the field of Social Security modeling to enter his or her own macroeconomic, demographic, and policy design assumptions.
- **Macroeconomic analysis**—The Social Security program both affects and is affected by the broader U.S. economy. The ability to analyze these complex interrelationships is central to much of the current debate.<sup>4</sup>
- **Risk analysis**—Sound projections about any social

program do not involve projecting what will happen but rather what is most likely to occur within a range of possibilities. Adding macroeconomic variables to the analysis, such as projections about equity market performance, introduces additional uncertainty. EBRI-SSASIM2 explicitly quantifies this uncertainty, allowing fundamental differences in the levels of risk associated with different policy options to be clearly identified for the first time.

- **Realistic age-earnings profiles**—Social Security benefits from an individual account would be based on account contributions and investment returns. Because contributions made earlier have more time to accrue returns, the rate at which earnings are acquired affects benefits. Other policy models generally assume that workers contribute the same amount steadily over their working lives, ignoring the fact that most workers' incomes grow as they age. By using realistic age-earning profiles, the EBRI-SSASIM2 Model projects individual account benefits more accurately.

At this stage, the Model analyzes the effects of Social Security reform on the birth cohorts of 1976 and those following. Work is currently under way to add historical data to the Model that will allow analysis of cohorts born before 1976.

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<sup>1</sup> For example, see Kelly Olsen, Jack VanDerhei, and Dallas Salisbury, "A Framework for Analyzing and Comparing Social Security Policies," EBRI Issue Brief no. 183 (Employee Benefit Research Institute, March 1997).

<sup>2</sup> Jackie Calmes, "President's Goal to Place 'Social Security First' is Likely to Change Debate over Budget Surplus," *The Washington Post*, 29 January 1998: A20; Alex Simendinger, "A Good Time to Tackle Social Security," *National Journal*, 10 January 1998: 68–69; "Gingrich Seeks Social Security Reform Panel," *The Washington Post*, 6 January 1998: A1 and A4; "Mr. Clinton and Social Security," *The Washington Post* (Editorial), 6 January 1998: A12; Peter Passell, "Economic Scene: Clinton May Soon Tackle the Devilish Social Security Issue," *The New York Times*, 23 October 1997: D2; and *The Associated Press*, "Clinton Quietly Seeks Dialogue to Plan Social Security Repairs," *The Washington Times*, 26 August 1997: A4.

<sup>3</sup> For more information on cross-validity testing of the model, see Holmer (1996b), pp. 79–83.

<sup>4</sup> For more information about the Model's macroeconomic capabilities, see Holmer (1997b) and Holmer (1996b).

## Generic Reforms

In the world of policymaking, provisions in one reform package are often com-

bined with those of other packages to create final legislation.<sup>5</sup> In this environment, it is critical to identify which aspects of different packages drive particular policy results. To inform policymakers and the public about how individual aspects of reform packages affect Social Security's costs and benefits, EBRI's initial modeling efforts focus on the analysis of generic reforms rather than complex legislative proposals. With this knowledge, more intricate reform packages can be modeled with increased understanding of how their individual components affect policy projections.

Like actual proposals facing legislators,<sup>6</sup> the generic reforms modeled in this report have different cost rates and benefit provisions. Each would place the OASI program in actuarial balance<sup>7</sup> over 75 years. The first of these generic reforms, "Raising Taxes Only," involves raising taxes only enough to maintain current-law benefit projections. The opposite reform, "Reducing

Benefits Only," gradually reduces current-law benefits in order to maintain today's contribution rates. Raising Taxes Only and Reducing Benefits Only are both *traditional reforms*.<sup>8</sup>

In addition, a third traditional reform, "Raising Taxes/Normal Retirement Age (NRA)," is somewhat of a hybrid of Raising Taxes Only and Reducing Benefits Only. It involves reducing benefits in that the NRA is increased more quickly to age 67 than under current law<sup>9</sup> and is indexed to longevity thereafter.<sup>10</sup> This reform also involves raising taxes enough to bring the OASI program into actuarial balance. Because the NRA increase would save on program costs, average taxes under this reform are not as high as those under Raising Taxes Only.

The fourth and fifth generic options modeled are *structural reforms* representing two different ways of setting up one basic system of "partial privatization." Under the basic system modeled here, the traditional benefits of the OASI (defined benefit) program are gradually reduced by 70 percent between 1999 and 2040.<sup>11</sup> In addition, a system of individual accounts requiring contributions of 5 percent of taxable payroll is introduced. At retirement, individual account balances

<sup>5</sup> See Achenbaum (1986) and Light (1985) for a detailed discussion.

<sup>6</sup> For information about different reform proposals, see Kelly Olsen, "Keeping Track of Social Security Reform Proposals: A Summary," EBRI Notes no. 11 (November 1996): 1-8. An update of this publication is scheduled for the April 1998 issue of EBRI Notes.

<sup>7</sup> See Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds (1997), Section IIF2B, pp. 113-116.

<sup>8</sup> As part of traditional reforms based on the current system, annual cost-of-living adjustments (COLAs) of benefits are made in order to maintain constant purchasing power of the life of the beneficiary. This COLA is made in the Model based on the projected rate of inflation in a given year.

<sup>9</sup> Under current law, the NRA will rise from age 65 to age 67 in two steps. First, the NRA will increase by two months for each year a person is born after 1937 until it reaches age 66 for those born in 1943. After a brief hiatus, the NRA will increase again by two months annually until it reaches age 67 for those born after 1959 (U.S. House of Representatives, 1996).

<sup>10</sup> This is the same NRA reform proposed in the Individual Accounts plan supported by two members of the 1994-1996 Advisory Council on Social Security. Specifically, this reform involves increasing the NRA by two months annually beginning in the year 2000 until it reaches age 67 for those reaching age 62 in 2011. The NRA is scheduled to be indexed to longevity thereafter. When run in deterministic mode, the EBRI-SSASIM2 Policy Simulation Model can produce cost estimates very near those estimated by the Social Security Office of the Actuary (assuming no behavioral responses). See Social Security Advisory Council (1997), Appendix III, pages 234, items D1 and D2.

<sup>11</sup> The 70 percent reduction applies equally to all income groups.

<sup>12</sup> Life annuities provide a payment on a periodic basis for the life of the participant and possibly his or her spouse. Real annuities provide recipients with the same benefits in terms of purchasing power over time by indexing benefits to the rate of inflation. In this analysis, mandatory real life annuities are assumed to make benefits under an individual account program most comparable with benefits under the traditional OASI program (which are in the form of indexed life annuities). Annuity assumptions are discussed in greater detail in footnote 28.

*It is important to note that this analysis makes two highly controversial assumptions in order to model the two-tiered options in this report.*

must be used to purchase a real life annuity.<sup>12</sup> Transition<sup>13</sup> to this generic “two-tiered” system<sup>14</sup> is projected to cost 5 percent of taxable payroll, scheduled for payment over 40 years. Transition costs are likely to be spread across a time period at least this long under actual reform proposals. Thus, the two-tiered system modeled in this report is illustrative of a “worst case scenario” in terms of potential transition burdens for the 1976 cohort (and a best case scenario for the 2026 cohort).

In the first generic option modeled under the two-tiered system, participants are assumed to invest individual account assets in a life-cycle manner whereby they initially invest in 100 percent equities during their twenties and gradually move to a mixed portfolio of 23 percent equities and 77 percent Treasury bonds by age 60. From 2000 to 2070, returns on this type of life-cycle investment are projected by the Model to average a nominal 7.06 percent. Given EBRI’s research under its Defined Contribution and Participant Behavior Research Program,<sup>15</sup> it is unlikely that equity investment will be uniformly this high, especially for younger participants (Yakoboski and VanDerhei, 1996). Such a high equity investment assumption has been modeled under the first two-tiered option presented in this report in order to show projections under a “best-case scenario” investment mix between Treasury bonds and equities. This generic reform option is called the “Two-Tiered Option with Life-Cycle Investment.”

The second generic option modeled under a two-tiered system is one that is identical to the Two-Tiered Option with Life-Cycle Investment with the major exception that investment of individual Social Security account balances is in Treasury bonds alone. From 2000 to 2070, the Model projects average returns on Treasury bonds to be 5.97 percent (nominal). Not only do results under this option represent projections under a restrictive regulatory environment that would not allow other individual account investments, but they are also representative of benefit projections for the most conservative investors under a system with multiple

investment options. This generic reform can be considered a “worst-case scenario” in terms of investment mix (or lack thereof) and is called the “Two-Tiered Option, All Bond Investment.”<sup>16</sup>

It is important to note that this analysis makes two highly controversial assumptions in order to model the two-tiered options in this report. First, it assumes that a system of individual accounts is administratively feasible, which is not immediately evident from the available research.<sup>17</sup> While administrative feasibility is less of a challenge for an individual account system that is an offshoot of the present system (with the payroll tax collection, delayed credits, and investment in government bonds), it would be a significant challenge under an individual account approach that would involve accounts outside the government or demand faster credits within the government than an annual W-2 allows. For example, in this type of setting, substantial administrative cost issues arise for the tens of millions of lower-income Americans for whom annual contributions would be less than \$200–\$500.

In addition, another highly controversial assumption that this analysis makes in order to model the two-tiered options is that individual account balances are

<sup>13</sup> A transition cost is incurred under any structural reform involving individual accounts because of the need to pay for both new individual account contributions and the current defined benefit obligations already promised under the old system. The 5 percent transition tax until 2040 under the generic two-tiered system would allow current OASI defined benefit obligations to be paid off during the period when defined benefit provisions are being scaled back for younger workers and as these younger workers begin prefunding a portion of their own Social Security benefits.

<sup>14</sup> Keep in mind that a two-tiered system could take many forms, of which this generic approach is only one.

<sup>15</sup> See [http://www.ebri.org/DCproject/dc\\_program\\_fact\\_sheet.html](http://www.ebri.org/DCproject/dc_program_fact_sheet.html) for more information about the EBRI Defined Contribution and Participant Behavior Research Program.

<sup>16</sup> Some have questioned the markets’ ability to absorb such increased Treasury or equity investment. For analysis of this issue, see Warshawsky and Hammond (1997).

<sup>17</sup> See Pozen (1997) for a discussion of administrative issues.

Table 1  
The 13 Key Assumption Variables

- |   |                             |
|---|-----------------------------|
| • Total fertility rate                  | • Productivity growth rate  |
| • Net flow of immigration               | • Wage-share growth rate    |
| • Mortality decline rate                | • Hours worked growth rate  |
| • Female labor force participation rate | • Nominal interest rate     |
| • Male labor force participation rate   | • Disability incidence rate |
| • Unemployment rate                     | • Disability recovery rate  |
| • Inflation rate                        |                             |

Source: EBRI-SSASIM2 Policy Simulation Model.

preserved for retirement and paid as life annuities, contrary to the results of recent activity related to IRAs and employment-based pensions.<sup>18</sup> If any individual account balances were available for loans or for early withdrawals, the benefit projections reported for the two-tiered options in this report would be overestimates.

## Baseline Assumptions

Although literally hundreds of EBRI-SSASIM2's parameters are subject to change by the individual model user, this report's simulations are based on the Model's default, or "baseline" assumptions, which were agreed on during regular discussions with Social Security experts from the fields of economics, finance, and actuarial science. For the 13 key assumption variables (table 1), the Model simulates<sup>19</sup> from baseline values obtained from the 1994 and 1995 Social Security Trustees' reports—with the exception of the mortality decline rate, which is simulated from a baseline value derived from the Census Bureau's mid-range projections.<sup>20</sup> The exact simulation process is guided by a series of baseline formulas, which the Model user can also alter. In this report, results are based on averages over 1,000 potential, real-world scenarios generated stochastically by the Model.<sup>21</sup> In addition to the inflation and interest rate variables listed in table 1, EBRI-SSASIM2 simulates future values of the equity and bond markets using well-accepted

econometric techniques based on historical data obtained from Ibbotson Associates (1995). (See Technical Appendix I.)

## Contributions and Costs

Today, 10.6 percent of taxable payroll is collected through Federal Insurance Contributions

Act (FICA) taxes to finance the OASI program. As indicated above, Reducing Benefits Only would leave this rate unchanged indefinitely, whereas Raising Taxes Only (i.e., funding current-law benefits) and Raising Taxes/NRA would increase this rate as necessary to fund benefit projections. Chart 1 shows that the percentage of taxable payroll required to finance OASI by Raising Taxes Only is projected to rise from 10.6 percent to 16.4 percent of taxable payroll by 2060—an increase of over 50 percent. The Raising Taxes/NRA option increases taxes from 10.6 percent to 14.92 percent, with tax rates identical to those of Raising Taxes Only until 2025 and 9 percent lower thereafter (chart 1).

The two-tiered options modeled in this report (i.e., Two-Tiered Option with Life Cycle Investment and Two-Tiered Option, All Bond Investment) would cut the traditional Social Security benefit to 30 percent of current levels by 2040 in order to reduce the portion of FICA taxes that are used to finance the OASI program to 5.6 percent. On top of this scaled-back traditional OASI

<sup>18</sup> For example, the Omnibus Appropriations Act of 1997 included a provision to allow participants of the federal Thrift Savings Plan to take loans from these "retirement" accounts for any reason, overriding prior legislation that restricted loans to the purposes of purchasing a primary residence, paying educational or medical expenses, or meeting other expenses only under circumstances of financial hardship. In addition the Taxpayer Relief Act of 1997 (TRA '97) included provisions that allow IRAs now to be used to fund first-time home purchase and college expenses without incurring the 10 percent penalty tax that previously had been applied to distributions made to individuals younger than age 59½. This legislation also expanded eligibility for currently existing deductible IRAs and allowed the accumulated

funds to be used for purposes other than retirement without penalty (Yakoboski and Pierron, 1997).

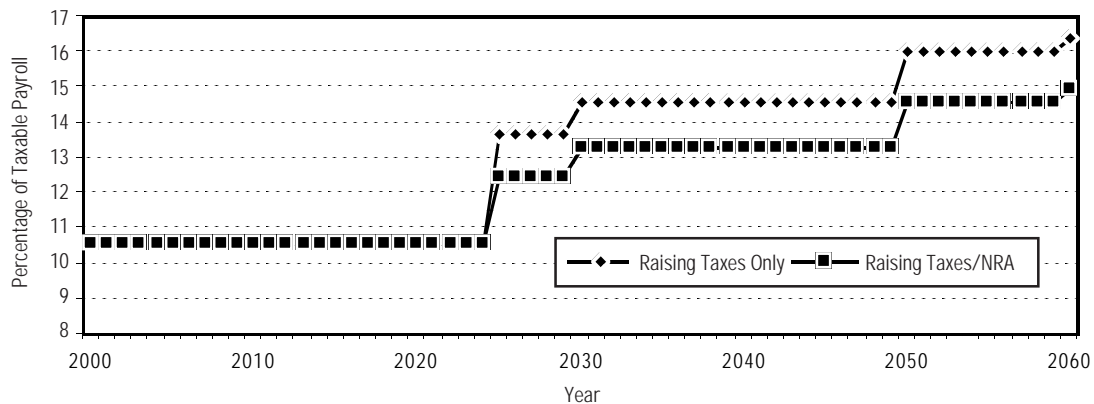
<sup>19</sup> Using Monte Carlo simulation techniques over 1,000 scenarios. For more information, see Holmer (1996b)

<sup>20</sup> For a more detailed discussion of the debate over mortality decline assumptions and the effect of using the Census Bureau's mid-range assumptions rather than those used by the Social Security Trustees, see Holmer (1997a).

<sup>21</sup> For detailed information about these formulas and the Monte Carlo stochastic simulation process, see Holmer (1997b) and Holmer (1996a).



Chart 1  
 Comparison of Scheduled Tax Increases under the Raising Taxes Only Reform  
 versus the Raising Taxes and normal Retirement Age (NRA) Reform, 2000–2070



Source: EBRI-SSASIM2 Policy Simulation Model.

program, a second tier of individual accounts with mandatory contributions of 5 percent of taxable payroll would be added. To fund the transition to this structural reform, a tax of 5 percent of taxable payroll would be levied from 2000 to 2040, such that total tax<sup>22</sup>/contribution rates under the two-tiered system would equal 15.6 percent from 2000 to 2040. After 2040, combined tax and contribution rates for this reform are scheduled to drop to 10.6 percent of taxable payroll.

Although tax/contribution schedules represent the payroll contribution rates required to place each generic reform within actuarial balance<sup>23</sup> over 75 years, payroll contributions are not the sole source of OASI program revenues. Revenue used to finance the OASI program under these generic reforms also comes from the income taxation of Social Security benefits as well as any trust fund reserves and investment returns thereon. As a result, rates of taxable payroll contributions do not fully reflect the OASI program's total direct expenses.

Cost rates are a more comprehensive measure of the social expenditures used to operate a defined benefit Social Security program. Usually expressed as a percentage of taxable payroll, OASI cost rates measure the dollars paid in defined benefits over a certain period. The full amount required by society to finance a two-tiered system is more closely approximated when any individual account contributions are added to these cost

rates. Chart 2 compares average<sup>24</sup> cost rates plus any required annual individual account contributions across reforms, revealing that the combined average rate for Reducing Benefits Only would average 11.93 percent of taxable payroll over 75 years. Of the reforms modeled here, this reform's cost rate is most steady from 2000 to 2070, rising slightly in the later years.

Raising Taxes/NRA proves to be the second least expensive of the five generic reforms, with cost rates averaging 13.75 percent of taxable payroll over 75 years. This compares with the average cost rate of 14.52 percent for Raising Taxes Only, the most expensive reform. Hence, Raising Taxes/NRA would have costs over 75 years that are 0.77 percentage points—or 5.6 percent—lower than Raising Taxes Only. The cost rates of both Raising Taxes Only and Raising Taxes/NRA both rise steadily over time to an average of 18.84 percent and 14.6 percent of payroll, respectively, by 2070. Notice that Raising Taxes/NRA results in over 2.5 percentage points—or 13 percent—lower cost rates by 2070 than Raising Taxes Only.

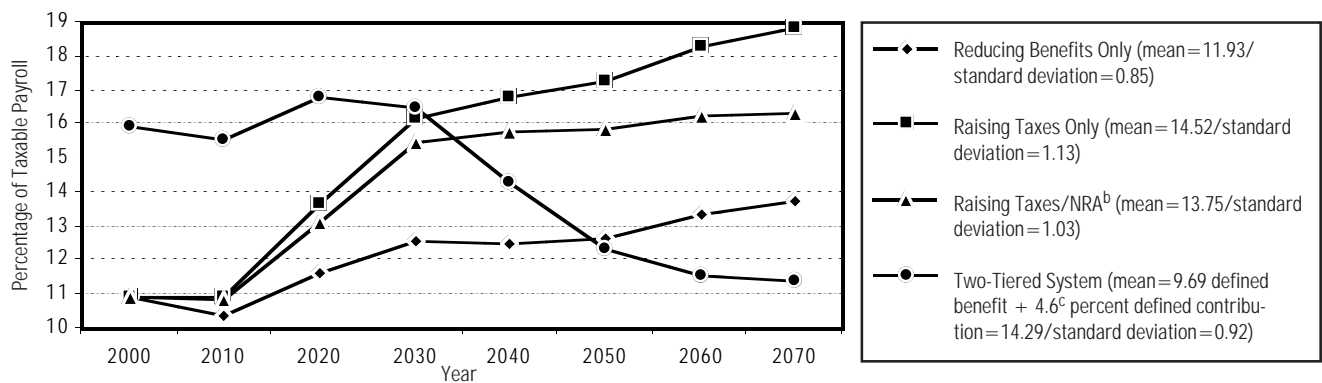
Finally, both options modeled under the two-tiered system are projected to have an average combined tax/contribution rate of 14.29 percent of taxable payroll over 75 years—more expensive than Reducing Benefits Only and Raising Taxes/NRA but slightly less expensive (0.23 percentage points) than Raising Taxes Only. However, over time, rates under the two-tiered options would grow less expensive as transition taxes end in the year 2040 and as the defined benefit portion of OASI benefits is scaled back. By 2050, the two-tiered options are projected to have a combined tax/contribution rate that is 28.5 percent less than Raising Taxes Only and 22.2 percent less than Raising Taxes/NRA. This pro-

<sup>22</sup> Although contributions made to individual accounts are like a tax in that immediate disposable income is reduced, many argue that they are not a tax because none of this revenue is owned by the government and, provided positive returns, total lifetime income is not necessarily reduced on a present-value basis.

<sup>23</sup> See footnote 7.

<sup>24</sup> Remember that the averages reported in this Issue Brief are those generated over 1,000 stochastic scenarios (Holmer 1996b).

Chart 2  
Projected Average<sup>a</sup> Cost/Contribution Rates under Four Generic Reforms, 2000–2070



Source: EBRI-SSASIM2 Policy Simulation Model.

<sup>a</sup>Average over 1,000 scenarios.

<sup>b</sup>Normal retirement age.

<sup>c</sup>Contribution projections over 75 years under the two-tiered system are lower than the 5 percent of taxable payroll required by law because individual account contributions occur in only 69 years of the 75-year averaging period.

jected tax/contribution rate “savings” under the two-tiered options relative to Raising Taxes Only and Raising Taxes/NRA occurs only after transition costs are paid off in 2040.

## Benefit Projections

This analysis projects OASI benefit results for an “average” single man and an “average” single woman

(with no dependents) born in 1976, as well as their 2026 counterparts.<sup>25</sup> A man and woman of the 1976 birth cohort are modeled because they are part of a cohort whose members would pay transition costs over their entire working lives under the generic two-tiered options.<sup>26</sup> A man and woman of the 2026 birth cohort are modeled because they are scheduled to pay no transition costs, since they will attain age 16 in the year 2042, two years after the end of the transition tax. Hence, benefit results are presented for both cohorts in order to compare one of the cohorts scheduled to fare worst in terms

of projected transition costs to the first cohort paying no transition costs whatsoever.

The “average” man and woman modeled in 1976 and 2026 are assumed to retire at age 67 and to earn steadily at the gender, age, and cohort-wide average wages over their careers. In addition, they are assumed to die on reaching the average projected remaining life expectancy for their cohort and gender at NRA, as generated through the Model.<sup>27</sup> On reaching NRA, women born in 1976 are projected to live on average to age 89, and their 2026 counterparts are projected to reach age 92. Men born in 1976 are projected to survive to an average age of 85 on attaining NRA, and men born in 2026 may expect to live to be 89 years old, on average.

## Average Annual Benefits

Table 2 shows average annual real benefit projections by cohort and gender over all retirement years for Reducing Benefits Only, Raising Taxes Only, Raising Taxes/NRA, and the two-tiered options.<sup>28</sup> Keep in mind that traditional (defined benefit) Social Security benefits grow in real value under current law because they are indexed to

<sup>25</sup> While the Model can compute survivor and spousal benefits on a cohort-wide basis into lifetime benefit measures, the calculation of benefits in this report does not include them for two reasons. First, the primary focus of this analysis is to identify projected retirement benefits based on a person’s own labor force attachment and earnings under different reforms—not to project benefits based on a person’s probability of leaving a surviving spouse or dependents. Second, it is unclear how a two-tiered system would provide survivor and spousal benefits, or at what level. As a result, most analyses by the research community thus far have not included survivors and spousal provisions in benefit comparisons between traditional and structural reforms.

<sup>26</sup> Persons born in 1976 would reach age 16 in 1992 and presumably work until at least age 67, which would be attained in the year 2046. Hence,

workers in this cohort would pay transition taxes to the two-tiered system during the full 40-year period that the tax is levied, from 2000–2040.

<sup>27</sup> Based on the Bureau of the Census’ mid-range projections, simulated stochastically over 1,000 scenarios.

<sup>28</sup> Under the generic two-tiered reform, mandatory annuitization is assumed for the full balance of individual accounts on retirement. Annuities are assumed to be in the form of individual annuities with annuity loading factors equal to 5 percent of individual account balances. The annuity is priced assuming a continuation of recent mortality decline rates and using a real rate of interest calculated with an expected rate of inflation that is a moving average of recent inflation rates. Annuity prices for males and females differ because of longevity differences. For more information, see Holmer, 1997b.

Table 2  
Average<sup>a</sup> Annual Real Benefits Under Generic Reforms,  
by Birth Cohort and Gender (\$1997)

| Gender and Birth Year            | Raising Taxes Only (Funding Current-Law Benefits) | Two-Tiered Option with Life-Cycle Investment <sup>b</sup> | Raising Taxes/NRA <sup>c</sup> | Two-Tiered Option, All Bond Investment <sup>d</sup> | Reducing Benefits Only |
|----------------------------------|---|---|--------------------------------|---|------------------------|
| Average man, <sup>e</sup> 1976   | \$23,003  | 23,795  | \$21,464                       | \$17,715  | \$16,265               |
| Average woman, <sup>e</sup> 1976 | 16,455  | 13,945  | 15,361                         | 10,397  | 11,647                 |
| Average man, <sup>e</sup> 2026   | 38,922  | 37,093  | 31,203                         | 28,547  | 27,398                 |
| Average woman, <sup>e</sup> 2026 | 27,822  | 22,345  | 22,300                         | 17,124  | 19,578                 |

Source: EBRI-SSASIM2 Policy Simulation Model.

<sup>a</sup>Average over 1,000 stochastic scenarios. These projections, like all those in this report, are inclusive of the macroeconomic effects projected under the different reforms. The Macroeconomic Effects section of this report explores these effects.

<sup>b</sup>Individual account participants under the Two-Tiered Option with Life-Cycle investment are assumed to invest in a life-cycle pattern in which they begin investing account balances in 100 percent equities during their 20s and gradually move to a portfolio consisting of 23 percent equities and 77 percent Treasury bonds by age 60.

<sup>c</sup>Normal retirement age.

<sup>d</sup>This option assumes 100 percent of individual account balances are invested in Treasury bonds.

<sup>e</sup>Men and women of both cohorts are assumed to earn steadily over their careers at the age and gender cohort average, to retire at age 67, and to die after attaining the average remaining life expectancy for their gender and cohort at the NRA.

wages. Because wages have historically grown over time and are projected to continue growing in the Model, traditional reforms like Raising Taxes Only (i.e., funding the current system) provide higher real annual benefits for the 2026 cohort than for the 1976 cohort—even though benefits are scheduled to remain the “same” in that they continue to follow current-law benefit policy. Also, because real wages are projected to grow over time, the 5 percent of taxable payroll contributed to individual accounts will increase in real dollar value as well, which explains why benefits for the 2026 cohort are higher than those for the 1976 cohort under the structural reforms.

Results in table 2 indicate, not surprisingly, that the lowest projected average annual real benefits for both cohorts would occur under the options that would reduce benefits to keep current payroll tax rates unchanged and would involve individual accounts with only Treasury bond investment. Of these two low-benefit reforms, males of both the 1976 and 2026 cohorts would receive fewer projected real annual average benefits under Reducing Benefits Only, while women would receive fewer benefits under the Two-Tiered Option, All Bond Investment.

Given the contribution rates modeled in this analysis, only the man born in 1976 is projected to do better in terms of average annual real benefits under the Two-Tiered Option with Life-Cycle Investment than under Raising Taxes Only. He is projected to receive, on average, \$792—or 3.4 percent more—in real annual benefits under this two-tiered option. In contrast, a man born in 2026 is projected to receive \$1,829—or almost

5 percent higher benefits—under Raising Taxes Only than he would receive under the Two-Tiered Option with Life-Cycle Investment.

Projected benefit differences between Raising Taxes Only and the Two-Tiered Option with Life Cycle Investment are more striking for women. A woman born in 1976 and her 2026 counterpart are projected to receive an average of \$2,510 and \$5,477 more, respectively, in average annual real benefits under Raising Taxes Only than under the generic Two-Tiered Option with Life-Cycle Investment. A woman born in 1976 could expect an average of 18 percent more in annual benefits under Raising Taxes Only, and her 2026 counterpart could expect an average of 24.5 percent more.

For three primary reasons, benefits under the Two-Tiered Option with Life-Cycle Investment are, on average, lower (with the exception of those received by a man born in 1976) than those under the reform Raising Taxes Only. The foremost reason applies specifically to the 2026 cohort. A significant force pushing down benefits under the Two-Tiered Option with Life-Cycle Investment is simply the combined cost/contribution rate differences between reforms. Recall that the combined cost/contribution rate for the two-tiered options are scheduled to decrease steadily from 14.34 percent in 2040 to 11.42 percent by 2070 (chart 2). In contrast, Raising Taxes Only is projected to cost 16.81 percent of taxable payroll in 2040, rising to 18.84 percent by 2070. Largely as a result, the more expensive Raising Taxes Only reform is projected to provide higher benefits for the 2026 cohort than the Two-Tiered Option with Life-Cycle Investment.

*The projected difference in average benefits for men versus women under structural versus traditional reforms is likely to continue so long as differences in average earning levels and job tenure patterns persist between genders.*

The second reason behind lower average benefits under the Two-Tiered Option with Life-Cycle Investment largely explains the gender differentials between projections shown in table 2. Hence, it also explains why a woman born in 1976 is projected to receive higher benefits—and a woman born in 2026 is projected to receive about the same benefits—under the Raising Taxes/NRA reform, which significantly reduces current-law benefit promises, than under the Two-Tiered Option with Life-Cycle Investment. Furthermore, it explains why women tend to fare worst in terms of annual benefits under the Two-Tiered Option, All Bond Investment than men, who fare worst under Reducing Benefits Only. The explanation is that women tend to benefit more than men from the redistributive aspects of the current defined benefit OASI system, which would be maintained fully under the traditional reform of Raising Taxes Only, and to a lesser extent under Raising Taxes/NRA and Reducing Benefits Only.<sup>29</sup> Because men tend to have higher earnings and more years of earnings than women, men would benefit more, on average, under a structural reform tying benefits more closely to contributions, such as a the Two-Tiered Option with Life Cycle Investment.

The OASI program is projected to continue redistributing more income to women than to men, in part because women are expected to live longer. Annual benefits under the current OASI program are provided in the form of a life annuity, with (nonsurvivor) benefits based solely on one's own earnings history. Hence, if a man and woman have identical earnings histories under

the current system, they will both receive the same annual benefit for life—but the average woman will collect more in cumulative lifetime benefits because she lives more years as a beneficiary. In comparison,

annual benefits from individual accounts under the two-tiered options are based exclusively on individual account accumulations. Converting identical account balances into an annuity that provides a man and woman with the same cumulative lifetime benefits must adjust for their different life expectancies. While an annuity that takes such longevity differentials into account will provide average men and women possessing identical account balances with identical cumulative lifetime benefits, the woman's annual benefit will be lower. Put most simply, the woman's annuitized benefit would have to be spread thinner so that it lasts longer.

Another reason that women benefit more from the redistributive aspects of the current system is that traditional OASI benefits are structured to redistribute income to lower income workers. Women, on average, tend to earn lower incomes than men because they spend less time in the labor force<sup>30</sup> and because of lower average earnings.<sup>31</sup> The projected difference in average benefits for men versus women under structural versus traditional reforms is likely to continue so long as differences in average earning levels and job tenure patterns persist between genders.

A final reason why the Two-Tiered Option with Life-Cycle Investment has lower projected average benefits than Raising Taxes Only pertains specifically to the 2026 cohort and explains perhaps another surprising

<sup>29</sup> While the redistributive dynamics of the current system would be maintained under Reducing Benefits Only and Raising Taxes/NRA, they would not be maintained fully in the sense that real benefits for all beneficiaries would be reduced.

<sup>30</sup> The baseline historical assumptions for relative labor force participation rates are from the 1996 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds, pp. 147–148. Over time, the Trustees project the difference in male and female

labor force participation rates to decline from 17.7 percentage points (or a 31 percent difference) in 1995 to 12.7 percentage points (or a 22 percent difference) by 2070.

<sup>31</sup> The historical age-gender wage data used in the model are mean earnings data for 1994 from Employee Benefit Research Institute tabulations of March 1995 Current Population Survey file. According to these data, men ages 16–67 earn, on average, 62 percent more than women of the same age group.

Table 3  
Average<sup>a</sup> Payback Ratios Across Generic Reform Options

| Gender and Birth Year | Reducing Benefits Only | Raising Taxes Only | Raising Taxes/NRA <sup>b</sup> | Two-Tiered Option with Life-Cycle Investment | Two-Tiered Option, All Bond Investment |
|-----------------------|------------------------|--------------------|--------------------------------|--|--|
| Man, 1976             | 62%                    | 77%                | 75%                            | 66%  | 47%                                    |
| Woman, 1976           | 83                     | 106                | 102                            | 75   | 53                                     |
| Man, 2026             | 74                     | 69                 | 61                             | 104  | 76                                     |
| Woman, 2026           | 94                     | 88                 | 78                             | 114  | 83                                     |

Source: EBRI-SSASIM2 Policy Simulation Model.

<sup>a</sup>Over 1,000 scenarios.

<sup>b</sup>Normal retirement age.

result shown in table 2: given the contribution assumptions used in these reforms, average benefit projections for a male born in 2026 are not higher under the Two-Tiered Option with Life-Cycle Investment than those under Raising Taxes Only. In comparison, a male born in 1976 is projected to do 3.4 percent better, on average, under this two-tiered option. This result is counterintuitive to many who would have expected the favorable growth effects (see section on Macroeconomic Effects) of the Two-Tiered Option with Life-Cycle Investment over time to have caused a man born in 2026 to be more favored under this reform than his 1976 counterpart.

Examination of this result reveals that another factor pushing down average annual real benefits under the Two-Tiered Option with Life-Cycle Investment for those born in 2026 is the lower interest rates<sup>32</sup> projected to be experienced by this birth cohort. These lower interest rates arise largely because of the favorable economic effects of the two-tiered system, which is projected to increase national saving and provide a larger pool of capital for investment (see section on Macroeconomic Effects). Hence, the favorable growth effects under a two-tiered system lower benefits under the assumption of mandatory purchase of real annuities.<sup>33</sup> This is due to the fact that the purchase price of these types of annu-

ities is increased (thus depressing benefits) when interest rates fall. It should be noted that this is a consequence of the portfolio asset allocation assumed for the insurer under this type of annuity; however, there are other types of annuities not modeled in this analysis (viz., variable annuities) that would not be subject to this type of increased price when interest rates decline.

## Payback Ratios

Because of the importance of tax/contribution rates in benefit projections, another outcome measure frequently used in comparing Social Security reforms is the relationship between tax/contribution rates and benefits. One technique for measuring the relationship between costs and benefits is to compute payback ratios, which measure the benefits an individual receives from a Social Security system against the dollars he or she has contributed. In colloquial language, payback ratios measure the “bang for the buck” relationship between contributions and benefits.<sup>34</sup> While payback ratios can be measured a number of ways (Geanakoplos et al., 1997; Myers and Schobel, 1993), EBRI-SSASIM2 measures them as the ratio of lifetime benefits divided by lifetime payroll tax contributions (from both employer and employee), including transition costs.<sup>35</sup>

<sup>32</sup> In 2030, nominal interest rates under a system that raises taxes only are projected to be 6.58 percent, which is 51 basis points higher than the 6.07 percent projected under the two-tiered system. By 2140, average nominal interest rates are projected to be 6.46 percent under a system that raises taxes only, 52 basis points higher than the rate of 5.94 percent projected under the Two-Tiered Option with Life-Cycle Investment.

<sup>33</sup> As explained in footnote 12, indexed life annuities have been modeled for this report in order to render the benefits that could be provided under a system of individual accounts directly comparable to those provided by the indexed life annuities paid through the traditional OASI system. For a further explanation on how annuity prices relate to interest rates, see Holmer (1996b) and footnote 28.

<sup>34</sup> Some (see Myers, 1997, for example) have argued that payback ratios are

inappropriate measures of benefits under a social insurance program such as Social Security, which, like any form of insurance, is not designed to provide returns but to protect against risks. Controversy over whether the Social Security program's performance should be held up against this measure reflects a basic tension in the current reform debate concerning whether Social Security's appropriate role is as a social insurance program or as an individual investment program.

<sup>35</sup> Both lifetime benefits and payroll tax/contributions are measured in present values. Discount rates used in the Model are the nominal interest rate for each year along a scenario. This is the standard approach in finance when interest rates vary both across time and across stochastic scenarios. Discounted values are expressed in nominal (not real) terms. Only in a more simplistic analysis that assumes no time variation and no future uncertainty can one compute present values using a single discount rate.

Results in table 3 indicate that average payback ratios under the Two-Tiered Option, All Bond Investment could be the lowest of all the reforms for the 1976 cohort if account balances are forced to be invested in Treasury bonds, or for “average” persons who make the most conservative investment allocations possible over their entire lives. Table 3 also shows that average payback ratios under the Two-Tiered Option with Life-Cycle Investment are projected to be about 14 percent lower for a man born in 1976 and 29 percent lower for a woman of the 1976 cohort than payback ratios under Raising Taxes Only.

Conversely, for members of the 2026 birth cohort, the Two-Tiered Option with Life-Cycle Investment offers 51 percent higher payback ratios for men and 30 percent higher average payback ratios for women. The disparity in average payback ratio results between cohorts is due to the fact that persons born in 1976 are paying the “extra” cost of financing the transition to the Two-Tiered Option with Life-Cycle Investment—a cost that does not add to their benefit levels and therefore lowers the ratio of benefits relative to program contributions. In contrast, the 2026 cohort finances none of the transition costs.

Unlike comparisons between Raising Taxes Only and the Two-Tiered Option with Life-Cycle Investment, payback ratios between Raising Taxes Only and the Two-Tiered Option, All Bond Investment are roughly comparable for the 2026 cohort (about 7 percentage points higher for men and 5 percentage points lower for women). Although this cohort pays no transition costs that would lower their benefits under the Two-Tiered Option, All Bond Investment reform, they would not get high enough returns on their investments in Treasury bonds to offset the 70 percent cuts in traditional benefits accompanying the two-tiered options. The implication is that while the two-tiered options do not provide higher payback ratios than Raising Taxes Only for the 1976 cohort because of the transition costs scheduled in this analysis, the prospect of higher payback ratios for the 2026 cohort exists only if the beneficiary invests to some extent in equities.

Table 4  
Comparing Average<sup>a</sup> Annual Real Benefits  
(\$1997) with Average Payback Ratios

| Group/Policy  | Average Annual Real Benefits | Average Payback Ratios |
|---|------------------------------|------------------------|
| Man, 1976, Reducing Benefits Only                         | \$ 16,265                    | 62%                    |
| Man, 1976, Raising Taxes Only                             | 23,003                       | 77 <sup>b</sup>        |
| Man, 1976, Raising Taxes/NRA <sup>c</sup>                 | 21,464                       | 75                     |
| Man, 1976, Two-Tiered Option, All Bond Investment         | 17,715                       | 47                     |
| Man, 1976, Two-Tiered Option with Life-Cycle Investment   | 23,795 <sup>b</sup>          | 66                     |
| Woman, 1976, Reducing Benefits Only                       | 11,647                       | 83                     |
| Woman, 1976, Raising Taxes Only                           | 16,455 <sup>b</sup>          | 106 <sup>b</sup>       |
| Woman, 1976, Raising Taxes/NRA <sup>c</sup>               | 15,361                       | 102                    |
| Woman, 1976, Two-Tiered Option, All Bond Investment       | 10,397                       | 53                     |
| Woman, 1976, Two-Tiered Option with Life-Cycle Investment | 13,945                       | 75                     |
| Man, 2026, Reducing Benefits Only                         | 27,398                       | 74                     |
| Man, 2026, Raising Taxes Only                             | 38,922 <sup>b</sup>          | 69                     |
| Man, 2026, Raising Taxes/NRA <sup>c</sup>                 | 31,203                       | 61                     |
| Man, 2026, Two-Tiered Option, All Bond Investment         | 28,547                       | 76                     |
| Man, 2026, Two-Tiered Option with Life-Cycle Investment   | 37,093                       | 104 <sup>b</sup>       |
| Woman, 2026, Reducing Benefits Only                       | 19,578                       | 94                     |
| Woman, 2026, Raising Taxes Only                           | 27,822 <sup>b</sup>          | 88                     |
| Woman, 2026, Raising Taxes/NRA <sup>c</sup>               | 22,300                       | 78                     |
| Woman, 2026, Two-Tiered Option, All Bond Investment       | 17,124                       | 83                     |
| Woman, 2026, Two-Tiered Option with Life-Cycle Investment | 22,345                       | 114 <sup>b</sup>       |

Source: EBRI tabulations of results from the EBRI-SSASIM2 Policy Simulation Model.

<sup>a</sup> Average over 1,000 scenarios.

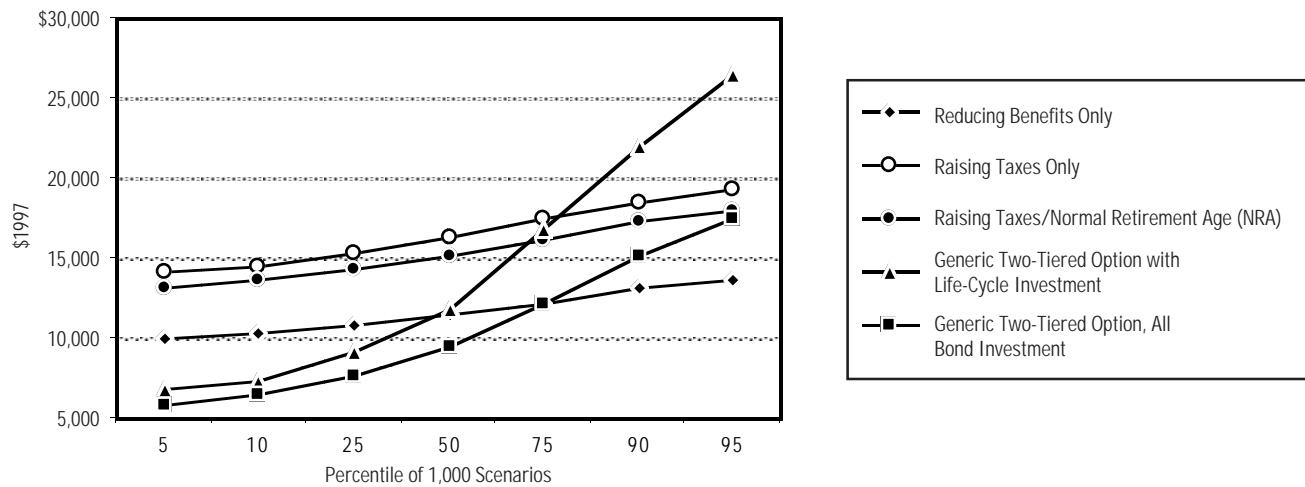
<sup>b</sup> Highest value for gender and cohort.

<sup>c</sup> Normal retirement age.

## Policy Tradeoffs

Juxtaposition of average payback ratios with average benefit projections highlights the tradeoff between payback ratios and benefits that policymakers may have to face for some groups. Table 4 shows that only a woman born in 1976 would face no tradeoff between higher payback ratios and higher benefits, because in terms of both policy performance measures, she is better off under Raising Taxes Only. For a male born in 1976, there is a tradeoff between payback ratios under Raising Taxes Only (i.e., funding the current system) and the benefits under Two-Tiered Option with Life-Cycle Investment. Payback ratios are about 11 percentage points higher under the Raising Taxes Only approach, and benefits are projected to be \$792 higher under Two-Tiered Option with Life-Cycle Investment.

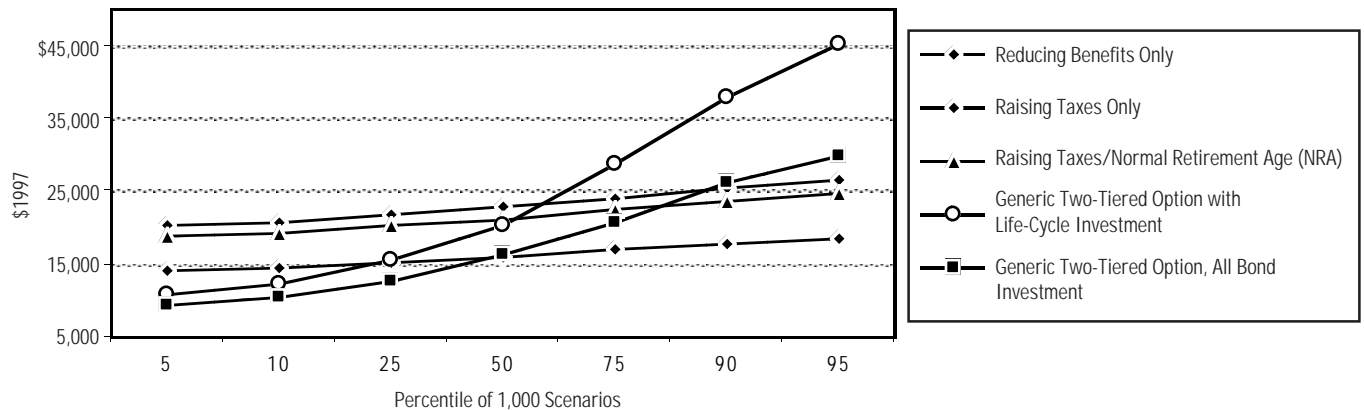
Chart 3  
**Percentile Distributions of Annual Real Benefits for a Woman Born in 1976 under Five Reforms**



Source: EBRI-SSASIM2 Policy Simulation Model.

Note: The mean for Raising Taxes Only is \$16,455, with a standard deviation of \$1,645. The mean for Raising Taxes/NRA is \$15,361, with a standard deviation of \$1,528. The mean for Reducing Benefits Only is \$11,647, with a standard deviation of \$1,610. The mean for the Two-Tiered Option with Life-Cycle Investment is \$13,945, with a standard deviation of \$8,300. The mean for Two-Tiered Option, All Bond Investment is \$10,397, with a standard deviation of \$3,971.

Chart 4  
**Percentile Distributions of Annual Real Benefits for a Man Born in 1976 under Five Reforms**



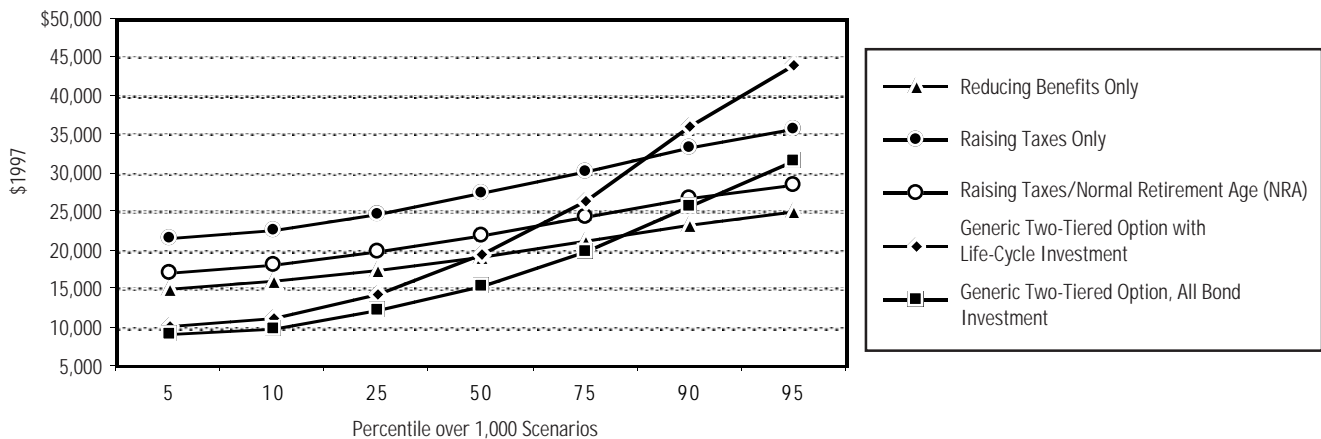
Source: EBRI-SSASIM2 Policy Simulation Model.

Note: The mean for Raising Taxes Only is \$23,003, with a standard deviation of \$1,952. The mean for Raising Taxes/NRA is \$21,464, with a standard deviation of \$1,818. The mean for Reducing Benefits Only is \$16,252, with a standard deviation of \$1,383. The mean for the Two-Tiered Option with Life-Cycle Investment is \$23,795, with a standard deviation of \$13,956. The mean for the Two-Tiered Option, All Bond Investment is \$17,715, with a standard deviation of \$7,128.

There are also tradeoffs for the average man and woman of the 2026 cohort. However, since the man born in 2026 would receive just \$1,829 (or 4.9 percent) more in annual real benefits under Raising Taxes Only, but a payback ratio that is 35.5 percentage points (or about 50 percent) higher under the two-tiered system, he may favor the Two-Tiered Option with Life-Cycle Investment when weighing his options. On the other hand, a woman born in 2026 has a more profound tradeoff. She would

receive \$5,477 (or about 24.5 percent) more in annual real benefits under Raising Taxes Only and receive an average payback ratio that is 26.02 percentage points—or about 30 percent—higher under the Two-Tiered Option with Life-Cycle Investment. When comparing these two reforms for women born in 2026, policymakers and the public would have to decide whether adequacy of benefits or equity of payback ratios is a more pressing policy goal.

Chart 5  
Average<sup>a</sup> Percentile Distributions of Annual Real Benefits for a Woman Born in 2026 under Five Reforms



Source: EBRI-SSASIM2 Policy Simulation Model.

Note: The mean for Raising Taxes Only is \$27,822, with a standard deviation of \$4,295. The mean for Raising Taxes/NRA is \$22,300, with a standard deviation of \$3,436. The mean for Reducing Benefits Only is \$19,578, with a standard deviation of \$3,012. The mean for the Two-Tiered Option with Life-Cycle Investment is \$22,345, with a standard deviation of \$11,870. The mean for the Two-Tiered Option, All Bond Investment is \$17,124, with a standard deviation of \$7,552.

<sup>a</sup>Average over 1,000 scenarios.

## Assessing Risk

Based on the average benefit and payback projections above, one might be tempted to simply conclude: (1) a woman born in 1976 is better off under Raising Taxes Only; (2) a man born in 1976 and a woman born in 2026 are better off under the Two-Tiered Option with Life-Cycle Investment than under Raising Taxes Only if one views higher payback ratios as more desirable than higher benefits; and finally, (3) a man born in 2026 is better off under the Two-Tiered Option with Life-Cycle Investment if one views higher payback ratios as more desirable than higher benefits. In actuality, reform comparison is likely to be based on a number of considerations other than average annual real benefits and payback ratios. The level of risk that policymakers are comfortable letting Social Security participants assume is one of these considerations.

Charts 3 through 6 show the percentile distributions of different benefit probabilities for average men and women of the 1976 and 2026 birth cohorts.<sup>36</sup> It is clear from the steeper upward slopes of the Two-Tiered Option with Life-Cycle Investment that this reform has the most variation, or “risk.” At the 5<sup>th</sup> percentile, average benefits under this reform could fall lower than benefits under a system that simply reduces benefits to begin with. On the other hand, benefits at the 95<sup>th</sup> percentile could greatly exceed average annual benefits under any of the three nonstructural reforms in

this report.

While not of the same magnitude, there is also considerable upward slope under the Two-Tiered Option, All Bond Investment. In comparison, less risk exists in projections for the more traditional reforms of Reducing Benefits Only, Raising Taxes Only, and Raising Taxes/NRA. While benefits are not likely ever to fall as low under these traditional reforms as under the worst-case scenario for the two-tiered options, the tradeoff is that benefits under the traditional reforms do not have the same probability of rising as high. Comparison of benefits under policies with different risk levels must take into account not only average benefit probabilities but also the degree of risk aversion policymakers believe is appropriate in pursuing those probabilities through reform.

## Risk-Adjusted Benefits

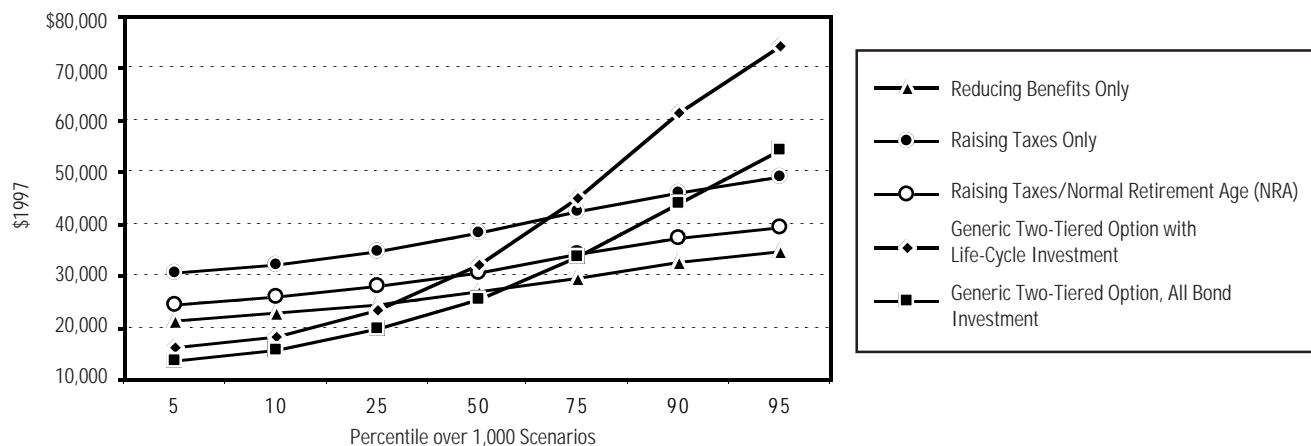
Because EBRI-SSASIM2 quantifies the amount of risk inherent in different reform approaches, benefits under different Social Security policies can be risk adjusted. Risk adjustment allows identification of the type of tradeoff between risks and returns that have long been identified through quantitative techniques in the financial community but rarely in the world of policymaking. Higher assumed degrees of risk aversion correspond to greater concern for variability (i.e., uncertainty) in projections.

It is unclear what the appropriate degree of risk aversion should be for assessing the relative merits of

<sup>36</sup> See footnote 19.



Chart 6  
Average<sup>a</sup> Percentile Distributions of Annual Real Benefits for a Man Born in 2026 under Five Reforms



Source: EBRI-SSASIM2 Policy Simulation Model.

Note: The mean for Raising Taxes Only is \$38,922, with a standard deviation of \$5,667. The mean for Raising Taxes/NRA is \$31,203, with a standard deviation of \$4,540. The mean for Reducing Benefits Only is \$27,398, with a standard deviation of \$3,983. The mean for the Two-Tiered Option with Life-Cycle Investment is \$37,093, with a standard deviation of \$20,024. The mean for the Two-Tiered Option, All Bond Investment is \$28,547, with a standard deviation of \$13,498.

<sup>a</sup>Average over 1,000 scenarios.

Social Security reforms. Therefore, the risk aversion parameters illustrated in tables 5 and 6 cover a wide range of attitudes toward risk, from risk neutral to a highly unlikely degree of risk aversion (risk aversion equals 3.5).<sup>37</sup> A risk-averse individual (anyone with a risk aversion level greater than 0) penalizes the expected rate of return on a portfolio by a certain percentage to account for the risk involved. The greater the individual's risk aversion, the larger his or her risk aversion level will be and hence the larger the penalty he or she will assign to increased uncertainty. Hence, the higher one's degree of risk aversion, the lower one will rate a reform involving risk. Because the Two-Tiered Option with Life-Cycle Investment has the highest degree of associated market risk, the relative advantage of this individual account system decreases as the risk aversion level increases in tables 5 and 6 due to increasing penalties assigned to market risk.<sup>38</sup>

Table 5 has been constructed such that if the

values are positive, the Two-Tiered Option with Life-Cycle Investment has an advantage in terms of annual real benefits relative to Raising Taxes Only. If values are negative, then the Raising Taxes Only option provides higher relative benefits. The higher the negative number, the more advantage that Raising Taxes Only has compared with the Two-Tiered Option with Life-Cycle Investment.

Results calculated under the assumption of risk neutrality (column 0.0) indicate that a man born in 2026 would receive average annual real benefits from the Two-Tiered Option with Life-Cycle Investment that are 5 percent lower than under Raising Taxes Only. Women of both cohorts would receive lower benefits (16 percent and 20 percent) under the Two-Tiered Option with Life-Cycle Investment. Conversely, a man born in 1976 would receive, on average, 3 percent more in real annual benefits under the Two-Tiered Option with Life-Cycle Investment than under Raising Taxes Only.<sup>39</sup> However, as one moves into a perspective of higher risk aversion for Social Security policy, the advantage of the Two-Tiered Option with Life-Cycle Investment for a man in the 1976 birth cohort wanes. By moving to a risk aver-

<sup>37</sup> Under the power expected utility function used in this analysis, a risk aversion level of 2.0 implies that one would be willing to pay a premium of approximately 2 percent of a dollar amount to insure against a 2 percent risk of losing one-half of the dollar amount. Compared with someone who is risk neutral (a risk aversion level of 0) and therefore willing to pay only the actuarial value of that loss (1 percent), this risk-averse individual would be willing to pay an insurance premium approximately twice the expected value of the loss. As the risk aversion level increases, the maximum insurance premium that the individual would be willing to pay increases correspondingly. For a more complete explanation of risk aversion and utility levels see Zvi Bodie, Alex Kane, and Alan J. Marcus, *Investments*, Third edition (Chicago, IL: Richard D. Irwin, forthcoming).

<sup>38</sup> Market risk is not the only type of risk involved in the Social Security reforms modeled in this report; political risk is also a factor. Unfortunately, this type of risk does not as easily lend itself to quantitative analysis.

<sup>39</sup> Data in the 0.0 column of tables 5 and 6 are different from percentage differences one would obtain from calculations based on the data in tables 2 and 3. This is because calculations in tables 2 and 3 and tables 5 and 6 data have been rounded. Calculations based on two rounded benefit numbers from tables 2 and 3 are not directly comparable with the data in tables 5 and 6, which have also been rounded for presentation purposes. The rounding used in this report does not affect the direction of the data (positive or negative), nor does it substantially alter the magnitude of results. In addition, calculations are different because tables 2 and 3 are based on means over 1,000 scenarios, and tables 5 and 6 are based on means of differences over 1,000 scenarios.

Table 5  
**Risk-Adjusted Average<sup>a</sup> Annual Real Benefits: Advantage of a Two-Tiered Option  
 Assuming Life-Cycle Investment versus Funding the Current System  
 (Raising Taxes Only)**

| Gender and Birth Year | Degree of Risk Aversion |     |     |      |      |      |      |      |
|-----------------------|-------------------------|-----|-----|------|------|------|------|------|
|                       | 0.0                     | 0.5 | 1.0 | 1.5  | 2.0  | 2.5  | 3.0  | 3.5  |
| Man, 1976             | +3%                     | -2% | -7% | -11% | -15% | -18% | -21% | -23% |
| Woman, 1976           | -16                     | -20 | -24 | -27  | -29  | -32  | -34  | -36  |
| Man, 2026             | -5                      | -10 | -14 | -18  | -22  | -25  | -28  | -31  |
| Woman, 2026           | -20                     | -24 | -27 | -30  | -33  | -36  | -38  | -40  |

Source: EBRI tabulations of results from the EBRI-SSASIM2 Policy Simulation Model.  
<sup>a</sup>Over 1,000 scenarios.

sion level of 0.5, a male born in 1976 no longer receives highest average adjusted benefits under the generic Two-Tiered Option with Life-Cycle Investment. That is, the positive sign in the 0.0 (risk-neutral) column becomes a negative sign at the 0.5 level. As one moves into higher degrees of risk aversion, the values become more negative (e.g., from -2 percent at 0.5 for men born in 1976 to -23 percent at the 3.5 level).

In summary, risk adjustment of the average annual real benefits presented in table 2 suggests that from a perspective of policymakers who are more risk averse (i.e., who believe Social Security policy should be made with the lowest levels of risk in real annual benefit projections), adjusted benefits under the Two-Tiered Option with Life-Cycle Investment are lower, on average, than those of more traditional reforms. Only at levels of lower risk aversion for the four age/gender cohorts are average adjusted annual benefits projections under the Two-Tiered Option with Life-Cycle Investment higher, and even then only for an average male born in 1976.

Payback ratio projections are presented in table

6 similarly to the annual benefit projections presented in table 5 such that if the values in the table are positive, then the Two-Tiered Option with Life-Cycle Investment has an advantage relative to Raising Taxes Only. If values are negative, Raising Taxes Only has an advantage. The higher the negative number, the less favorably the Two-Tiered Option with Life-Cycle Investment compares with Raising Taxes Only. Results in table 6 indicate that the “average” male and female members of the 1976 birth cohort would receive an average of 9 percent and 25 percent lower payback ratios (-9 percent and -25 percent), respectively, under the Two-Tiered Option with Life-Cycle Investment than under Raising Taxes Only. Results also indicate that the more favorable payback ratios projected under the two-tiered system for the 2026 cohort are relatively robust to risk-adjustment. Even at the extremes of risk-adjustment, the relative advantage for the

Table 6  
**Risk-Adjusted Average<sup>a</sup> Payback Ratios: Advantage of a Two-Tiered Option  
 Assuming Life-Cycle Investment versus Funding the Current System  
 (Raising Taxes Only)**

| Gender and Birth Year | Degree of Risk Aversion |      |      |      |      |      |      |      |
|-----------------------|-------------------------|------|------|------|------|------|------|------|
|                       | 0.0                     | 0.5  | 1.0  | 1.5  | 2.0  | 2.5  | 3.0  | 3.5  |
| Man, 1976             | -9%                     | -14% | -18% | -22% | -25% | -28% | -31% | -33% |
| Woman, 1976           | -25                     | -29  | -32  | -35  | -38  | -40  | -42  | -43  |
| Man, 2026             | +63                     | +54  | +46  | +39  | +33  | +28  | +23  | +18  |
| Woman, 2026           | +39                     | +32  | +26  | +20  | +15  | +11  | +7   | +4   |

Source: EBRI tabulations of results from the EBRI-SSASIM2 Policy Simulation Model.  
<sup>a</sup>Over 1,000 scenarios.

Table 7  
**Benefits and Payback Ratios under Three Generic Reforms for Different Hypothetical Men Born in 1976**

|  | Raising Taxes Only<br>(i.e., Funding the Current System) |                   | Two-Tiered Option with<br>Life-Cycle Investment       |                   | Two-Tiered Option,<br>All Bond Investment             |                   |
|--|--|-------------------|---|-------------------|---|-------------------|
|  | Average <sup>a</sup> annual<br>real benefits (\$1997)    | Payback<br>ratios | Average <sup>a</sup> annual<br>real benefits (\$1997) | Payback<br>ratios | Average <sup>a</sup> annual<br>real benefits (\$1997) | Payback<br>ratios |
| Average Man <sup>b</sup>                                   | \$23,003   | 77                | \$23,795  | 66                | \$17,715  | 47                |
| Working Poor Man   | 12,506   | 111               | 10,040  | 74                | 7,720   | 54                |
| Man with Average Life Expectancy + Five Years <sup>b</sup> | 23,215   | 94                | 23,851  | 81                | 17,771  | 57                |
| Maximum Taxable Wage-Earner (Man)                          | 27,265   | 55                | 37,360  | 63                | 28,859  | 41                |

Source: EBRI-SSASIM2 Policy Simulation Model.

<sup>a</sup>Over 1,000 scenarios.

<sup>b</sup>One might initially expect that benefits for a person living five years longer would be identical to those of someone living only to the average age, given identical earnings records. However, because benefits are indexed to inflation, an extra five years will create slight differences in real benefits for these two participants.

two-tiered system remains. This means that for even those policymakers who believe Social Security policy should be made with high levels of risk aversion, payback ratios are indisputably better for the “average” man and woman born in 2026 under the Two-Tiered Option with Life-Cycle Investment than under Raising Taxes Only.

## Variation Among Members of the Same Cohort

The foregoing results are averages for men and women earning at the cohort-wide age and gender average wages steadily over their careers, retiring at age 67, and dying after reaching the gender and cohort-wide average life expectancy at the NRA. Just as variations in benefit results between the 1976 and 2026 cohorts are identified in the previous sections, this section identifies variations among members of the same cohort by projecting benefits for six additional individuals and comparing them against the benefit results above. Approximations are made to simulate benefits for working poor males and females,<sup>40</sup> those persons living five years past the cohort-wide and gender-specific average life expectancy after reaching NRA,<sup>41</sup> and members of both genders who steadily earn at three times average earnings over their careers. Those earning at three times average earnings over their careers are modeled as a proxy for workers earning near or at the maximum taxable wage base over their lives.<sup>42</sup> Keep in mind that results in tables 7 through 10 are not risk-adjusted, thus painting the Two-Tiered Option with Life-Cycle Investment (which has the most market risk) in the best possible light relative to the other options. Had they been risk adjusted, values for the Two-Tiered Option would be lower than is shown in tables 7 through 10.

Although not risk adjusted, tables 7 through 10 highlight four recurring themes when comparing the reforms of Raising Taxes Only with the two-tiered options. The first is the lower amount of redistribution under the Two-Tiered Option with Life-Cycle Investment versus the current system (Raising Taxes Only). Of the men born in 1976 (table 7), the only risk-neutral person who would do better under the traditional reform of Raising Taxes Only than under the Two-Tiered Option with Life-Cycle Investment is the working poor man.<sup>43</sup> This man would benefit more than the others from the redistributive nature of the current OASI program, which would be maintained under the traditional reforms and which would allow him to contribute

<sup>40</sup> The working poor are defined here as earning wages at exactly the poverty level steadily over their careers. In 1995, the poverty level was approximately 38 percent of the average annual earnings level of \$20,537 [EBRI tabulations, U.S. Department of Health and Human Services, Social Security Administration (1996)]. This definition of the working poor assumes that the relationship between the poverty level and average wages will remain constant over time.

<sup>41</sup> A woman born in 1976 and living five years longer than her remaining life expectancy at the normal retirement age is assumed to die at age 94, while a man of the same cohort living an additional five years is expected to live to age 90. A woman born in the 2026 cohort and living five years longer than her gender and cohort remaining life expectancy at the NRA is assumed to die at age 97. Her male counterpart is assumed to die at age 94. As stated above, remaining life expectancy by gender and cohort is an output of the Model, generated stochastically and based on the Bureau of the Census' mid-range estimate.

<sup>42</sup> Persons earning steadily at three times the gender-cohort average are modeled as a proxy for workers who earn steadily at the maximum taxable wage base over their careers. In 1995, the maximum taxable wage base was \$61,200 (U.S. Department of Health and Human Services, 1996), which was 2.98 times the average annual earnings level of \$20,537 (U.S. Department of Labor).

<sup>43</sup> Some research (Yakoboski and VanDerhei, 1996) suggests that persons with lower incomes tend to invest more conservatively than others, suggesting that despite their low levels, the benefits projected under the Two-Tiered Option with Life-Cycle Investment for the working poor in these tables are unrealistically high.

Table 8  
**Benefits and Payback Ratios under Three Generic Reforms  
for Different Hypothetical Women Born in 1976**

|  | Raising Taxes Only<br>(i.e., Funding the Current System) |                   | Two-Tiered Option with<br>Life-Cycle Investment       |                   | Two-Tiered Option,<br>All Bond Investment             |                   |
|--|--|-------------------|---|-------------------|---|-------------------|
|  | Average <sup>a</sup> annual<br>real benefits (\$1997)    | Payback<br>ratios | Average <sup>a</sup> annual<br>real benefits (\$1997) | Payback<br>ratios | Average <sup>a</sup> annual<br>real benefits (\$1997) | Payback<br>ratios |
| Average Woman <sup>b</sup>                                   | \$16,455   | 106               | \$13,945  | 75                | \$10,397  | 53                |
| Working Poor Woman   | 9,337  | 159               | 6,124   | 88                | 4,752   | 64                |
| Woman with Average Life Expectancy + Five Years <sup>b</sup> | 16,600   | 124               | 13,989  | 89                | 10,431  | 62                |
| Maximum Taxable Wage-Earner (Woman)                          | 27,164   | 67                | 32,039  | 67                | 22,702  | 44                |

Source: EBRI-SSASIM2 Policy Simulation Model.

<sup>a</sup>Over 1,000 scenarios.

<sup>b</sup>One might initially expect that benefits for a person living five years longer would be identical to those of someone living only to the average age, given identical earnings records. However, because benefits are indexed to inflation, an extra five years will create slight differences in real benefits for these two participants.

Table 9  
**Benefits and Payback Ratios under Three Generic Reforms  
for Different Hypothetical Men Born in 2026**

|   | Raising Taxes Only<br>(i.e., Funding the Current System) |                   | Two-Tiered Option with<br>Life-Cycle Investment       |                   | Two-Tiered Option,<br>All Bond Investment             |                   |
|---|--|-------------------|---|-------------------|---|-------------------|
|   | Average <sup>a</sup> annual<br>real benefits (\$1997)    | Payback<br>ratios | Average <sup>a</sup> annual<br>real benefits (\$1997) | Payback<br>ratios | Average <sup>a</sup> annual<br>real benefits (\$1997) | Payback<br>ratios |
| Average Man <sup>b</sup>                                | \$38,922   | 69                | \$37,093  | 105               | \$28,547  | 76                |
| Working Poor Man  | 21,151   | 99                | 15,785  | 118               | 12,506  | 89                |
| Man with Average Life Expectancy + 5 Years <sup>b</sup> | 39,268   | 81                | 37,193  | 123               | 28,637  | 89                |
| Maximum Taxable Wage-Earner (Man)                       | 46,062   | 49                | 58,835  | 100               | 41,9223   | 67                |

Source: EBRI-SSASIM2 Policy Simulation Model.

<sup>a</sup>Over 1,000 scenarios.

<sup>b</sup>One might initially expect that benefits for a person living five years longer would be identical to those of someone living only to the average age, given identical earnings records. However, because benefits are indexed to inflation, an extra five years will create slight differences in real benefits for these two participants.

Table 10  
**Benefits and Payback Ratios under Three Generic Reforms  
for Different Hypothetical Women Born in 2026**

|   | Raising Taxes Only<br>(i.e., Funding the Current System) |                   | Two-Tiered Option with<br>Life-Cycle Investment       |                   | Two-Tiered Option,<br>All Bond Investment             |                   |
|---|--|-------------------|---|-------------------|---|-------------------|
|   | Average <sup>a</sup> annual<br>real benefits (\$1997)    | Payback<br>ratios | Average <sup>a</sup> annual<br>real benefits (\$1997) | Payback<br>ratios | Average <sup>a</sup> annual<br>real benefits (\$1997) | Payback<br>ratios |
| Average Woman <sup>b</sup>                                | \$27,822   | 89                | \$22,345  | 114               | \$17,124  | 83                |
| Working Poor Woman  | 15,774   | 132               | 9,873   | 134               | 7,865   | 102               |
| Woman with Average Life Expectancy + 5 years <sup>b</sup> | 28,068   | 101               | 22,412  | 132               | 17,191  | 95                |
| Maximum Taxable Wage-Earner (Woman)                       | 45,828   | 57                | 51,138  | 101               | 37,316  | 69                |

Source: EBRI-SSASIM2 Policy Simulation Model.

<sup>a</sup>Over 1,000 scenarios.

<sup>b</sup>One might initially expect that benefits for a person living five years longer would be identical to those of someone living only to the average age, given identical earnings records. However, because benefits are indexed to inflation, an extra five years will create slight differences in real benefits for these two participants.

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smaller amounts over his working lifetime for proportionately larger benefits at retirement.

The second recurring theme in the comparison of the two-tiered options with Raising Taxes Only is that benefit projections under the Two-Tiered Option with Life-Cycle Investment favor the more affluent most. Of the men born in 1976 who are shown in table 7, the only clear winner under the Two-Tiered Option with Life-Cycle Investment in terms of average payback ratios and annual real benefits is the man earning roughly at the maximum taxable wage base over his career. Under a traditional OASI system like Raising Taxes Only, a larger portion of this worker's lifetime program contributions would be redistributed to retirees with lower lifetime earnings.

Of the women modeled who were born in 1976 (table 8), again the only clear winner under the Two-Tiered Option with Life-Cycle Investment in terms of annual benefits is the most affluent woman earning at or near the maximum taxable wage base steadily over her career. The "average" woman, the woman living five years beyond her life expectancy, and the working poor woman would all receive higher payback ratios under Raising Taxes Only than under the Two-Tiered Option with Life-Cycle Investment.

Although the clear winners under the Two-Tiered Option with Life-Cycle Investment in terms of payback ratios and replacement rates are again the man and woman earning steadily at the maximum taxable wage base over their working lifetimes (tables 9 and 10), results for individuals in the 2026 birth cohort show a slightly different theme: a tradeoff between payback ratios and annual benefits. For the "average," working poor, and longer-living men and women born in 2026, non-risk-adjusted average payback ratios are higher under the Two-Tiered Option with Life-Cycle Investment because it more closely links benefits to contributions. However, annual real benefits are higher under the Raising Taxes Only reform because tax/contribution rates are higher. Which reform is, on average, better for these persons therefore depends on one's view of the

relative importance of higher benefits (and higher contributions) versus higher payback ratios (and lower contributions).

The fourth and final recurring theme in the comparison between the two-tiered options and Raising Taxes Only is that the lowest projected benefits for all groups tend to be those under a two-tiered system where investment of individual accounts is limited to Treasury bonds, whether due to system restrictions or to participant choice. The implication is that individual accounts, themselves, do not guarantee higher benefits and payback ratios for any group. It is the investment of those individual account funds in equities that could produce higher benefits for some under a two-tiered system, not the fact that the system is two-tiered, per se.

## *Macroeconomic Effects*

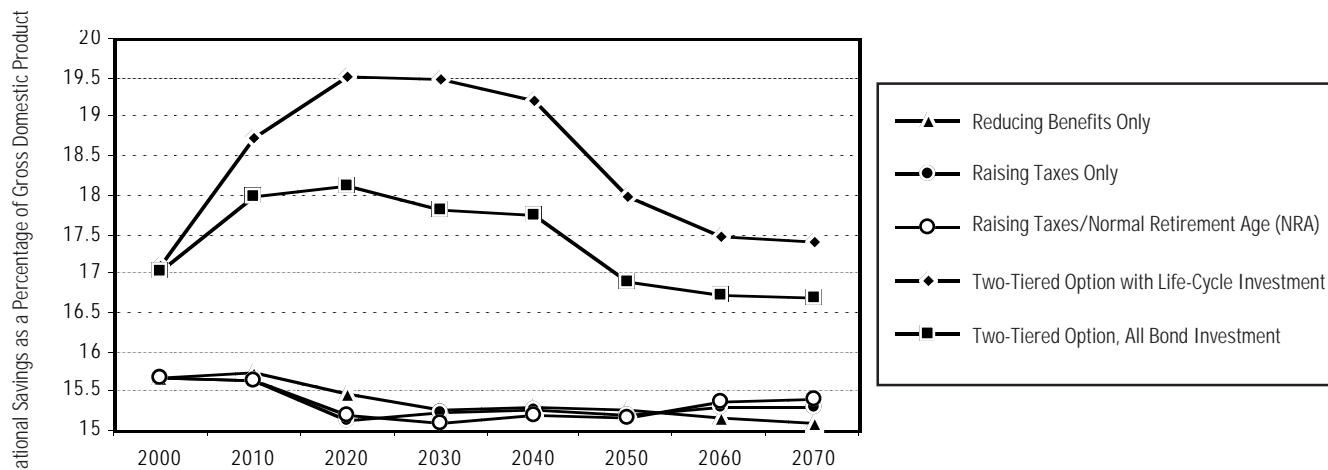
### **Saving Effects**

Although changeable by the Model

user, one of the EBRI-SSASIM2 Policy Simulation Model's baseline assumptions is that increased saving or dissaving (i.e., spending or borrowing) under any reform has direct and indirect effects on other forms of saving. One way that Social Security affects national saving is through its trust fund surplus. Under the baseline assumptions, an increase in the trust fund surplus translates directly into a change in national saving.

The Model also allows two behavioral assumptions to be set to indirectly modify this direct saving effect. First, a parameter can be set to assume that a change in the OASDI trust funds affects the non-OASDI federal surplus. This parameter is set to zero under the baseline assumptions, such that the federal political process is assumed not to make decisions about federal spending or taxing based on a change in the Social Security surplus. The second indirect effect is the reaction of all nonfederal entities such as households,

Chart 7  
Average National Savings Effects of Five Reforms



Source: EBRI-SSASIM2 Policy Simulation Model.  
<sup>a</sup>Average over 1,000 scenarios.

businesses, and state and local governments<sup>44</sup> to a change in the federal government's budget surplus. Under the baseline assumptions, if the federal budget surplus rises by \$1, state and local governments, households, and/or businesses are assumed to react by saving 50 cents less. Conversely, if the federal budget surplus declines by \$1, state and local governments, households, and/or businesses are assumed to react by saving 50 cents more.

Chart 7 shows that the combined impact of these direct and indirect effects under the baseline assumptions is the projection of steadily rising national saving rates under the generic Two-Tiered Option with Life-Cycle Investment. These rates are projected to peak at 19.51 percent in 2020. Program income falls after the transition tax is paid off in 2040, and as a result, saving rates under the Two-Tiered Option with Life-Cycle Investment also drop. However, even by 2070, national saving rates under this system are projected to be 17.41 percent of GDP, as compared with 15 percent to 16 percent of GDP under the traditional reforms of Raising Taxes Only, Raising Taxes/NRA, and Reducing Benefits Only.

Four factors explain the rise in national saving rates<sup>45</sup> under the two-tiered system relative to the traditional reforms. First, saving rates decline slightly under the traditional reforms due to the drawing down of the OASI trust funds to pay benefits, which does not occur under the two-tiered options because defined benefit obligations are steadily decreased to 30 percent of their current levels from 2000 to 2040. Second, over 75 years, the two-tiered options are projected to be more

expensive than the Raising Taxes/NRA and Reducing Benefits Only reforms, with a combined tax/contribution rate of 14.29 percent of taxable payroll, compared with 13.75 and 11.93, respectively (see section on Generic Reforms). Having more tax/contributions over a 75-year period means more revenue for boosting national saving rates.

The final two explanations for higher saving projections under the two-tiered options relate to what is done with program contributions—not just how much is contributed. After all, the Two-Tiered Option with Life-Cycle Investment reform is projected to produce higher national saving effects than Raising Taxes Only, which is scheduled to have 0.23 percentage points higher contributions over 75 years. Hence, total contributions are only part of the saving story. Saving rates are also affected by the asset allocation of any program tax/contributions made in one year that are not immediately used to pay benefits. Because the Two-Tiered Option with Life-Cycle Investment is assumed to have part of this revenue invested in equities,<sup>46</sup> which are projected to produce higher returns than the Special Issue Treasury Bonds that traditional reforms must invest in by law, the Two-Tiered Option with Life Cycle Investment is projected to produce the highest saving rates.

<sup>44</sup> One way that households, businesses, and state and local governments may save is through retirement plans.

<sup>45</sup> For information on the savings-offset assumptions used in the Model, see Holmer (1997b).

<sup>46</sup> See section on Generic Reforms for asset allocation assumptions under the Two-Tiered Option with Life-Cycle Investment.

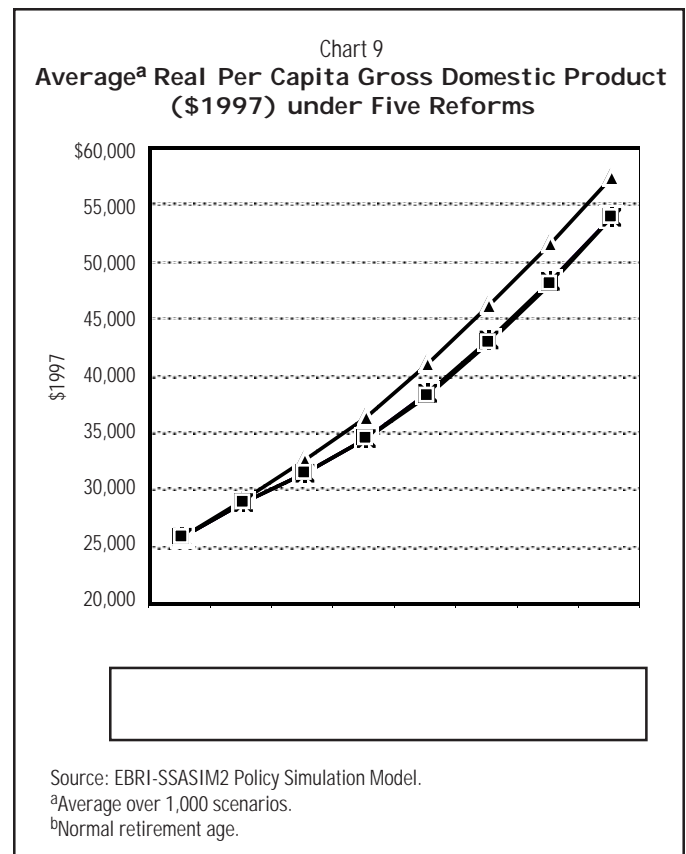
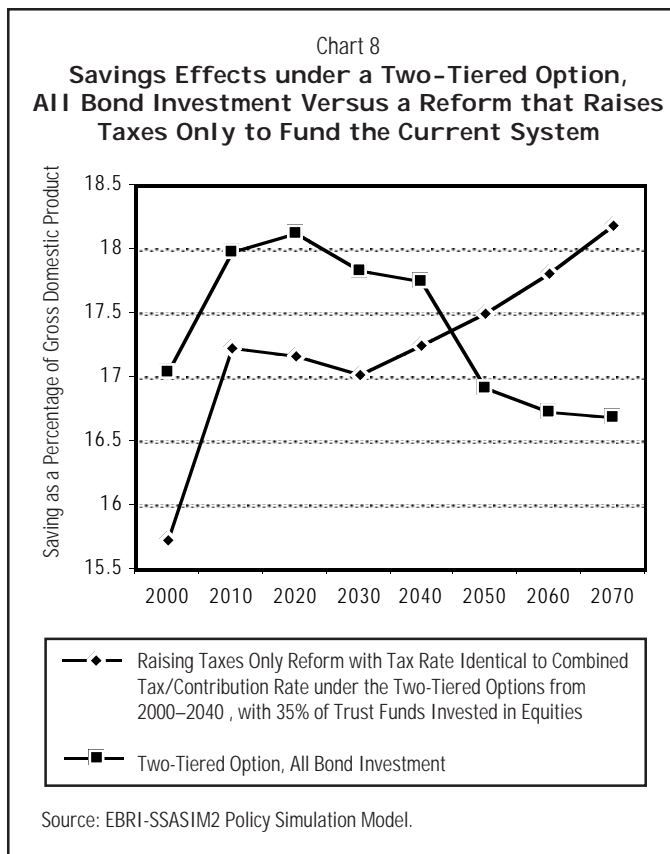


Chart 8 shows that even when Raising Taxes Only receives exactly the same tax/contribution rates from 2000 to 2040 as the Two-Tiered Option, All Bond Investment, it does not produce equal saving effects. Higher saving rates are projected under the Two-Tiered Option, All Bond Investment even when 35 percent of the trust funds under the Raising Taxes Only reform are invested in equities. Although saving for Raising Taxes Only jumps from 2000 to 2010 when equity investment begins, it does not reach the level of the Two-Tiered Option, All Bond Investment reform until after 2040. The saving differential before 2040 is a result of both higher benefit obligations under Raising Taxes Only and of more benefit prefunding under the Two-Tiered Option, All Bond Investment. The saving differential after 2040 is a result of different tax/contribution rates between the reforms. After sharing the same tax/contribution rates from 2000 to 2040 (shown in chart 9), the Raising Taxes Only reform and the Two-Tiered Option, All Bond Investment reform return to the tax/contribution rates scheduled in the section on Contributions and Cost. This means that the Two-Tiered Option, All Bond Investment drops to a combined tax/contribution rate of 10.6 after

2040, and Raising Taxes Only climbs to 16.4 percent by 2060.

## Per Capita GDP Effects

When saving rises under a given reform, the EBRI-SSASIM2 economic growth model assumes that additional domestic investment increases the capital stock and hence the level of national output.<sup>47</sup> Chart 9 shows the real per capita GDP growth effects simulated by the EBRI-SSASIM2 Model from the saving rate effects shown in chart 8. As indicated above, the Two-Tiered Option with Life-Cycle Investment is more likely to raise average saving rates not only because of its higher contribution/tax rates from 2000 through 2040 but because a portion of individual account contributions is invested in equities and prefunds future benefits (to a larger extent than the more traditional reforms, which are primarily pay-as-you-go). As a result, real per capita GDP is projected to be about \$3,600 higher<sup>48</sup> by 2070 under the Two-Tiered Option with Life-Cycle Investment than under the three more traditional reforms (chart 9).

<sup>47</sup> EBRI-SSASIM2 utilizes a Cobb-Douglas production function that allows savings effects to be translated into GDP growth. For more information on the growth model, see Holmer (1997b).

<sup>48</sup> The Two-Tiered Option with Life Cycle Investment has a projected real per capita GDP that is \$3,592 more than under Raising Taxes Only, \$3,648 more than Reducing Benefits Only, and \$3,592 more than Raising Taxes/NRA.

Table 11  
**The Average<sup>a</sup> Benefits of Economic Growth for Preretirement Earnings, Men born in 1976**

|   | More Traditional Reforms <sup>b</sup> | Two-Tiered Option with Life-Cycle Investment | Approximate Percent Difference <sup>c</sup> | Dollar Difference |
|---|---------------------------------------|--|---|-------------------|
| Average Man                                   | \$ 48,500                             | \$ 52,458                                    | 7.5%  | \$ 3,958          |
| Working Poor Man                              | 18,400                                | 19,909                                       | 7.6   | 1,409             |
| Man with Average Life Expectancy + Five Years | 48,500                                | 52,466                                       | 7.6   | 3,966             |
| Maximum Taxable Wage-Earner (Man)             | 145,700                               | 157,518                                      | 7.5   | 11,818            |

Source: EBRI-SSASIM2 Policy Simulation Model.

<sup>a</sup>Over 1,000 scenarios.

<sup>b</sup>Raising Taxes Only, Raising Taxes/Normal Retirement Age (NRA), and Reducing Benefits Only have almost identical effects on average preretirement earnings.

<sup>c</sup>Percent differences differ slightly as a result of rounding preretirement earnings figures, which has been done for presentation purposes.

## Earnings

The EBRI-SSASIM2 Policy Simulation Model assumes that an increase in national output translates into a somewhat smaller increase in aggregate earnings. The Model estimated that average earnings rise by about 8 percent under the Two-Tiered Option with Life-Cycle Investment.

If increasing growth and earnings is a goal for Social Security policy, policymakers and the public may be concerned with how this additional wealth is shared across income groups. Tables 11 and 12 illustrate the simple fact that an approximately 8 percent increase in preretirement earnings for all cohort members implies those with higher earnings would benefit most in total dollars from the positive effects of economic growth. Hence, while a man earning at the average wage would have \$3,958 in higher preretirement earnings before retirement under the Two-Tiered Option with Life-Cycle Investment, his counterpart earning at the maximum taxable wage base would likely receive an average of \$11,818 in higher preretirement earnings. Hence, even if the positive economic growth effects under this two-tiered system were shared equally as a percentage of income for all, the most gains would accrue to those in the upper income levels.

## Lifetime Average Earnings Plus Net Social Security Benefits

At this point in the report, the reader has been exposed to a number of different reforms and their projected costs, benefits, and policy tradeoffs. Table 13 presents one way of synthesizing into a single number the effects of the following results shown above: (1) differing tax/contribution rates (see section on Contributions and Costs); (2) the different scheduled benefits payments and payback ratios (see section on Benefit Projections); and (3) different lifetime earnings resulting from different macroeconomic growth effects (see section on Macroeconomic Effects). Although a single measure of such a complex policy issue as Social Security reform is by no means conclusive concerning the relative desirability of different reform paths, such summary calculations are sometimes helpful in making comparisons when numerous considerations must be taken into account.

Using the results presented in this report, one is able to compute the present value<sup>50</sup> of lifetime average earnings plus net Social Security benefits under the various generic reform options. To obtain these results,

<sup>49</sup> Lifetime earnings, lifetime benefits, and lifetime program taxes/contributions have been converted into present values. See footnote 35.

Table 12  
**The Average<sup>a</sup> Benefits of Economic Growth for Preretirement Earnings, Women born in 1976**

|   | More Traditional Reforms <sup>b</sup> | Two-Tiered Option with Life-Cycle Investment | Approximate Percent Difference <sup>c</sup> | Dollar Difference |
|---|---------------------------------------|--|---|-------------------|
| Average Woman                                   | \$25,300                              | \$27,342                                     | 8.0%  | \$2,042           |
| Working Poor Woman                              | 9,600                                 | 10,379                                       | 8.0   | 779               |
| Woman with Average Life Expectancy + Five Years | 25,300                                | 27,349                                       | 8.0   | 2,049             |
| Maximum Taxable Wage-Earner (Woman)             | 76,000                                | 82,118                                       | 8.1   | 6,118             |

Source: EBRI-SSASIM2 Policy Simulation Model.

<sup>a</sup>Over 1,000 scenarios.

<sup>b</sup>Raising Taxes Only, Raising Taxes/Normal Retirement Age (NRA), and Reducing Benefits Only have almost identical effects on average preretirement earnings.

<sup>c</sup>Percent differences differ slightly as a result of rounding preretirement earnings figures, which has been done for presentation purposes.



Table 13  
**Lifetime Average Earnings Plus Net Social Security Benefits**

|              | Reducing Benefits Only | Raising Taxes Only (Funding the Current System) as a Percentage of Reducing Benefits Only | Raising Taxes/NRA <sup>a</sup> as a Percentage of Reducing Benefits Only | Two-Tiered Option with Life-Cycle Investment as a Percentage of Reducing Benefits Only | Two-Tiered Option, All Bond Investment as a Percentage of Reducing Benefits Only |
|--------------|------------------------|---|--|--|--|
| Male, 1976   | \$3,809,675 (100%)     | 102%  | 101%   | 94%  | 92%  |
| Female, 1976 | 2,409,633 (100%)       | 103   | 102  | 92   | 91   |
| Male, 2026   | 6,476,447 (100%)       | 97  | 96   | 98   | 97   |
| Female, 2026 | 4,077,858 (100%)       | 98  | 97   | 97   | 95   |

Source: EBRI SSASIM2 Policy Simulation Model.

<sup>a</sup>Normal retirement age.

lifetime earnings are added to the lifetime program benefits from both the traditional (defined benefit) system and individual accounts. The present value of total lifetime program contributions, taking into account both individual account contributions, transition taxes, and/or taxes paid to the traditional system, was then subtracted. The resultant calculation is called “Average Earnings Plus Net Social Security Benefits.”

Using Reducing Benefits Only as a baseline, results indicate that highest average lifetime earnings plus net Social Security benefits would accrue to the 1976 cohort under Raising Taxes Only, despite the higher average preretirement earnings projections presented in the section on Earnings under Macroeconomic Effects (tables 11 and 12). Under the Two-Tiered Option with Life-Cycle Investment, an average man born in 1976 is projected to receive 8 percentage points less in average earnings plus net Social Security benefits under the Two-Tiered Option with Life-Cycle Investment, and his female counterpart is projected to receive 11 percentage points less. However, for the 2026 cohort, highest lifetime average earnings plus net Social Security benefits are projected to be obtained under a Reducing Benefits Only reform. The average male of this cohort is projected to receive 3 percentage points more in lifetime average earnings plus net Social Security benefits under Reducing Benefits Only than under Raising Taxes Only, and the average female born in 2026 is projected to receive 3 percentage points more.

Unfortunately, the lifetime average earnings plus net Social Security benefit projections shown in table 13 may not take into account the full costs of paying for a Social Security reform, because the Social Security program affects income taxes in many ways. For example, the trust fund balances that are drawn down to pay benefits under the traditional reforms modeled in this report depend on the federal government’s ability to pay back funds it has borrowed from the Social Security

trust funds. To pay these obligations, the federal government may have to raise income taxes. On the other hand, if a system of individual accounts were to provide lower than expected benefits for many retirees (because of below-expected average market performance, poor investment choice, or preretirement access to account balances, for example), more retirees could end up relying on welfare benefits such as Supplemental Security Income and Medicaid, which are financed by general tax revenues. If these programs became overburdened, income taxes might have to rise in order to accommodate the growing need.

Of course, any reform that would drive up the federal government’s need for income could potentially be handled without an income tax increase. Spending in other areas could be reduced, increased government debt could be undertaken with its attendant interest obligations, or Social Security benefits could be reduced. While Social Security’s effect on payroll taxes is determinable, how actual Social Security reform options would ultimately affect total lifetime consumable income is contingent on a myriad of future political and economic events.

## Summary & Implications

Our results indicate that no reform option appears to be win-win for all groups in all aspects. That is,

no reform is likely to be a policy panacea for the challenges facing this aging nation. Social Security reform will necessitate major policy tradeoffs. This section summarizes who wins and who loses (and how) under the types of reform options modeled in this report. The report has used key assumptions based on those used by the Social Security Trustees, with the exception of the mortality decline rate, which is based on the Census

*Assuming that partial privatization is administratively feasible, people born in 1976 would fare less well under the partially privatized system analyzed in this report relative to maintaining the current system with tax increases.*

Bureau's mid-range assumptions. The results presented are based on these and hundreds of other baseline assumptions, which can be altered by the individual user of the EBRI-SSASIM2 Policy Simulation Model.

Assuming that partial privatization is administratively feasible, people born in 1976 would fare less well under the partially privatized system analyzed in this report relative to maintaining the current system with tax increases—even if they invested in a mixed (life cycle) portfolio of equities and bonds (assumed to yield a nominal investment return of 7.06 percent in the simulations utilized in this report). Because the current Social Security system is largely pay-as-you go, most of what workers pay into the system funds today's benefits. These benefits have already been accrued. Unless Congress modifies the current statute, these benefits will have to be paid. Workers moving to a privatized system would have to pay "twice"—once for the benefits going to today's beneficiaries and again to their own individual Social Security accounts. Paying for this transition would give persons born in 1976—those persons scheduled to pay transition taxes over their entire working lives in this report—fewer benefits for their Social Security contributions (that is, lower "payback ratios") and lower average net lifetime earnings (when Social Security contributions are subtracted) than a reform that would "simply" raise taxes enough to pay for the current Social Security system. That is, the extra money that average workers born in 1976 would have to contribute to Social Security to make the transition to a partially privatized system offsets the extra expected returns that could be earned from individual Social Security accounts.

Because transition costs are expected to be fully paid by the time persons born in 2026 retire, some persons born in 2026 would win under a partially privatized system. However, the degree to which they would win is influenced by the extent to which they invest in equities and might not be that much even if

they pursued a life-cycle asset allocation. On average, program taxes/contributions would be about 50 percent lower by 2060, and payback ratios would be much higher for average workers born in 2026 under the partially privatized system

modeled in this report than under a reform that maintained the current system by raising taxes only. These same individuals would receive payback ratios much closer to those realized by more traditional reforms if they chose to invest very conservatively (for example, a portfolio consisting entirely of Treasury bonds that produces a nominal rate of return of 5.97 percent in our simulations.)

In exchange for higher payback ratios and lower program tax/contribution rates, average workers born in 2026 who adopt a life-cycle asset allocation would receive, on average, between \$1,800 and \$5,500 less in annual Social Security benefits under a partially privatized system than under a system that "simply" raises taxes to pay for the current Social Security program. In addition, the potential for market risk exists in any form of privatized system, especially if assets are invested in equities. Benefits under a partially privatized system could fall to the same levels as benefits under a reform that reduces benefits to maintain current tax rates, if not lower, if the participant invests in an extremely conservative fashion or if returns on equities are not as high as those expected based on historical market performance. And, unfortunately, results indicate that increased national savings under a partially privatized system would fail for many to make up for benefit reductions and/or increased risk, as lifetime average earnings plus net Social Security benefits would be just 1.3 percent higher for men born in 2026 and 1.7 percent *lower* for women under a partially privatized system with equity investment than they would be if taxes were raised to fund today's Social Security program.

Who would benefit most from a partially priva-

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tized Social Security system? Results indicate that any system that relies more on individual accounts (which closely connect benefits with contributions and investment returns) and relies less on the traditional defined benefit system (which redistributes income from high to low wage earners) will disproportionately benefit higher wage earners. If they invested in a mixed (life-cycle) portfolio of Treasury bonds and equities, higher wage earners would do better under partial privatization than under any of the traditional reforms modeled in this report in terms of both annual benefits and payback ratios on program contributions. Given their higher levels of wealth, higher wage earners would also, on average, stand to gain most in total dollars from the beneficial effects of economic growth that are projected to arise from a partially privatized system.

Who is worst off in terms of annual benefits under partial privatization relative to a funded current system? Those with lower earnings or less attachment to the labor force, such as low-income workers and women with average earnings—even if they were to invest in a mixed portfolio that is expected to generate a higher rate of return—would receive lower annual benefits under a partially privatized system. The working poor (defined as those earning at the poverty level over their entire working lives) would also receive lower payback ratios for their Social Security contributions, as would average women born in 1976. For lower-income earners, the returns that could be obtained by investing individual Social Security accounts partially in equities would not, on average, compensate for the additional costs of transition taxes and the reduced benefits from the current, redistributive system. In addition, lower-earning workers could be at higher risk of investing extremely conservatively and of falling into poverty if rates of return on individual account assets were below those expected based on historical averages.

Is raising taxes to fund the current system a better solution than partial privatization? Not necessarily, as funding the current system would require

a 50 percent increase in Social Security (OASI) taxes by the year 2060. And, this reform would not produce the higher national saving and growth effects produced by the partially privatized system modeled in this report. Which reform is better also depends on one's view of the appropriate levels of risk, redistribution, guaranteed base benefits, and individual responsibility in the Social Security system (Olsen, VanDerhei, and Salisbury, 1997). In addition, questions of administrative feasibility and political risk (for both traditional and structural reforms) must be considered, along with the multitude of reform options that are a combination of raising taxes and/or reducing benefits (such as the NRA reform presented in this report) and/or introducing individual accounts, etc.

The simple overriding implication of this report's results, having been created under reasonable and widely accepted assumptions, is that all reform options involve tradeoffs and have winners and losers among generations and among members of the same generation. Identifying these tradeoffs is the first step in giving policymakers and the public the necessary information to engage in an informed public dialogue about the choices they are facing in preparing for the financial challenges confronting the Social Security system.

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The model is available for licensing to interested individuals and organizations. Contact [vanderhei@ebri.org](mailto:vanderhei@ebri.org) for additional information.

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Technical Appendix I  
**Brief Explanation of EBRI-SSASIM2 Macroeconomic Variables and Their Adaptation  
for Stochastic Generation in the Model<sup>a</sup>**

| Variable              | Definition   | Source of Original Input  | Years     | Data Converted to   | Model Parameters that Determine Cyclical Dynamics of Stochastic Variable Obtained by  |
|-----------------------|--|---|-----------|---|---|
| Interest Rate         | The yield on all long-term Treasury bonds with maturities of approximately 20 years. The yield is defined as the internal rate of return that equates the bond's price (the average of bid and ask plus the accrued coupon) with the stream of cash flows (coupons and principal) promised to bondholders.       | Ibbotson Associates, 1995   | 1926–1994 | Deviations from the sample average value, expressed as the natural logarithm of the decimal rate.   | Equation using a VAR <sup>b</sup> with two-year lags (VAR (2) model)  |
| Inflation Rate        | The change in the CPI-U, <sup>c</sup> not seasonally adjusted, measured in December of each year. Prior to 1978, the CPI <sup>d</sup> was used (not the CPI-U).  | Ibbotson Associates, 1995   | 1926–1994 | Deviations from the sample average value, expressed as annual decimal rates.  | Equation using a VAR with two-year lags (VAR (2) model)   |
| Unemployment Rate     | The fraction of the civilian labor force unemployed, as defined by the U.S. Bureau of Labor Statistics. For years prior to 1947, persons ages 14 and older were included. After 1947, persons ages 16 and older were included.   | <i>Statistical Abstracts</i> , U.S. Department of Commerce <sup>e</sup> | 1926–1994 | Deviations from the sample average value, expressed as the natural logarithm of the odds of the rates.  | Equation using a VAR <sup>b</sup> with two-year lags (VAR (2) model)  |
| Treasury Bond Return  | The total annual return, assuming that bonds are held for the entire calendar year, of long-term Treasury bonds with maturities of approximately 20 years. Total returns account for income returns as well as capital gains and losses.   | Ibbotson Associates, 1995   | 1926–1994 | Asset returns—annual rates of return added to 1.0. Total returns—deviations from the sample average value, expressed as the natural logarithm of the decimal returns. | Regression model representing yields and capital gains and not allowing for a residual error term. Treasury bond returns are, therefore, stable during periods of constant interest rates.  |
| Corporate Bond Return | The total annual return, assuming that bonds are held for the entire calendar year, of long-term corporate bonds (maturities of about 20 years) as represented by the Salomon Brothers' long-term high-grade corporate bond index. Total returns account for income returns as well as capital gains and losses. | Ibbotson Associates, 1995   | 1926–1994 | Asset returns—annual rates of return added to 1.0. Total returns—deviations from the sample average value, expressed as the natural logarithm of the decimal returns. | Multivariate regression model including current and prior year interest rate, inflation rate, and unemployment rate. Equation represents uncertainty of returns, which are contemporaneously correlated with equity returns.          |
| Equity Return         | The total annual return on U.S. large company common stocks, as represented by the S&P 500 Index. Total return includes reinvested dividends.  | Ibbotson Associates, 1995   | 1926–1994 | Asset returns—annual rates of return added to 1.0. Total returns—deviations from the sample average value, expressed as the natural logarithm of the decimal returns. | Multivariate regression model, including current and prior year interest rate, inflation rate, and unemployment rate. Equation represents uncertainty of returns, which are contemporaneously correlated with corporate bond returns. |

<sup>a</sup>See Homer (1997b), sections 2.2 and 2.3, pages 8–18.

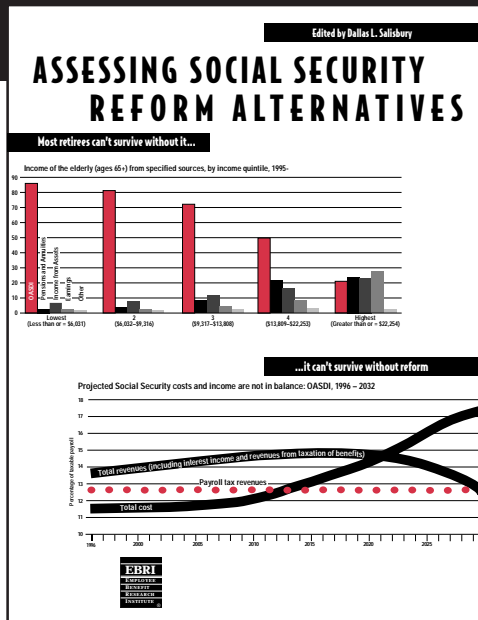
<sup>b</sup>Vector autoregressive model.

<sup>c</sup>Consumer Price Index—Urban Wage Earners.

<sup>d</sup>Consumer Price Index.

<sup>e</sup>U.S. Department of Commerce, *Statistical Abstract of the United States* (Washington, DC: U.S. Government Printing Office, various years).

## Additional Sources of Information



In the most fundamental sense, the issues surrounding Social Security are as old as the program itself. On December 4, 1996, the Employee Benefit Research Institute Education and Research Fund (EBRI-ERF) convened a policy forum of leading experts in the field to debate such issues as the role of social insurance in a market economy, defining the appropriate balance between individual and collective responsibility, and what is fair and efficient at the individual, family, and aggregate social levels. These are difficult questions, but recent reform proposals pose analytical challenges far more daunting than the relatively modest, incremental changes that have been

considered in the past. The result of this lively debate is *Assessing Social Security Reform Alternatives*, EBRI-ERF's new book based on the proceedings of the policy forum.

We stand at a crossroads in deciding the future of the Social Security system. However, we are ill-prepared to choose which path to take. The options proposed—large-scale government investment in the stock market, a new mandatory savings plan for individuals, or partial "privatization" of the current system—would lead us in profoundly different directions. Yet, we understand only vaguely the impact each would have on our retirement security, social relationships, and the economy.

The papers in this book examine how we can better assess these and other Social Security reform alternatives, and they provide a preview of the forthcoming policy debate. To this end, some of the nation's leading authorities on Social Security take a first look at EBRI-SSASIM2, a state-of-the-art computer model that the Employee Benefit Research Institute is developing to clarify the web of demographic, economic, psychological, social, and political factors that lie behind various reform proposals.

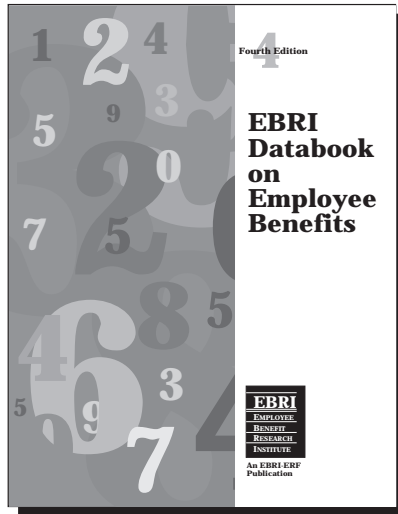
Members of the press may request complimentary copies of *Assessing Social Security Reform Alternatives* by calling EBRI at (202) 659-0670. Others may purchase copies for \$15 prepaid by calling (410) 516-6946. For media inquiries, contact Maureen Richmond at (202) 775-6341.

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