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# SOCIAL SECURITY REFORM

## Implications of Different Indexing Choices



G A O

Accountability \* Integrity \* Reliability



Highlights of [GAO-06-804](#), a report to congressional addressees

## Why GAO Did This Study

The financing shortfall currently facing the Social Security program is significant. Without remedial action, program trust funds will be exhausted in 2040. Many recent reform proposals have included modifications of the indexing currently used in the Social Security program. Indexing is a way to link the growth of benefits and/or revenues to changes in an economic or demographic variable.

Given the recent attention focused on indexing, this report examines (1) the current use of indexing in the Social Security program and how reform proposals might modify that use, (2) the experiences of other developed nations that have modified indexing, (3) the effects of modifying the indexing on the distribution of benefits, and (4) the key considerations associated with modifying the indexing. To illustrate the effects of different forms of indexing on the distribution of benefits, we calculated benefit levels for a sample of workers born in 1985, using a microsimulation model. We have prepared this report under the Comptroller General's statutory authority to conduct evaluations on his own initiative as part of a continued effort to assist Congress in addressing the challenges facing Social Security. We provided a draft of this report to SSA and the Department of the Treasury. SSA provided technical comments, which we have incorporated as appropriate.

[www.gao.gov/cgi-bin/getrpt?GAO-06-804](http://www.gao.gov/cgi-bin/getrpt?GAO-06-804).

To view the full product, including the scope and methodology, click on the link above. For more information, contact Barbara Bovbjerg at (202) 512-7215 or [bovbjergb@gao.gov](mailto:bovbjergb@gao.gov).

# SOCIAL SECURITY REFORM

## Implications of Different Indexing Choices

### What GAO Found

Indexing currently plays a key role in determining Social Security's benefits and revenues, and is a central element of many proposals to reform the program. The current indexing provisions that affect most workers and beneficiaries relate to (1) benefit calculations for new beneficiaries, (2) the annual cost-of-living adjustment (COLA) for existing beneficiaries, and (3) the cap on taxable earnings. Some reform proposals would slow benefit growth by indexing the initial benefit formula to changes in prices or life expectancy rather than wages. Some would revise the COLA under the premise that it currently overstates inflation, and some would increase the cap on taxable earnings.

National pension reforms in other countries have used indexing in various ways. In countries with high contribution rates that need to address solvency issues, recent changes have generally focused on reducing benefits. Although most Organisation for Economic Co-operation and Development (OECD) countries compute retirement benefits using wage indexing, some have moved to price indexing, or a mix of both. Some countries reflect improvements in life expectancy in computing initial benefits. Reforms in other countries that include indexing changes sometimes affect both current and future retirees.

Indexing can have various distributional effects on benefits and revenues. Changing the indexing of initial benefits through the benefit formula typically results in the same percentage change in benefits across income levels regardless of the index used. However, indexing can also be designed to maintain benefits for lower earners while reducing or slowing the growth of benefits for higher earners. Indexing payroll tax rates would maintain scheduled benefit levels but reduce the ratio of benefits to contributions for younger cohorts. Finally, the effect of modifying the COLA would be greater the longer people collect benefits.

Indexing raises considerations about the program's role, the treatment of disabled workers, and other issues. For example, indexing initial benefits to prices instead of wages implies that benefit levels should maintain purchasing power rather than maintain relative standards of living across age groups (i.e., replacement rates). Also, as with other ways to change benefits, changing the indexing of the benefit formula to improve solvency could also result in benefit reductions for disabled workers as well as retirees.

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## Abbreviations

ABM	automatic balancing mechanism
AIME	average indexed monthly earnings
AWI	average wage index
COLA	cost-of-living adjustment
CPI	consumer price index
CPI-E	consumer price index for older Americans
CPI-U	consumer price index for all urban consumers
CPI-W	consumer price index for urban wage earners and clerical workers
DI	Disability Insurance
GDP	gross domestic product
GEMINI	Genuine Microsimulation of social Security and Accounts
OASDI	Old-Age, Survivors, and Disability Insurance
OASI	Old-Age and Survivors Insurance
OCACT	Office of the Chief Actuary
OECD	Organisation for Economic Co-operation and Development
PENSIM	Pension Simulator
PIA	primary insurance amount
PSG	Policy Simulation Group
SSA	Social Security Administration
SSASIM	Social Security and Accounts Simulator

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September 14, 2006

The Honorable Charles E. Grassley  
Chairman  
The Honorable Max Baucus  
Ranking Minority Member  
Committee on Finance  
United States Senate

The Honorable Jim McCrery  
Chairman  
The Honorable Sander M. Levin  
Ranking Minority Member  
Subcommittee on Social Security  
Committee on Ways and Means  
House of Representatives

The Honorable John Warner  
United States Senate

The total long-term financing shortfall currently facing the Social Security program is significant and growing over time, thereby making system reform an important priority. Once the Social Security trust fund balances are exhausted in 2040, annual revenue will be sufficient only to pay about 74 percent of promised benefits, according to the Social Security trustees' 2006 intermediate assumptions. Benefit costs are projected to exceed income in 2017, and thus trust fund securities will need to be redeemed. This will require increased government revenue, increased borrowing from the public, reduced spending in the rest of the government, or some combination of these. Redeeming these securities will have an adverse impact on the federal budget much sooner than the 2040 trust fund exhaustion date.

Many recent reform proposals have proposed modifications to the indexing currently used in the Social Security program. Indexing is a way to link the growth of benefits and/or revenues to changes in economic or demographic variables. For example, initial benefits can be set to grow with changes in average wages or changes in prices. Modifications to indexing seek to slow the growth of benefits or increase the growth of revenues, either of which would improve solvency. However, indexing does not guarantee that the program will achieve and remain in long-term financial balance. Proposals that would modify Social Security's indexing

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implicitly pose the question of whether and how such adjustments could provide a mechanism to keep the program sustainably solvent and minimize the need for periodic rebalancing of the program's finances. At the same time, how it is done can affect the distribution of benefits between low and high earners and across generations of workers.

Given the recent attention focused on indexing as a critical component of reform, this report examines (1) the current use of indexing in the Social Security program and how reform proposals might modify that use, (2) the experiences of other developed nations that have modified indexing when reforming their public pension systems, (3) the effects of indexing modifications on the distribution of Social Security benefits, and (4) the key considerations associated with modifying Social Security's indexing.

To examine the use of indexing in the Social Security program and how reform proposals might modify the indexing, we conducted a literature review and reviewed recent Social Security reform proposals. To examine the experience of other developed nations that changed indexing when reforming their own national pension systems, we reviewed the academic literature and documentation on other countries' public pension systems. To analyze the effects of different forms of indexing on the distribution of benefits, we calculated benefit levels for a sample of workers using a microsimulation model (see app. I for a more detailed discussion of our scope and methodology).<sup>1</sup> For this analysis, we selected four well-known indexing approaches to illustrate the effects on the distribution of benefits.<sup>2</sup> To describe the distributional effects of the different indexing approaches, we used our model to simulate benefits for workers born in

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<sup>1</sup> We used the GEMINI model under a license from the Policy Simulation Group, a private contractor. GEMINI estimates individual effects of policy scenarios for a representative sample of future beneficiaries. GEMINI can simulate different reform features, including individual accounts with an offset, for their effects on the level and distribution of benefits. See appendix I for more detail on the modeling analysis, including a discussion of our assessment of the data reliability of the model.

<sup>2</sup> These are consumer price index (CPI) indexing, dependency ratio indexing, mortality indexing, and a so-called progressive indexing approach that uses different indexes at various earnings levels. See appendix I for a discussion of these indexes and our scope and methodology, as well as GAO, *Social Security: Program's Role in Helping Ensure Income Adequacy*, [GAO-02-62](#) (Washington, D.C.: Nov. 30, 2001), GAO, *Social Security Reform: Analysis of Reform Models Developed by the President's Commission to Strengthen Social Security*, [GAO-03-310](#) (Washington, D.C.: Jan. 15, 2003), and GAO, *Social Security: Distribution of Benefits and Taxes Relative to Earnings Level*, [GAO-04-747](#) (Washington, D.C.: June 15, 2004).

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1985.<sup>3</sup> Consistent with our past work on Social Security reform, and to illustrate a full range of possible outcomes, we used hypothetical benchmark policy scenarios that would achieve 75-year solvency either by only increasing payroll taxes (which simulated “promised benefits”) or only reducing benefits (which simulated “funded benefits”).<sup>4</sup> To determine the key considerations associated with various forms of indexing, we reviewed the literature and talked with relevant experts. We have prepared this report under the Comptroller General’s statutory authority to conduct evaluations on his own initiative as part of a continued effort to assist Congress in addressing the challenges facing Social Security. We conducted our work between July 2005 and August 2006 in accordance with generally accepted government auditing standards.

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## Results in Brief

While the initial Social Security program did not use automatic indexing, it is now a key feature of the program’s design, as well as a central element of many proposals to reform the program. Under the current system, the indexing provisions that affect most workers and beneficiaries relate to (1) the formula used to calculate initial benefits for new beneficiaries, (2) the cost-of-living adjustment (COLA) for existing beneficiaries, and (3) the cap on taxable earnings. The benefit indexing provisions help maintain relative standards of living across age groups and protect the purchasing power of benefits over time. Various reform proposals have suggested changes to all of these provisions. For example, for future beneficiaries, some proposals would index initial benefit levels to keep pace with price inflation rather than wages. This would result in gradually declining earnings replacement rates but maintain the purchasing power of current benefit levels across age groups, assuming wages grow faster than prices on average over time.<sup>5</sup> Other proposals accept slowing the growth of initial benefits, in general, but seek to protect benefit levels for the lowest earners, consistent with the program’s goal of helping ensure income adequacy. Proposals to change the annual COLA for existing beneficiaries generally focus on making it reflect inflation levels more accurately, with the presumption that this would result in lower benefits. On the revenue side, proposals to

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<sup>3</sup> We focused on workers born in 1985 because all prospective program changes under all alternative policy scenarios would be almost fully phased in for these workers.

<sup>4</sup> See appendix I for a complete description of our benchmark policy scenarios.

<sup>5</sup> Earnings replacement rates measure the extent to which retirement income replaces pre-retirement income for particular individuals and thereby helps them maintain a pre-retirement standard of living.



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increase the cap on taxable earnings generally seek to raise revenue from higher earners and avoid increasing tax rates for all workers.

Other countries' efforts to reform their national pension systems reveal a diversity of indexing approaches. Countries with relatively high contribution rates tend to focus on methods that reduce benefits to address the financial solvency of their pension systems. Although most Organisation for Economic Co-operation and Development (OECD) countries index past earnings to reflect wage growth in computing initial retirement benefits, some now use a price growth index (France, Belgium, and South Korea), or an index that blends price and wage growth (Portugal, Poland, and Finland). Some benefit formulas contain a measure of life expectancy that reduces payments to new retirees in accordance with increases in longevity (Sweden, Italy, and Poland). Changes to indexing approaches abroad sometimes affect both current and future retirees. Germany includes a "sustainability" factor that lowers pension amounts for both new and old retirees when the number of workers paying into the system declines relative to those drawing benefits. Similarly, other national systems rely on automatic balancing mechanisms that modify both the future benefits of workers and the benefits of current pensioners (Sweden, Japan).

Indexing can have different effects on the distribution of benefits and on the relationship between contributions and benefits, depending on how it is applied. Regardless of the index, adjusting the initial benefit level through the benefit formula typically would have a proportional effect, with constant percentage changes at all earnings levels, on the distribution of benefits. However, indexing can also be used to achieve specific distributional goals. For example, so-called progressive indexing applies different indexes at different earnings levels to adjust benefits of higher-income earners more than the benefits of lower-income earners. Indexing payroll tax rates would have distributional effects across generations, maintaining the existing distribution of benefits but instead affecting equity measures like the ratio of benefits to contributions across age cohorts. In this case, younger cohorts would have lower ratios, because they would receive lower benefits relative to their contributions. Finally, proposals that modify the indexing of annual COLAs for existing beneficiaries would have adverse distributional effects for groups with longer life expectancies, such as women, but these individuals would still receive higher lifetime benefits since they live longer. In addition, disabled worker beneficiaries, especially those who receive benefits for many years, would also experience lower benefits because such proposals

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would typically reduce future benefits, and this effect compounds over time.

Indexing raises other important considerations about the program's role, the stability of economic or demographic relationships underlying the index, and the treatment of disabled worker beneficiaries. The choice of the index implies certain assumptions about the appropriate level of benefits and taxes for the program. Thus, if the current indexing of initial benefits to wage growth was changed to track price growth, there is an implication that the appropriate level of benefits is one that maintains purchasing power over time rather than the current approach that maintains replacement rates. The solvency effects of an index are predicated upon the relative stability and historical trends of the underlying economic or demographic relationships implied by the index. For example, the 1970s were a period of economic instability in which actual inflation rates and earnings growth diverged markedly from past experience, with the result that benefits unexpectedly grew much faster than revenues. Finally, since the benefit formula for Social Security retirement and disability benefits are linked, an important consideration of any indexing proposal, as with any other change to benefits, is its effect on the benefits provided to disabled workers. Disabled worker beneficiaries typically become entitled to benefits much sooner than retired workers and under different eligibility criteria. An index that is designed to improve solvency, for example, by adjusting retirement benefits, could also result in large reductions to disabled workers, who often have fewer options to obtain additional income from other sources.

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## Background

Title II of the Social Security Act, as amended, establishes the Old-Age, Survivors, and Disability Insurance (OASDI) program, which is generally known as Social Security. The program provides cash benefits to retired and disabled workers and their eligible dependents and survivors. Congress designed Social Security benefits with an implicit focus on replacing lost wages. However, Social Security is not meant to be the sole source of retirement income; rather it forms a foundation for individuals to build upon. The program is financed on a modified pay-as-you-go basis in which payroll tax contributions of those currently working are largely transferred to current beneficiaries. Current beneficiaries include insured workers who are entitled to retirement or disability benefits, and their eligible dependents, as well as eligible survivors of deceased insured workers. The program's benefit structure is progressive, that is, it provides greater insurance protection relative to contributions for earners with lower wages than for high-wage earners. Workers qualify for benefits by

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earning Social Security credits when they work and pay Social Security taxes<sup>6</sup>; they and their employers pay payroll taxes on those earnings. In 2005, approximately 159 million people had earnings covered by Social Security, and 48 million people received approximately \$521 billion in OASDI benefits.

Currently, the Social Security program collects more in taxes than it pays out in benefits. However, because of changing demographics, this situation will reverse itself, with the annual cash surplus beginning to decline in 2009 and turning negative in 2017. In addition, all of the accumulated Treasury obligations held by the trust funds are expected to be exhausted by 2040.<sup>7</sup> Social Security's long-term financing shortfall stems primarily from the fact that people are living longer and labor force growth has slowed.<sup>8</sup> As a result, the number of workers paying into the system for each beneficiary has been falling and is projected to decline from 3.3 today to about 2 by 2040. The projected long-term insolvency of the OASDI program necessitates system reform to restore its long-term solvency and assure its sustainability. Restoring solvency and assuring sustainability for the long term requires that either Social Security gets additional income (revenue increases), reduces costs (benefit reductions), or undertakes some combination of the two.

To evaluate reform proposals, we have suggested that policy makers should consider three basic criteria:<sup>9</sup>

1. the extent to which the proposal achieves sustainable solvency and how the proposal would affect the economy and the federal budget;

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<sup>6</sup> In 2006, workers receive 1 credit for each \$970 of earnings, up to the maximum of 4 credits per year. To be eligible for retirement benefits a worker needs 40 credits.

<sup>7</sup> These estimates are based on the Social Security trustees' 2006 intermediate, or best-estimate, assumptions.

<sup>8</sup> Life expectancy has increased fairly steadily since the 1930s, and further increases are expected. Increases in life expectancy vary by gender, education, and earnings. Women, highly educated individuals, and higher-income individuals generally experience greater life expectancy.

<sup>9</sup> See GAO, *Social Security: Criteria for Evaluating Reform Proposals*, GAO/T-HEHS-99-94 (Washington, D.C.: Mar. 25, 1999), and GAO, *Social Security: Evaluating Reform Proposals*, GAO/AIMD/HEHS-00-29 (Washington, D.C.: Nov. 4, 1999).

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2. the balance struck between the goals of individual equity<sup>10</sup> (rates of return on individual contributions) and income adequacy<sup>11</sup> (level and certainty of monthly benefits); and

3. how readily such changes could be implemented, administered, and explained to the public.

Moreover, reform proposals should be evaluated as packages that strike a balance among the individual elements of the proposal and the interactions among these elements. The overall evaluation of any particular reform proposal depends on the weight individual policy makers place on each of the above criteria.

Changing the indexing used by the OASDI program could be used to increase income or reduce costs. Indexing provides a form of regular adjustment of revenues or benefits that is pegged to a particular economic, demographic, or actuarial variable. An advantage of such indexing approaches is that they take some of the “politics” out of the system, allowing the system to move toward some agreed-upon objective; they may also be administratively simple. However, this “automatic pilot” aspect of indexing poses a challenge, as it may make policy makers hesitant to enact changes, even when problems arise.

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## Social Security Currently Indexes Both Benefits and Revenues

While Social Security did not use automatic indexing initially, it is now a key feature of the program’s design, as well as a central element of many reform proposals. Under the current program, benefits for new beneficiaries are computed using wage indexing, benefits for existing beneficiaries are adjusted using price indexing, and on the revenue side, the cap on the amount of earnings subject to the payroll tax is also adjusted using wage indexing. Reform proposals have included provisions for modifying each of these indexing features.

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<sup>10</sup> For a discussion of individual equity issues, see GAO, *Social Security: Issues in Comparing Rates of Return with Market Investments*, [GAO/HEHS-99-110](#) (Washington, D.C.: Aug. 5, 1999).

<sup>11</sup> [GAO-02-62](#).

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## Program Did Not Use Indexing until 1970s

Before the 1970s, the Social Security program did not use indexing to adjust benefits or taxes automatically. For both new and existing beneficiaries, benefit rates increased only when Congress voted to raise them. Benefit levels, when adjusted for inflation, fell and then jumped up with ad hoc increases, and these fluctuations were dramatic at times. Similarly, Congress made only ad hoc changes to the tax rate and the cap on the amount of workers' earnings that were subject to the payroll tax, which is also known as the maximum taxable earnings level. Adjusted for inflation, the maximum taxable earnings level also fluctuated dramatically, and as a result, the proportion of all wages subject to the payroll tax also fluctuated. (See app. II for more detail.)

For the first time, the 1972 amendments provided for automatic indexing. They provided for automatically increasing the maximum taxable earnings level based on increases in average earnings, and this approach is still in use today. However, the 1972 amendments provided an indexing approach for benefits that became widely viewed as flawed. In particular, the indexing approach in the 1972 amendments resulted in (1) a "double-indexing" of benefits to inflation for new beneficiaries though not for existing ones<sup>12</sup>; (2) a form of "bracket creep" based on the structure of the benefit formula that slowed benefit growth as earnings increased over time, which offset the double indexing to some degree; and (3) instability of program costs that was driven by the interaction of price and wage growth in benefit calculations. (See app. II for more detail.) Within a few years, problems with the 1972 amendments became apparent. Benefits were growing far faster than anticipated, especially since wage and price growth varied dramatically from previous historical experience. Addressing the instability of this indexing approach became a focus of policy makers' efforts to come up with a new approach. As a 1977 paper on the problem noted, "Clearly, it is a system that needs to be brought under greater control, so that the behavior of retirement benefits over time will stop reflecting the chance interaction of certain economic variables."<sup>13</sup>

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<sup>12</sup> One type of indexing took the form of automatic inflation adjustments to the earnings replacement factors in the benefit formula. At the same time, the earnings used in the formula were higher on average for each new group of beneficiaries, partially because of inflation. See appendix II.

<sup>13</sup> Lawrence H. Thompson. "Toward the Rational Adjustment of Social Security Benefit Levels," *Policy Analysis*, Vol. 3, No. 4, Fall 1977.

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## 1977 Amendments Created Indexing Approach of Current Social Security System

The 1977 amendments instituted a new approach to indexing benefits that remains in use today. The experience with the 1972 amendments and double indexing made clear the need to index benefits differently for new and existing beneficiaries, which was referred to as “decoupling” benefits. Indexing now applies to several distinct steps of the benefit computation process, including (1) indexing lifetime earnings for each worker to wage growth, (2) indexing the benefit formula for new beneficiaries to wage growth, and (3) indexing benefits for existing beneficiaries to price inflation.<sup>14</sup> Under this approach, benefit calculations for new beneficiaries are indexed differently than for existing beneficiaries, and earnings replacement rates have been fairly stable. The cap on taxable earnings is still indexed to wage growth as specified by the 1972 amendments.

## Indexing Lifetime Earnings to Wages

Social Security benefits are designed to partially replace earnings that workers lose when they retire, become disabled, or die. As a result, the first step of the benefit formula calculates a worker’s average indexed monthly earnings (AIME), which is based on the worker’s lifetime history of earnings covered by Social Security taxes. The formula adjusts these lifetime earnings by indexing them to changes in average wages.<sup>15</sup> Indexing the earnings to changes in wage levels ensures that the same relative value is accorded to each year’s earnings, no matter when they were earned.

For example, consider a worker who earned \$5,000 in 1965 and \$40,000 in 2000. The worker’s earnings increased by eight times, but much of that increase reflected changes in the average wage level in the economy, which increased by about seven times (690 percent) over the same period. The growth in average wages in turn partially reflects price inflation; however, wages may grow faster or slower than prices in any given year. Indexed to reflect wage growth, the \$5,000 would become roughly \$35,000, giving it greater weight in computing average earnings over time and making it more comparable to 2000 wage levels.

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<sup>14</sup> Wage indexing also applies to other provisions of the program that are not part of the primary benefit computations. Such provisions include earnings test thresholds, maximum family benefits, coverage thresholds, and thresholds relating to disability insurance.

<sup>15</sup> A worker’s earnings for a given year are indexed by multiplying them by the ratio of the national average wage for the indexing year to the national average wage in the year the income was earned. The indexing year is the second calendar year before the year in which the worker is first eligible—the year the worker reaches age 62, becomes disabled, or dies. Earnings after the indexing year are counted at their actual value.

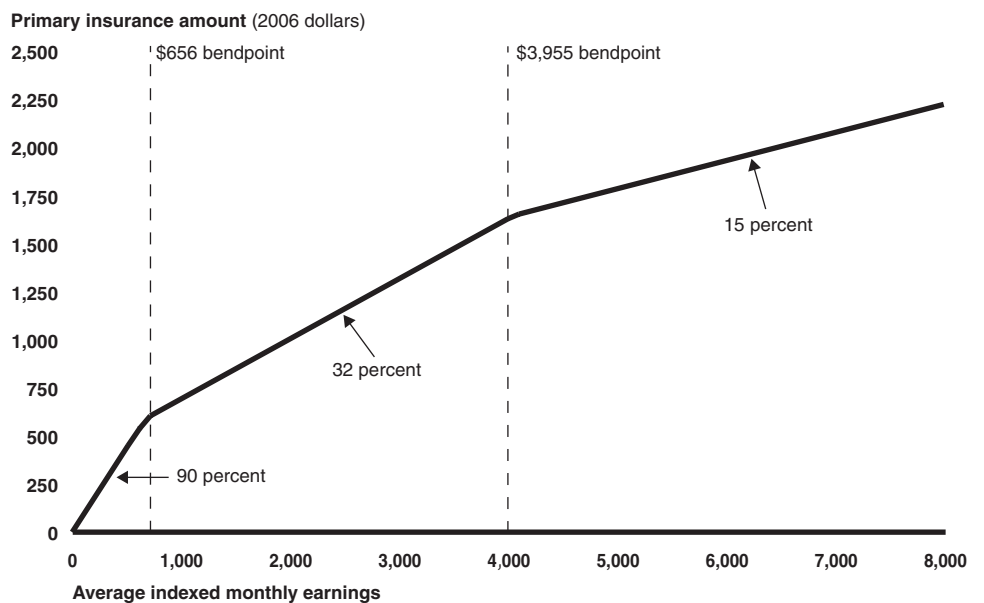
## Indexing Initial Benefit Formula to Wages

Once the AIME is determined, it is applied to the formula used to calculate the worker's primary insurance amount (PIA). This formula applies different earnings replacement factors to different portions of the worker's average earnings. The different replacement factors make the formula progressive, meaning that the formula replaces a larger portion of earnings for lower earners than for higher earners. For workers who become eligible for benefits in 2006, the PIA equals

- 90 percent of the first \$656 dollars of AIME plus
- 32 percent of the next \$3,299 dollars of AIME plus
- 15 percent of AIME above \$3,955.

For workers who do not collect benefits until after the year they first become eligible, the PIA is adjusted to reflect any COLAs since they became eligible. The PIA is used in turn to determine benefits for new beneficiaries and all types of benefits payable on the basis of an individual's earnings record. To determine the actual monthly benefit, adjustments are made reflecting various other provisions, such as those relating to early or delayed retirement, type of beneficiary, and maximum family benefit amounts. Figure 1 illustrates how the PIA formula works.

**Figure 1: Social Security Benefit Formula Replaces Earnings at Different Rates**



Source: Social Security Administration.

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The dollar values in the formula that indicate where the different replacement factors apply are called bendpoints. These bendpoints (\$656 and \$3,955) are indexed to the change in average wages, while the replacement factors of 90, 32, and 15 percent are held constant. In contrast, under the 1972 amendments, the bendpoints were held constant and the replacement factors were indexed. (See app. II.) Indexing the bendpoints and holding replacement factors constant prevents bracket creep and keeps the resulting earnings replacement rates relatively level across birth years. Indexing the benefit formula in this way helps benefits for new retirees keep pace with wage growth, which reflects increases in the standard of living.

Figure 2, which shows earnings replacement rates for successive groups of illustrative workers, illustrates the program's history with indexing initial benefits.<sup>16</sup> Replacement rates declined before the first benefit increases were enacted in 1950 and then rose sharply as a result of those increases. From 1950 until the early 1970s, replacement rates fluctuated noticeably more from year to year than over other periods; this pattern reflects the ad hoc nature of benefit increases over that period. Between 1974 and 1979, replacement rates grew rapidly for new beneficiaries, reflecting the double indexing of the 1972 amendments. The 1977 amendments corrected for the unintended growth in benefits from double indexing, and replacement rates declined rapidly as a result. This pattern of increasing and then declining benefit levels is known as the notch.<sup>17</sup> Finally, replacement rates have been considerably more stable since the 1977 amendments took effect, a fact that has helped to stabilize program costs. (See app. II.)

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<sup>16</sup>In this figure, replacement rates are the annual retired worker benefits at age 65 divided by career-average earnings. Illustrative workers have career-average earnings equal to about 45, 100, and 160 percent of Social Security's Average Wage Index, respectively, for low, medium, and high earners. These three cases have earnings patterns that reflect differences by age in the probability of work and in average earnings levels. Taxable maximum earners have earnings equal to the maximum earnings taxable under OASDI in each year. Using illustrative workers holds other factors equal that might also affect replacement rates. For example, using illustrative workers filters out the effects of changes in the covered population or changes in work and retirement patterns.

<sup>17</sup>See GAO, *Social Security: GAO's Analysis of the Notch Issue*, [GAO/T-HEHS-94-236](#) (Washington, D.C.: Sept. 16, 1994).



**Figure 2: Social Security's Earnings Replacement Rates for Illustrative Workers**



Source: SSA.

Note: Replacement rates are the annual retired worker benefits at age 65 divided by career-average earnings. Illustrative workers have career-average earnings equal to about 45, 100, and 160 percent of Social Security's Average Wage Index, respectively, for low, medium, and high earners. These three cases have earnings patterns that reflect differences by age in the probability of work and in average earnings levels. Taxable maximum earners have earnings equal to the maximum earnings taxable under OASDI in each year. Variations in these illustrative replacement rates result not only from program changes but also from short-term fluctuations in the growth rate of wages, which helps determine the earnings histories of the illustrative earners.

**Indexing Benefits to Prices for Existing Beneficiaries**

After initial benefits have been set for the first year of entitlement, benefits in subsequent years increase with a COLA designed to keep pace with inflation and thereby help to maintain the purchasing power of those benefits. The COLA is based on the consumer price index (CPI), in contrast to the indexing of lifetime earnings and initial benefits, which are based on the national average wage index.<sup>18</sup>

<sup>18</sup> Specifically, Social Security's COLAs are based on the consumer price index for urban wage earners and clerical workers (CPI-W), as opposed to the CPI series for all urban consumers (CPI-U).

## Indexing Maximum Taxable Earnings to Wages

The cap on taxable earnings increases each year to keep pace with changes in average wages. As a result, in combination with a constant tax rate, total program revenues tend to keep pace with wage growth and therefore also with benefits to some degree. In 2006, the cap is set at \$94,200. As the distribution of earnings in the economy changes, the percentage of total earnings that fall below the cap can also change. (See app. II.)

Table 1 summarizes the various indexing and automatic adjustment approaches that affect most workers and beneficiaries under the current program.

**Table 1: Key Indexing Approaches under Current U.S. Social Security System**

Approach	How it works	Comments
<b>Benefit provisions</b>		
Wage-indexing initial benefit calculation	<p>Before averaging workers' earnings over their careers, AIME adjusts actual earnings using average wage index.</p> <p>Bendpoints of PIA formula rise over time according to wage growth.</p> <p>Earnings replacement factors in PIA formula remain constant.</p>	<p>Maintains relative standards of living across age groups (that is, replacement rates), at time of retirement.</p> <p>Actuarial balance of the program is relatively insensitive to economic fluctuations because benefit levels and tax revenues are both linked to wages.</p> <p>Initial benefits keep pace with standard of living, as reflected by wage levels.</p>
Price-indexing post-entitlement benefits	Benefits rise yearly according to rise in the CPI.	Purchasing power of benefits remains constant over time, once benefits start.
<b>Tax provisions</b>		
Wage-indexing maximum taxable earnings	Earnings are only taxed on the first \$94,200 per year in 2006. Limit rises every year according to average wage growth.	Share of earnings not taxed can change as income distribution changes.
Constant tax rate	Earnings are taxed yearly at 12.4 percent (6.2 percent from workers and 6.2 percent from employers).	<p>Program revenue rises annually with the rise in wages.</p> <p>Constant tax rate maintains the same proportion of taxes for all workers earning less than maximum taxable earnings.</p>

Source: GAO.

## Various Reform Proposals Include Indexing Provisions

Various reform proposals have suggested changes to most of the indexing features of the current Social Security system. Some proposals would use alternative indexes for initial benefits in order to slow their growth. Other proposals would take the same approach but would limit benefit reductions on workers with lower earnings. Some propose modifying the

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COLA in the belief that the CPI overstates the rate of inflation. Still others propose indexing revenue provisions in new ways.

Changes to the indexing of Social Security's initial benefits could be implemented by changing the indexing of lifetime earnings or the PIA formula's bendpoints.<sup>19</sup> However, they could also be implemented by adjusting the PIA formula's replacement factors, even though these factors are not now indexed. Under this approach, which is used in this report, the replacement factors are typically multiplied by a number that reflects the index being used. The replacement factors would be adjusted for each year in which benefits start, beginning with some future year. So such changes would not affect current beneficiaries. Indexing the replacement factors would reduce benefits at the same proportional rate across income levels, while changing the indexing of lifetime earnings or the bendpoints could alter the distribution of benefits across income levels. Recent reform proposals, as described by the Social Security Administration's (SSA) Office of the Chief Actuary in its evaluations, generally implement indexing changes as adjustments to the PIA formula's replacement factors.

Two indexing approaches—to reflect changes in the CPI or increasing longevity—have been proposed as alternatives to the average wage index for calculating initial benefits. Proponents of using CPI indexing for initial benefit calculations generally offer the rationale that wage indexing has never been fiscally sustainable and CPI indexing would slow the growth of benefits to an affordable level while maintaining the purchasing power of benefits. They say that maintaining the purchasing power of benefits should be the program's goal, as opposed to maintaining relative standards of living across age groups (that is, earnings replacement rates), which the current benefit formula accomplishes. Proponents of longevity indexing offer the rationale that increasing longevity is a key reason for the system's long-term insolvency. Since people are living longer on average, and are expected to continue to do so in the future, they will therefore collect benefits for more years on average. Using an index that reflects changes in life expectancy would maintain relatively comparable levels of lifetime benefits across birth years and thereby promote intergenerational equity. Also, longevity indexing could encourage people to work longer.

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<sup>19</sup>Andrew G. Biggs, Jeffrey R. Brown, Glenn Springstead, "Alternative Methods of Price Indexing Social Security: Implications for Benefits and System Financing," National Bureau of Economic Research, Working Paper 11406 (2005).

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Some indexing proposals accept the need to slow the growth of initial benefits in general but seek to protect benefit levels for the lowest earnings levels, consistent with the program's goal of helping ensure income adequacy. Such proposals would modify how a new index would be applied to the formula for initial benefits so that the formula is still wage-indexed below a certain earnings level. As a result, they would maintain benefits promised under the current program for those with earnings below that level such as, for example, those in the bottom 30 percent of the earnings distribution. Such an approach has been called progressive price indexing.

A few proposals would alter the COLA used to adjust benefits for current retirees. Some proposals respond to methodological concerns that have been raised about how the CPI is calculated and would adjust the COLA in the interest of accuracy.<sup>20</sup> In general, such changes would slightly slow the growth of the program's benefit costs. However, other proposals call for creating a new CPI for older Americans (CPI-E) specifically tailored to reflect how inflation affects the elderly population and using the CPI-E for computing Social Security's COLA.<sup>21</sup> Depending on its construction, such a change could increase the program's benefit costs.

Some proposals would index revenues in new ways. Some would apply a longevity index to payroll tax rates, again focused on the fact that increasing life expectancy is a primary source of the program's insolvency. Proponents of indexing tax rates feel that benefits are already fairly modest, so the adjustment for longevity should not come entirely from benefit reductions. Other proposals would institute other types of automatic revenue adjustments. Some would raise the maximum taxable earnings level gradually until some percentage of total earnings are covered and then maintain that percentage into the future. Implicitly, such proposals reflect a desire to hold constant the percentage of earnings

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<sup>20</sup>For more information on the CPI and how it overstates the true rate of inflation, see Advisory Commission to Study the Consumer Price Index, "Toward a More Accurate Measure of the Cost of Living," Final Report to the Senate Committee on Finance, Dec. 1996, which is known as the Boskin Commission report. A variety of changes have been made to the CPI since that report, including changes that in turn affect Social Security's COLA. In addition, a new "chained" CPI reflects how consumers substitute one product for another when their relative prices change. This new CPI is not yet used by government agencies, but some reform proposals call for using a variation of it in computing COLAs.

<sup>21</sup>For example, the elderly allot a larger proportion of their expenses to medical care than the general population, which partially depends on Medicare's coverage and premiums.

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subject to the payroll tax. Still another proposal would provide for automatically increasing the tax rate when the ratio of trust fund assets to annual program costs is projected to fall.

Table 2 summarizes the various indexing and automatic adjustment approaches that reform proposals have contained.

**Table 2: Summary of Indexes and Automatic Adjustments Proposed in United States**

<b>Provision</b>	<b>How it works</b>	<b>Rationales offered by proponents</b>
<b>Provisions affecting initial benefit calculations for future beneficiaries</b>		
Longevity indexing	Proportionally reduces replacement factors in PIA formula to reflect adjustments for increasing life expectancy. <sup>a</sup>	Increasing longevity is a key reason for the system's long-term solvency problem. People are living longer on average and therefore collecting benefits for more years on average. Would maintain comparable levels of lifetime benefits across birth years and thereby promote intergenerational equity.
Price indexing <sup>b</sup>	Proportionally reduces replacement factors in PIA formula to reflect changes in index. <sup>a</sup>	"Wage-indexing ... has never been fiscally sustainable." <sup>c</sup> Would slow the growth of benefits to an affordable level. Would still maintain the purchasing power of benefits.
Progressive price indexing	Proportionally reduces replacement factors in PIA formula to reflect changes in index. <sup>a</sup>  But no change to factors for earnings below a certain level.  Effectively adds new bendpoint between two current ones.	Protects benefits for lower earnings to help ensure income adequacy.
<b>Provisions affecting benefit COLAs for current and future beneficiaries</b>		
Revise COLA to reflect more accurate calculation of CPI	Use more accurate CPI in determining COLA.	Greater accuracy.
<b>Provisions affecting taxes for current and future workers</b>		
Longevity indexing of payroll tax rates	Proportionally increase payroll tax rate to reflect changes in index.	Increasing longevity is a key reason for the system's long-term solvency problem.
Increase payroll tax rates to ensure maintaining ratio of trust fund assets to program costs	Use trustees' intermediate projections of trust fund ratios.	Ensure ongoing solvency.
Increase maximum taxable earnings to ensure a constant percentage of aggregate earnings are taxed	Use recent data on earnings distribution with trustees' intermediate projections of wage growth.	Promote intergenerational equity by ensuring consistent application of payroll tax.

Source: GAO.

<sup>a</sup>Average indexed monthly earnings would be computed as under present law.

<sup>b</sup>An implication of price indexing is that it would slow benefit growth to a greater degree if wages grow faster than projected, even as Social Security's financial situation would be improving.

<sup>c</sup>Commission to Strengthen Social Security. "Strengthening Social Security and Creating Personal Wealth for All Americans: Report of the President's Commission" p. 120, Washington, D.C.: Dec. 21, 2001.

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## A Variety of Indexing Approaches Highlight International Reform Efforts

Faced with adverse demographic trends, many countries have enacted reforms in recent years to improve the long-term fiscal sustainability of their national pension systems. New indexing methods now appear in a variety of forms around the world in earnings-related national pension systems.<sup>22</sup> In general, they seek to contain pension costs associated with population aging. Some indexing methods affect both current and future retirees.

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## Retirement Indexing Approaches in Other Countries Generally Focus on Benefit Reductions instead of Increased Contributions

A number of reforms have focused on methods that primarily adjust benefits rather than taxes to address the fiscal solvency of national pension systems. There are two main reasons for this. First, contribution rates abroad are generally high already, making it politically difficult to raise them much further. For example, while in the United States total employer-employee Social Security contribution rates are 12.4 percent of taxable earnings, they are above 16 percent in Belgium and France, more than 18 percent in Sweden and Germany, above 25 percent in the Netherlands and the Czech Republic, and over 30 percent in Italy.<sup>23</sup> In fact, some countries have stipulated a ceiling on employee contribution rates in order to reassure the young—or current contributors—that the burden would be shared among generations. For example, Japan settled, with the 2004 Reform Law, its pension premium rates for the next 100 years with an increase of 0.35 percent per year until 2017, at which time premium levels are to be fixed at 18.3 percent of covered wages. Similarly, Canada chose to raise its combined employer-employee contribution rate more quickly than previously scheduled, from 5.6 percent to 9.9 percent between 1997 and 2003, and maintain it there until the end of the 75-year projection period.<sup>24</sup> This increase is meant to help Canada's pension system build a

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<sup>22</sup>In earnings-related public pension systems reviewed here, indexation appears in different forms but in all cases affects the way in which pension rights are accrued. For example, in notional defined contribution systems such as in Sweden and Italy, workers earn a notional rate of return on their contributions (based on their earnings), and indexation is implicit in that notional return. In point systems such as in Germany, workers earn pension points (also based on their earnings) that are multiplied by a pension-point value at the time of retirement. There, indexation is implicit in the value of the pension point.

<sup>23</sup> It is important to note that the structure of public pension programs differ across countries, and hence are not strictly comparable. For example, contributions in some cases help finance maternity/paternity and unemployment benefits in addition to old age benefits.

<sup>24</sup> The total employer and employee contributions of 9.9 percent may appear low, but the retirement pension benefits these generate are relatively modest, replacing only 25 percent of average pensionable earnings.

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large reserve fund and spread the costs of financial sustainability across generations.<sup>25</sup> Germany's recent reforms set the workers' contribution rate at 20 percent until 2020 and at 22 percent from 2020 to 2030. Second, increasing employee contribution rates without significantly reducing benefit levels will tend to make continued employment less attractive compared to retirement. In the context of population aging and fiscally stressed national pension systems facing many countries, reform measures seek to do the opposite: encourage people to remain in the labor force longer to enhance the fiscal solvency of pension programs. Contribution rates that become too high are not likely to provide sufficient incentives to continue work.

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### Indexing Approaches Aim at Containing Costs

One commonly used means of reducing, or containing the growth of, promised benefits involves changing the method used to compute initial benefits. For example, France, Belgium, and South Korea now adjust past earnings in line with price growth rather than wage growth to determine the initial pension benefits of new retirees. In general, this shift to price indexation tends to significantly lower benefits relative to earnings, as over long periods prices tend to grow more slowly than wages.<sup>26</sup> Because of compounding, the effect of such a change is larger when benefits are based on earnings over a long period than when they reflect only the last few years of work, as in pension plans with benefits based on final salaries. In fact, the OECD estimates that, in the case of a full-career worker with 45 years of earnings, price indexation can lead to benefits 40 percent lower than with wage indexation.<sup>27</sup> In contrast to full price indexing, some nations use an index that is a mix of price growth and wage growth, which tends to produce higher benefits than those calculated using price indexation only, then adjust the relative weights of the two to cover program costs. Finland, for example, changed its indexation of initial benefits from 50 percent prices and 50 percent wages

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<sup>25</sup> Canada's reserve fund is managed by an Investment Board that operates independently from the government since the late 1990s and invests in both foreign and domestic assets subject to some restrictions.

<sup>26</sup> As in the United States in the 1970s and 1980s, prices at times grow faster than wages; nonetheless, these periods remain exceptional.

<sup>27</sup> A full-career worker is defined as one having earnings between the ages of 20 and 65. The computation reflects the average effect, in OECD countries, for a manufacturing worker with average earnings.



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to 80 percent and 20 percent, respectively. Similarly, Portugal's index combines 75 percent price growth and 25 percent wage growth.<sup>28</sup>

A few countries have moved away from wage indexing but without necessarily adopting price indexation. Sweden, for instance, uses an index that reflects per capita wage growth to compute initial benefits, provided the system is in fiscal balance. However, when the system's obligations exceed its assets, a "brake" is applied automatically that allows the indexation to be temporarily abandoned.<sup>29</sup> This automatic balancing mechanism (ABM) ensures that the pension system remains financially stable.<sup>30</sup> In Germany and Japan, recent reforms changed benefit indexation from a gross-wage base to a net-wage base—i.e., gross wages minus contributions. In Italy, workers' benefit accounts rise in line with gross domestic product (GDP) growth so both the changes in the size of the labor force and in productivity dictate benefit levels.

Another approach countries have used is adding a longevity index to the formula determining pension payments. In Sweden, Poland, and Italy, for example, remaining life expectancy at the time of retirement inversely affects benefit levels. Thus, as life spans gradually increase, successive cohorts of retirees get smaller benefit payments unless they choose to begin receiving them later in life than those who retired before them. Also, people who retire earlier than their peers in a given cohort get significantly lower benefits throughout their remaining life than those who retire later.

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<sup>28</sup> In most OECD countries, the formula used varies by either individual earnings, age or length of service.

<sup>29</sup> Using per capita wage growth, i.e., wage growth divided by the labor force, as an index implies that when the labor force shrinks, per capita wage growth goes up. As a result, benefits increase right when the number of contributors gets smaller, creating an imbalance.

<sup>30</sup> More precisely, the average-wage-growth indexation is reduced whenever the Balance Ratio is less than 1, where Balance Ratio = (Contribution Asset + Buffer Funds)/Pension Liability. The index then automatically becomes average wage growth multiplied by the Balance Ratio, and remains so as long as the Balance Ratio is less than 1. The Buffer Funds are a collection of reserve funds to which part of pension contributions are transferred. These are then invested in domestic and foreign assets with the objective of achieving the highest possible returns. The Buffer Funds play an important role in ensuring the financial stability of the pension program insofar as high rates of return on these funds may partially or fully compensate for any adverse demographic or economic developments.

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Longevity indexing helps ensure that improvements in life expectancy do not strain the system financially.<sup>31</sup>

Germany, on the other hand, now uses a sustainability factor that links initial benefits to the system's dependency ratio—i.e., the number of people drawing benefits relative to the number paying into the system. This dependency ratio captures variations in fertility, longevity, and immigration, and consequently makes the pension system self-stabilizing. For example, higher fertility and immigration, which raise labor force growth, will, other things equal, improve the dependency ratio, leading to higher pension benefits, while higher longevity or life expectancy will increase the dependency ratio, and hence cause benefits to decline.<sup>32</sup>

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## Indexing Approaches Affect Both Current and Future Beneficiaries

In some of the countries we studied, changes in indexing methods affect both current and future retirees. In Japan, for example, post-retirement benefits were indexed to wages net of taxes before 2000. However, reforms enacted that year altered the formula by linking post-retirement benefits to prices. As a result, retirees saw their subsequent benefits rise at a much slower pace. The 2004 reforms reduced retirees' purchasing power further by introducing a negative "automatic adjustment indexation" to the formula. With this provision, post-retirement benefits increase in line with prices minus the adjustment rate, currently fixed at 0.9 percent until about 2023. This rate is the sum of two demographic factors: the decline in the number of people contributing to the pension program (projected at 0.6 percent) plus the increase in the number of years people collect pensions (projected at 0.3 percent). This negative adjustment also enters the formula determining the benefit of new recipients as past earnings are indexed to net wages minus the same 0.9 percent adjustment rate.

Sweden's ABM modifies both the retirement accounts of workers—or future retirees—and the benefits paid to current pensioners. As explained earlier, this mechanism is triggered whenever system assets fall short of system liabilities. Moreover, post-retirement benefits in Sweden are indexed each year to an economic factor equal to prices plus the average

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<sup>31</sup> The longevity factor enters the formula determining initial benefits for a given cohort and does not change for that cohort after the normal retirement age. It ensures that the present value of benefits does not increase with life expectancy across cohorts.

<sup>32</sup> Changes in fertility or longevity are likely to affect the dependency ratio in the long run, but little in the short run.

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rate of real wage increase minus 1.6 percent, which is the projected real long-term growth in wages. As a result, if average real wages grow annually at 1.6 percent, post-retirement benefits are adjusted for price increases. On the other hand, if real wage growth falls below 1.6 percent, benefits do not keep up with prices, leading to a decline in retiree purchasing power.<sup>33</sup>

Germany's sustainability factor affects those already retired, as it is included in the formula that adjusts their benefits each year. If, as projected, the number of contributors falls relative to that of pensioners, increasing the dependency ratio, all benefits are adjusted downward, so all cohorts share the burden of adverse demographic trends. This intergenerational burden sharing is also apparent in the indexation of all benefits to net wages—wages minus contributions, which affect workers and pensioners alike. Thus an increase in contributions, everything else equal, lowers both initial benefits and benefits already being paid.

Table 3 summarizes relevant characteristics of earnings-related public pension programs in selected countries.

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<sup>33</sup> Benefits at the time of retirement are determined by remaining life expectancy and a growth "norm" of 1.6 percent. Benefits are then adjusted each year for inflation plus or minus deviations from this norm.

**Table 3: Characteristics of Earnings-Related Public Pension Programs—Selected Countries**

	Remaining life expectancy at age 65 <sup>a</sup> men-women	Normal retirement age (early retirement age) <sup>b</sup>	Average contribution rate (percentage of earnings)	Years of individual earnings considered in initial benefit calculation	Indexing of earnings for calculating initial benefits	Indexing of benefits in retirement
Belgium	15.8 19.7 (2002)	65 (60)	16.36	Lifetime average	Prices	100% prices
Canada	17.4 20.8	65 (60)	9.9	Lifetime average excluding worst 15% of years	Average earnings	100% prices
Czech Republic	13.9 17.3	Men: 63 Women: 59-63 (men: 60, women: 56-60) <sup>c</sup>	28	Since 1985 moving to 30	Average earnings	67% prices 33% real wage growth
France	17.1 21.4 (2002)	60	16.45	Lifetime average (public employees: best 20 moving to 25)	Prices	100% prices
Germany	16.1 19.6	65 (63)	19.5	Lifetime average	Average net earnings (subject to demographic adjustment)	100% wages net of contributions (subject to demographic adjustment)
Italy	16.7 20.7 (2001)	65 (60)	32.7	Lifetime average	5-year moving average of GDP growth (subject to demographic adjustment)	Between 75-100% prices depending on benefit level
Japan	18.2 23.3 (2004)	65 (60)	13.58	Lifetime average	Average earnings (subject to demographic adjustment)	100% prices (subject to demographic adjustment)
Sweden	17.4 20.6 (2004)	65 (61)	18.5	Lifetime average	Average earnings (subject to demographic and fiscal adjustments)	100% prices plus real wages less 1.6% (subject to demographic and fiscal adjustments)
United States	16.8 19.8	67 (62)	12.4	Best 35	Average earnings up to age 60	100% prices

Source: GAO

<sup>a</sup>In 2003 unless otherwise indicated.

<sup>b</sup>2002 data, including legislated changes.

<sup>c</sup>Women's retirement ages (full and early) depend on the number of children.

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## Indexing Can Be Used to Achieve Desired Distributional Effect

In the U.S. Social Security program, indexing can have different effects on the distribution of benefits and on the relationship between contributions and benefits, depending on how it is applied to benefits or taxes. There are a variety of proposals that would change the current indexing of initial benefits, including a move to the CPI, to longevity or mortality measures, or to the dependency ratio.<sup>34</sup> When the index is implemented through the benefit formula, each will have a proportional effect, with constant percentage changes at all earnings levels, on the distribution of benefits (i.e., the progressivity of the current system is unchanged). However, indexing provisions can be modified to achieve other distributional effects. For example, so-called progressive indexing applies different indexes at different earnings levels in a manner that seeks to protect the benefits of low-income workers. Indexing payroll tax rates would also have distributional effects. Such changes maintain existing benefit levels but affect equity measures like the ratio of benefits to contributions across age cohorts, with younger cohorts having lower ratios because they receive lower benefits relative to their contributions. Finally, proposals that modify the indexing of COLAs for existing beneficiaries have important and adverse distributional effects for groups that have longer life expectancies, such as women and highly educated workers, because such proposals would typically reduce future benefits, and this effect compounds over time. In addition, disabled worker beneficiaries, especially those who receive benefits for many years, would also experience lower benefits.

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## Proposals to Index Initial Benefits Have a Proportional Effect on the Distribution of Benefits

There are a variety of proposals that would change the current indexing of initial benefits from the growth in average wages. These include a move to a measure of the change in prices like the CPI, to longevity measures that seek to capture the growth in population life expectancies, or to the dependency ratio that measures changes in the number of retirees compared to the workforce. We analyzed three indexing scenarios; the dependency ratio index, which links the growth of initial benefits to changes in the dependency ratio, the ratio of the number of retirees to workers; the CPI index, which links the growth of initial benefits to changes in the CPI; and the mortality index, which links the growth of initial benefits to changes in life expectancy to maintain a constant life expectancy at the normal retirement age.<sup>35</sup> Figure 3 illustrates the

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<sup>34</sup> Longevity and mortality are differing measures of life expectancy.

<sup>35</sup> See appendix I for more information on these indexes.

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projected distribution of benefits for workers born in 1985 under three different indexing scenarios<sup>36</sup> (on the left side of the figure) and under a so-called benefit reduction benchmark that reduces benefits just enough to achieve program solvency over a 75-year projection period (on the far right).<sup>37</sup> Median benefits under the dependency ratio index and the CPI index are lower than the median benefit for the benchmark; they reduce benefits more than is needed to achieve 75-year solvency.<sup>38</sup> In contrast, the mortality index has a higher median benefit level than the benchmark, so without further modifications, it would not achieve 75-year solvency.

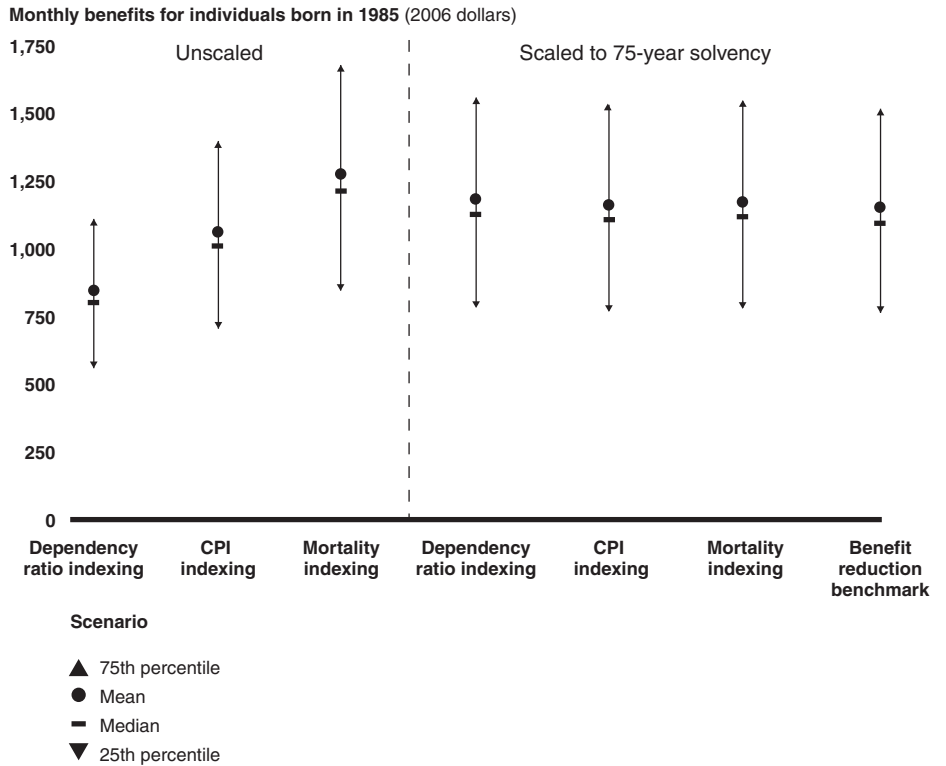
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<sup>36</sup> We focused on workers born in 1985 because all prospective program changes under all alternative policy scenarios would be almost fully phased in for such workers.

<sup>37</sup> The benefit reduction benchmark is a hypothetical benchmark policy scenario that would achieve 75-year solvency by only reducing benefits. For ease of modeling, the benefit reduction benchmark takes the form of reductions in the benefit formula factors. Each formula factor is reduced annually by subtracting a constant proportion of the factor's value under current law, resulting in a constant percentage reduction of currently promised benefits for everyone. See appendix I for more information about the benefit reduction benchmark. Consistent with the Social Security trustees' report, we use a 75-year projection period in assessing the solvency of different indexing scenarios and our benchmarks. The 75-year projection period has been standard practice for many years, although it does not capture sustainability over longer time horizons. We believe it is important to consider sustainability, and there are different ways to do so, but this issue is outside the scope of this report.

<sup>38</sup> While the level of solvency differs among these scenarios, the level of benefits under each scenario is lower than promised benefits, and replacement rates have declined in each scenario.

**Figure 3: Indexing Changes with a Larger Proportional Reduction Have a Greater Impact on the Distribution of Benefits, but Scaling to Achieve 75-Year Solvency Illustrates That the Proportional Effects Have Similar Results**



Source: GAO analysis of GEMINI data.

Note: Benefits are for all individuals in the GEMINI 1985 cohort sample in 2052 (the year the cohort reaches age 67). Scenarios are modeled using the intermediate assumptions of the 2005 trustees' report. The dependency ratio index links the growth of initial benefits to changes in the dependency ratio, the ratio of the number of retirees to workers. The dependency ratio index has a 197 percent improvement in 75-year solvency, generating far more programmatic savings than is needed to achieve solvency. The CPI index links the growth of initial benefits to changes in the CPI. The CPI index has a 127 percent improvement in 75-year solvency, generating more programmatic savings than is needed to achieve solvency. The mortality index links the growth of initial benefits to changes in life expectancy to maintain a constant life expectancy at the normal retirement age. The mortality index has a 72 percent improvement in 75-year solvency, which does not generate enough programmatic savings to be solvent. The benefit reduction benchmark is a hypothetical benchmark policy scenario that would achieve 75-year solvency by only reducing benefits. Thus, the benchmark has a 100 percent improvement in 75-year solvency, being exactly solvent at the end of the 75-year period. The scaled scenarios are adjusted to achieve a 75-year actuarial balance of zero. While scaling allows comparisons across distributions over 75 years, the different indexing scenarios are not identical in terms of sustainability. For a more complete description of the indexing scenarios, the benchmark, or the scaling, see appendix I.

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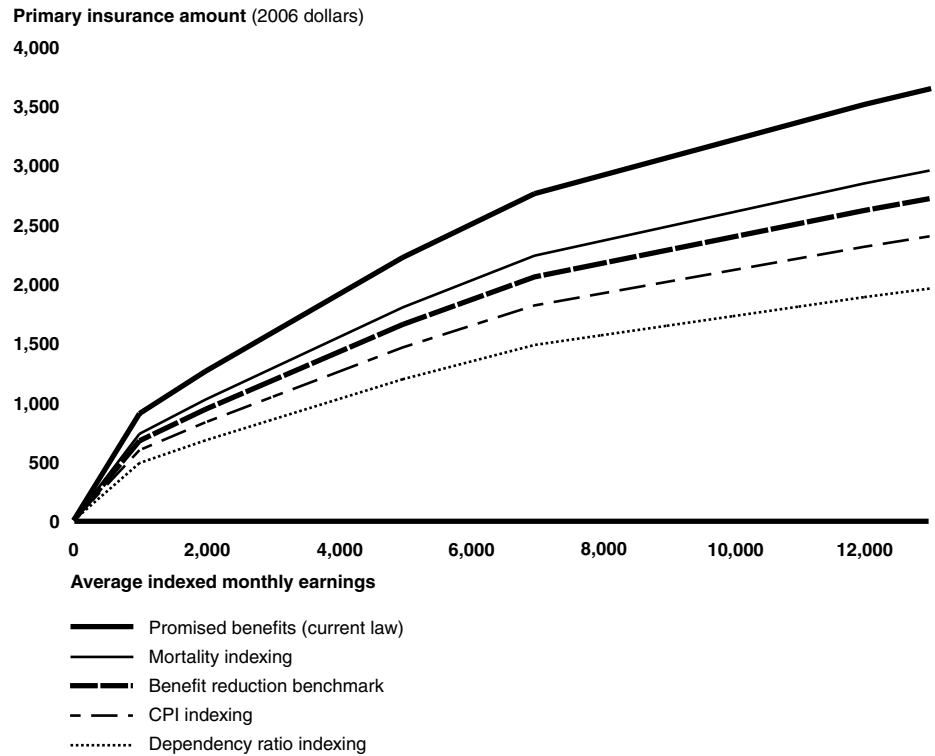
Regardless of the index used to modify initial benefits, most proposals apply the new index in a way that has proportional effects on the distribution of benefits.<sup>39</sup> Thus, benefits at all levels will be affected by the same percentage reduction, for example, 5 percent, regardless of earnings. The left half of figure 3 illustrates this proportionality in terms of monthly benefits. While the level of benefits differs, the distribution of benefits for each scenario has a similar structure. However, the range of each distribution varies by the difference in the size of the proportional reduction. A larger proportional reduction—the dependency ratio index—will result in a distribution with a similar structure, compared to promised benefits. However, each individual’s benefits are reduced by a constant percentage; therefore, the range of the distribution, the difference between benefits in the 25th and 75th percentile, would be smaller, compared to promised benefits. This proportional reduction in benefits is also illustrated in figure 4, which compares the currently scheduled or promised benefit formula with our three alternative indexing scenarios. Under each scenario, the line depicting scheduled benefits is lowered, by equal percentages at each AIME amount, by the difference between the growth in covered wages and the new index. Each indexing scenario maintains the shape of the current benefit formula; thus the progressivity of the system is maintained, but the line for each scenario is lower than scheduled benefits, which would affect the adequacy of benefits.

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<sup>39</sup> The general application of these indexes is to multiply the PIA formula’s replacement factors by a factor that reflects the new index. This is the approach taken by the Social Security actuaries and most proposals. See appendix I.



**Figure 4: Proportional Indexing Changes Would Maintain the Progressivity of the Current Benefit Formula, but Could Reduce Adequacy (Initial Benefits in 2050)**



Source: GAO calculations.

Note: The illustrated PIAs are for individuals who become eligible in 2050. The dependency ratio index links the growth of initial benefits to changes in the dependency ratio, the ratio of the number of retirees to workers. The CPI index links the growth of initial benefits to changes in the CPI. The mortality index links the growth of initial benefits to changes in life expectancy to maintain a constant life expectancy at the normal retirement age. For more information on each index see appendix I.

The proportional effects of indexing are best illustrated by adjusting, or scaling, each index to achieve comparable levels of solvency over 75 years.<sup>40</sup> Thus, for those indexes that do not by themselves achieve solvency, the benefit reductions are increased until solvency is achieved; for those that are more than solvent, the benefit reductions are decreased until solvency is achieved but not exceeded.

<sup>40</sup> While scaling allows comparisons across distributions over 75 years, the different indexing scenarios are not identical in terms of sustainability.

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The right half of figure 3 shows the distribution of monthly benefits for each of the scaled indexing scenarios and the benchmark scenario. Once the different indexing scenarios are scaled to achieve solvency, the distribution of benefits for each scenario is almost identical in terms of the level of benefits. Differences in the distributions deal with the timing associated with implementing the changes. Scaling the indexing scenarios also reveals that the shape of the distributions is the same. The distributions of monthly benefits for the indexing scenarios are also very similar to the distribution of benefits generated under the benefit reduction benchmark. Therefore, changes to the benefit formula, applied through the replacement factors, will have similar results regardless of whether the change is an indexing change or a straight benefit reduction, because of the proportional effect of the change.

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### Indexing Approaches Could Also Be Modified to Achieve Nonproportional Effects

Indexing could also be modified to achieve other distributional goals. For example, so-called progressive indexing, or the use of different indexes—such as prices and wages—at various earnings levels, has been proposed as a way of changing the indexing while protecting the benefits of low-income workers. Thus, under progressive price indexing, those individuals with indexed lifetime earnings below a certain point would still have their initial benefits adjusted by wage indexing; those individuals with earnings above that level would be subject to a combination of wage and price indexing on a sliding scale, with those individuals with the highest lifetime earnings having their benefits adjusted completely by price indexing.<sup>41</sup>

The effect that progressive price indexing would have on the benefit formula can be seen in figure 5, where the CPI indexing scenario is compared to a progressive CPI indexing scenario and to benefits promised under the current program formula.<sup>42</sup> Many lower-income individuals would do better under the progressive application of the CPI index than under the CPI indexing alone. However, a progressive application of CPI indexing does not by itself achieve 75-year solvency, and further changes would be necessary to do so. Figure 6 shows what happens to the benefit

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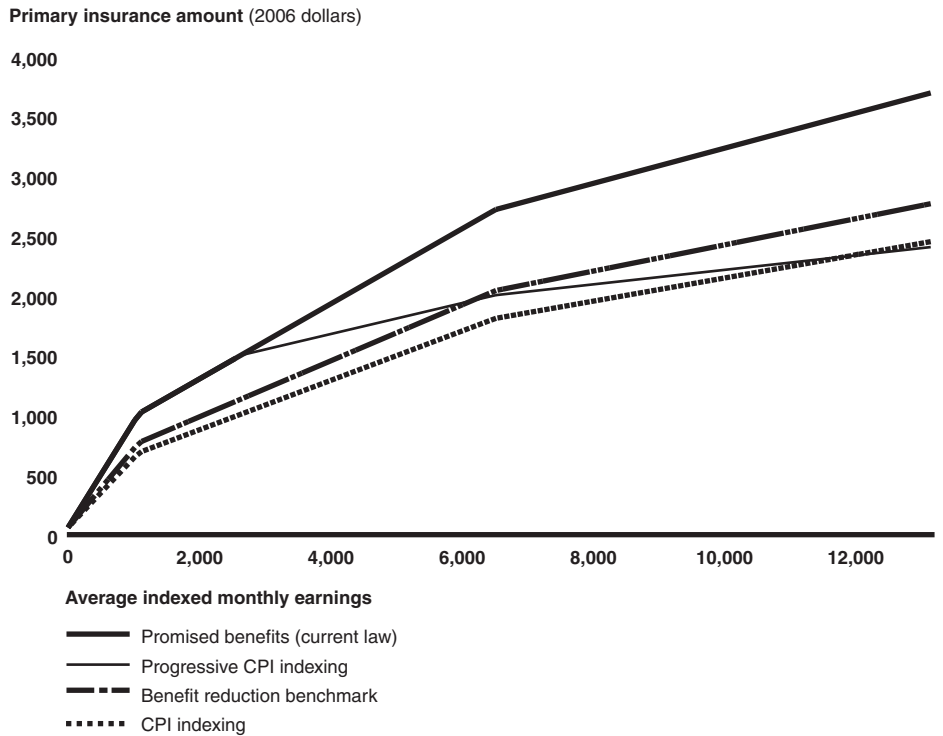
<sup>41</sup> For more details on the progressive price indexing proposal, see provision B7 of the August 10, 2005 Office of the Chief Actuary (OCACT) memo at <http://www.ssab.gov/documents/advisoryboardmemo--2005tr--08102005.pdf>, which was the basis for our analysis.

<sup>42</sup> Progressive price indexing and progressive CPI indexing are two ways of referring to the same proposal.

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formula when each of these indexing scenarios is scaled to achieve comparable levels of solvency over 75 years. Under progressive price indexing, to protect the benefits of low-income workers, the indexing to prices at higher earnings levels begins to flatten out benefits, causing the line in figure 6 to plateau. Thus, under this scenario, most individuals with earnings above a certain level would receive about the same level of benefits regardless of income—in the case of figure 6, a retiree with average indexed monthly earnings of \$2,000 would receive a similar benefit level as someone with average indexed monthly earnings of \$7,000. Since progressive price indexing would change the shape of the benefit formula, making it more progressive, it would reduce individual equity for higher earners, as they would receive much lower benefits relative to their contributions.

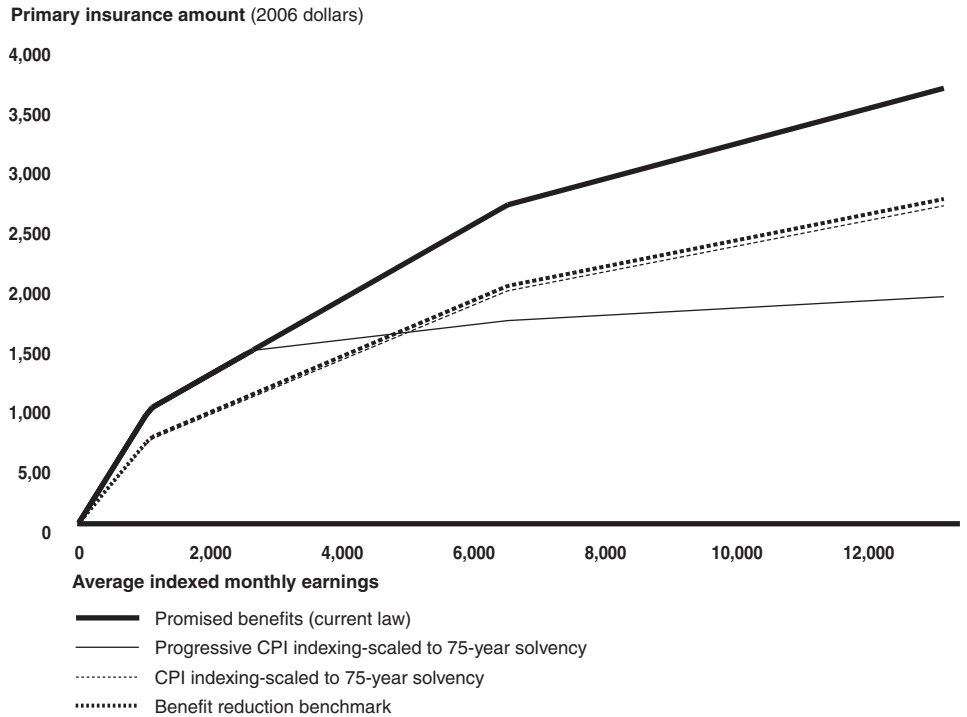
**Figure 5: Lower-Income Individuals Would Fare Comparatively Better under the Progressive Application of the CPI Index than under the CPI Index Alone (Initial Benefits in 2050)**



Source: GAO calculations.

Note: The illustrated PIAs are for individuals who become eligible in 2050. The CPI index links the growth of initial benefits to changes in the CPI. Progressive CPI indexing uses different indexes at various earnings levels. Individuals with earnings below a certain point would have their initial benefits adjusted by wage indexing; those individuals with earnings above that level would be subject to a combination of wage and price indexing on a sliding scale, with those individuals with the highest earnings having their benefits adjusted completely by price indexing. However, progressive CPI indexing does not achieve 75-year solvency, it has only a 74 percent improvement in solvency. For more information on the indexes see appendix I.

**Figure 6: Scaling the Progressive Application of the CPI Index to Achieve Equivalent Solvency Demonstrates That Most Individuals above a Certain Point Would Receive About the Same Level of Benefits (Initial Benefits in 2050)**



Source: GAO calculations.

Note: The illustrated PIAs are for individuals who become eligible in 2050. The CPI index links the growth of initial benefits to changes in the CPI. Progressive CPI indexing uses different indexes at various earnings levels. Individuals with earnings below a certain point would have their initial benefits adjusted by wage indexing; those individuals with earnings above that level would be subject to a combination of wage and price indexing on a sliding scale, with those individuals with the highest earnings having their benefits adjusted completely by price indexing. While scaling allows comparisons across distributions over 75 years, the different indexing scenarios are not identical in terms of sustainability. For more information on the indexes and the scaling, see appendix I.

While proposals that have suggested progressive indexing have focused on using prices, any index can be adjusted to achieve the desired level of progressivity, and the results will likely be similar. However, to the extent that wages grow faster than the new index over a long period of time, the benefit formula will eventually flatten out and all individuals above a certain income level would receive the same level of benefits.

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## Indexing Applied to Taxes Would Have Adequacy and Equity Considerations

Indexing changes could also be applied to program financing. Under the current structure of the system, one way this could be accomplished is by indexing the Social Security payroll tax rate.<sup>43</sup> As with indexing benefits, the payroll tax rate could be indexed to any economic or demographic variable. Under the tax scenarios presented, only the indexing of taxes would change, so promised benefits would be maintained. However, workers would be paying more in payroll taxes, which, like any tax change, could affect work, saving, and investment decisions.

While benefit levels would be higher under tax increase scenarios, as compared to benefit reduction scenarios, the timing of the tax changes matters, just as it did with benefit changes. Since benefits would be unchanged in the tax-increase-only scenarios, we use benefit-to-tax ratios to compare the effects of different tax increase scenarios. Benefit-to-tax ratios compare the present value of Social Security lifetime benefits with the present value of lifetime Social Security taxes.<sup>44</sup> The benefit-to-tax ratio is an equity measure that focuses on whether, over their lifetimes, beneficiaries can expect to receive a fair return on their contributions or get their “money’s worth” from the system. With benefits unchanged in the tax increase scenarios, the benefit-to-tax ratios would vary across scenarios because of differences in the timing of tax increases.<sup>45</sup>

To illustrate the effects of the timing of a change in tax rates, figure 7 shows the benefit-to-tax ratios, for four different birth cohorts, for two tax increase scenarios: (1) the dependency ratio tax indexing scenario scaled to achieve 75-year solvency and (2) our tax increase benchmark scenario that increases taxes just enough to achieve program solvency over a 75-

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<sup>43</sup> Under the current system, the maximum taxable earnings level, the level at which earnings are subject to the Social Security payroll tax, is indexed to the growth in wages, but the payroll tax rate itself is not indexed. Some proposals have suggested changing the indexing of the maximum taxable earnings level so that it maintains coverage of 90 percent of all wages. Other proposals have not focused on the 90 percent goal, but rather have suggested raising or completely eliminating the cap. With any of these changes, several issues arise, most importantly whether the benefit formula takes into account these higher earnings. These issues go beyond the scope of our work, and thus we did not analyze changes to the maximum taxable earnings level.

<sup>44</sup> A value less than one, for example, indicates that benefits collected fall short of taxes paid. The present value of benefits or taxes is the equivalent value, at a point in time, of the entire stream of benefits the individual receives or taxes the individual pays in his or her lifetime.

<sup>45</sup> Changing benefits would also affect the benefit-to-tax ratios, which would have adequacy and equity considerations.

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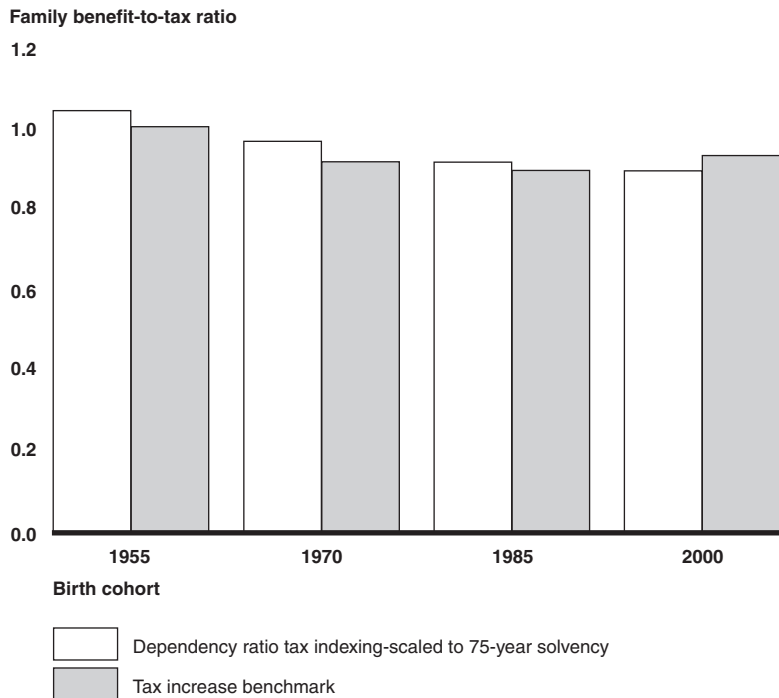
year projection period.<sup>46</sup> By raising payroll taxes once and immediately, the tax increase benchmark would spread the tax burden more evenly across generations. This is seen in figure 7, where the benefit-to-tax ratios are fairly stable across cohorts for this scenario.<sup>47</sup> The dependency ratio tax indexing scenario would increase the tax rate annually, in this case with changes in the dependency ratio. Under this scenario, later cohorts would face a higher tax rate and thus bear more of the tax burden, compared to earlier cohorts. This would result in declining benefit-to-tax ratios across cohorts, with later generations receiving relatively less compared to their contributions.

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<sup>46</sup> The tax increase benchmark is a hypothetical benchmark policy scenario that would achieve 75-year solvency by only increasing payroll taxes. It raises payroll taxes once and immediately by the amount of Social Security's actuarial deficit as a percentage of payroll (1.96 percentage points divided evenly between employers and employees). It results in the smallest ultimate tax rate that would achieve 75-year solvency and spreads the tax burden evenly across generations. See appendix I for more information about the tax increase benchmark.

<sup>47</sup> Since the 1955 cohort reaches age 62 in 2017, the earliest age of eligibility for retired worker benefits, members of this cohort will spend fewer years contributing to the system at the higher tax rate than the other cohorts. Thus, their benefit-to-tax ratios will be higher than those for the other cohorts. Also, since lifetime benefits grow over time as people live longer, the benefit-to-tax ratios for the tax increase benchmark will begin to increase, as can be seen for the 2000 cohort.

**Figure 7: A Onetime Payroll Tax Increase Would Spread the Tax Burden More Evenly across Cohorts than Gradual Increases through an Index**



Source: GAO analysis of GEMINI data.

Note: Benefit-to-tax ratios are the sum of the present value of family benefits divided by the present value of family taxes summed for all individuals in the cohort that survive until age 24. Scenarios are modeled using the 2005 trustees' report intermediate assumptions. The dependency ratio tax index links the growth in the payroll tax rate to changes in the dependency ratio, the ratio of the number of retirees to workers. The dependency ratio tax index has been adjusted—or "scaled"—to achieve a 75-year actuarial balance of zero. While scaling allows comparisons across distributions over 75 years, the different indexing scenarios are not identical in terms of sustainability. The tax increase benchmark is a hypothetical benchmark policy scenario that would achieve 75-year solvency by only increasing payroll taxes. For a more complete description of the indexing scenario, the scaling, or the benchmark, see appendix I.

## Revising COLA for Existing Beneficiaries Would Have Important Distributional Implications for Multiple Subpopulations

Indexing changes can also be applied to the COLA used to adjust existing benefits. Under the current structure of the program, benefits for existing beneficiaries are adjusted annually in line with changes in the CPI. The COLA helps to maintain the purchasing power of benefits for current retirees. Some proposals, under the premise that the current CPI overstates the rate of price inflation because of methodological issues associated with how the CPI is calculated, would alter the COLA. Figure 8 shows the difference in benefit growth over time under the current COLA and two alternatives: growing at rate of CPI minus 0.22 and growing at rate



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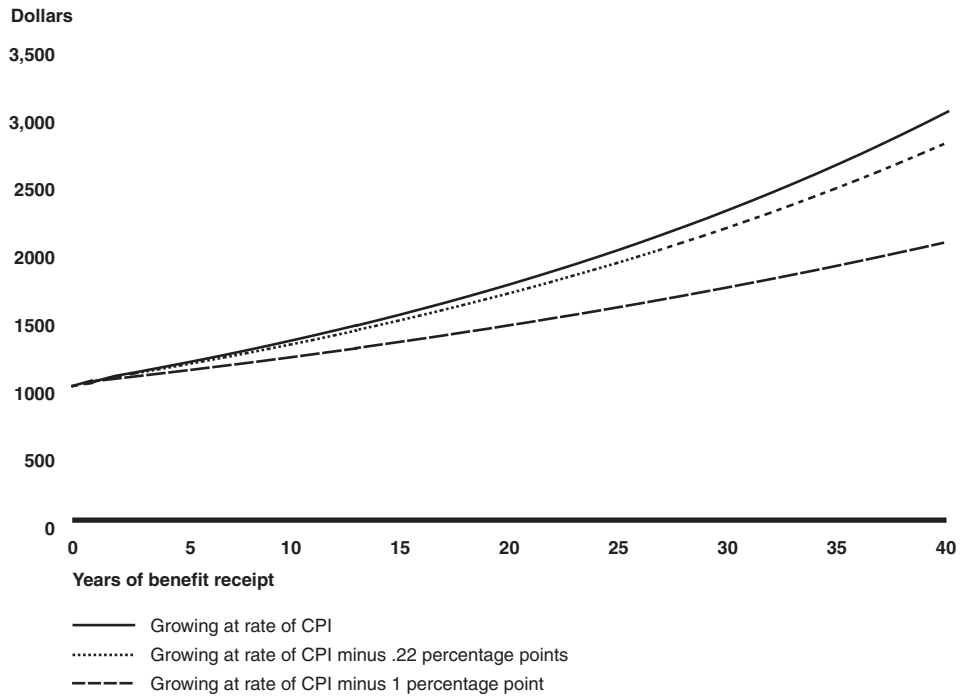
of CPI minus 1.<sup>48</sup> Changes to the COLA would also have adequacy implications. After 20 years, benefits growing at the rate of the CPI minus 0.22 would slow the growth of benefits by about 4 percent below the level given by the current COLA and growing at the rate of the CPI minus 1 by about 17 percent. This slower benefit growth would improve the finances of the system, but would also alter the distribution of benefits, particularly for some subpopulations. Since changes to the COLA compound over time, those most affected are those with longer life expectancies, for example, women, as they would have the biggest decrease in lifetime benefits as they tend to receive benefits over more years. In addition, as education is correlated with greater life expectancy, highly educated workers would also experience a significant benefit decrease. There could also be a potentially large adverse effect on the benefits paid to disabled beneficiaries, especially among those who become disabled at younger ages and receive benefits for many years. These beneficiaries could have a large decrease in lifetime benefits.<sup>49</sup>

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<sup>48</sup>The 0.22 percentage point reduction in the growth of the CPI has been proposed as a modification to the COLA to correct methodological issues associated with how the CPI is calculated. Thus the COLA would be based on a new CPI-W series that would reflect a “superlative” formula, of the type currently used for the new chained CCPI-U. The 1 percentage point reduction in the CPI is another possibility for slowing the growth of benefits that has been analyzed by the Office of the Actuary at SSA.

<sup>49</sup> Since the current benefit formula links the calculation of benefits for all beneficiaries, any proposed changes would affect the benefits of disabled workers as well as retirees. Proposals to reform Social Security often modify the benefit formula without taking into account that the circumstances facing disabled workers differ from those facing retired workers. See the next section of this report for a discussion of this issue, as well as [GAO-03-310](#), and GAO, *Social Security Reform: Potential Effects on SSA’s Disability Programs and Beneficiaries*, [GAO-01-35](#) (Washington, D.C.: Jan. 24, 2001).

**Figure 8: The Growth of \$1,000 Benefit under the CPI and Two Alternatives Illustrate That Those Beneficiaries Who Receive Benefits Longer Will Be Affected the Most**



Source: GAO analysis.

Reducing the COLA would also have equity implications. Since the COLA is applied to all beneficiaries, reductions in the COLA would lower the return on contributions for all beneficiaries. However, the magnitude of the effect will vary across subpopulations, similar to its effect on adequacy. Those individuals who have the biggest decrease in lifetime benefits will have the biggest decrease in individual equity. While these individuals have a large decrease in equity, they would still receive higher lifetime benefits since they live longer and collect benefits over more years. Individuals with shorter life expectancies will experience a decrease in equity, but they will fare comparably better than other groups that live longer, since their lifetime benefits will decrease much less. Therefore, men, African-Americans, low earners, and less educated individuals would experience a much smaller decrease in equity compared to their counterparts.

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## Key Considerations in Choosing an Index

Indexing raises other important considerations about the program's role, the stability of the variables underlying the index, and the treatment of Disability Insurance (DI) beneficiaries. The choice of the index implies certain assumptions about the appropriate level of benefits and taxes for the program. Thus, if the current indexing of initial benefits was changed to price growth, there is an implication that the appropriate level of benefits is one that maintains purchasing power over time rather than the current approach that maintains a relative standard of living across age groups (i.e., replacement rates). The solvency effects of an index are predicated upon the relative stability and historical trends of the underlying economic or demographic relationships implied by the index. For example, the 1970s were a period of much instability, in which actual inflation rates and earnings growth diverged markedly from past experience, with the result that benefits unexpectedly grew much faster than expected. Finally, since the benefit formulas for the Old-Age and Survivors Insurance (OASI) and DI programs are linked, an important consideration of any indexing proposal is its effect on the benefits provided to disabled workers. Disabled worker beneficiaries typically become entitled to benefits much sooner than retired workers and under different eligibility criteria. As with other ways to change benefits, an index that is designed to improve solvency by adjusting retirement benefits may result in large reductions to disabled workers, who often have fewer options to obtain additional income from other sources.

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## Choice of a Particular Index Implies Assumptions about the Appropriate Level of Benefits and Taxes, Adequacy and Equity

The choice of an index suggests certain assumptions about the appropriate level of benefits and the overall goal of the program.<sup>50</sup> The current indexing of initial benefits to wage growth implies that the appropriate level of benefits is one that maintains replacement rates across birth years. In turn, maintaining replacement rates implies a relative standard of adequacy and an assumption that initial benefits should reflect the prevailing standard of living at the time of retirement. In contrast, changing the current indexing of initial benefits to price growth implies that the appropriate level of benefits is one that maintains purchasing

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<sup>50</sup> Most proposals that change the indexing of initial benefits would implement the new index through the benefit formula by multiplying the replacement factors by the difference between the growth in wages and the growth in the new index. In such instances, changing the indexing would not likely pose any serious implementation issues from an agency operational perspective.

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power.<sup>51</sup> In turn, maintaining purchasing power implies an absolute standard of adequacy and an assumption that initial benefits should reflect a fixed notion of adequacy regardless of improvements in the standard of living. Also, any index that does not maintain purchasing power results in workers born in one year receiving higher benefits than workers with similar earnings born 1 year later.<sup>52</sup> This would occur with any benefit change that would reduce currently promised benefits more than price indexing initial benefits would, since price indexing maintains the purchasing power of initial benefits. In the case of longevity indexing, if the growth of initial benefits were indexed to life expectancy, then this implies that the increased costs of benefits that stem from increasing life expectancy should be borne by all future beneficiaries, even if society has become richer. Therefore, the desired outcome, in terms of initial benefit levels at the time of retirement, should drive the choice of an index.

The current indexing of existing benefits with the COLA implies that maintaining the purchasing power of benefits for current retirees is the appropriate level of benefits. Revising the COLA to reflect a more accurate calculation of the CPI retains this assumption. However, adjusting the COLA in a way that does not keep pace with the CPI would change that assumption and imply a view that the costs of reform should be shared by current as well as future retirees.

Similarly, on the revenue side, the program currently uses a constant tax rate, which maintains the same proportion of taxes for all workers earning less than the maximum taxable earnings level. Applying a life expectancy index to payroll tax rates suggests that the appropriate level of taxes is one that prefunds the additional retirement years increased life expectancy will bestow on current workers, but also that the appropriate level of benefits is one that maintains replacement rates, as benefits are unchanged.

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<sup>51</sup> Purchasing power reflects the amount of goods and services individuals can afford with a given level of benefits.

<sup>52</sup> This is the so-called notch effect. Such a situation occurred immediately after the 1977 amendments. Notches generate controversy and confusion among beneficiaries because of inequities that result from them. See [GAO/T-HEHS-94-236](#).

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## Stability of Economic or Demographic Relationships Underlying the Index Is a Consideration

Indexing raises other considerations about the stability of the underlying relationships between the economic and demographic variables captured by the index. The choice of an index includes issues of risk and methodology. Some indexes could be based on economic variables that are volatile, introducing instability because the index generates wide swings in benefits or taxes. In other cases, long-standing economic or demographic relationships premised by the index could change, resulting in unanticipated and unstable benefit or tax levels. While most indexes will also pose methodological issues, these can become problematic to address after the index has already been widely used, and the correction will have implications for benefits or taxes. An example is the current measurement limitations of the CPI. In other instances, the index may be based on estimates about future trends in variables like mortality that could later prove incorrect and erode public confidence in the system.

Some indexes are premised on the past behavior of economic or demographic relationships. If these long-standing relationships diverge for a significant period of time, they may result in unanticipated and unstable benefit or tax levels. For example, the 1972 amendments that introduced indexing into the Social Security program were premised on the belief that over time, wage growth will generally substantially exceed price inflation. However, for much of the 1970s, actual inflation rates and earnings growth diverged markedly from past experience; price inflation grew much faster than wages, with the result that benefits grew much faster than anticipated. This development introduced major instability into the program, which was unsustainable. Congress addressed this problem when it passed the 1977 amendments.<sup>53</sup> Moreover, even though the 1977 amendments succeeded in substantially stabilizing the replacement rates for initial benefits, a solvency crisis required reforms just 6 years later with the 1983 amendments. High inflation rates resulted in high COLAs for existing benefits just as recession was depressing receipts from the payroll taxes. The indexing of initial benefits under the 1977 amendments did not address the potential for such economic conditions to affect COLAs or payroll tax receipts.

Many indexes have methodological issues associated with their calculation, which can become problems over time. For example, the CPI has long been in use by the Social Security program and other social welfare programs. However, the CPI is not without its methodological

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<sup>53</sup> For more detail on the 1977 amendments, see appendix II.

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problems. Some studies have contended that the CPI overstates inflation for a number of reasons, including that it does not account for how consumers can substitute one good for another because the calculation assumes that consumers do not change their buying patterns in response to price changes.<sup>54</sup> Correcting for this “substitution effect” would likely lower the CPI. Changing the calculation in response to this concern might improve accuracy but is controversial because it would also likely result in lower future benefits and put more judgment into the calculation.

Indexes that are constructed around assumptions about future experience raise other methodological issues. An example is a mortality index, which seeks to measure future changes in population deaths. Such a measure would presumably capture an aspect of increased longevity or well-being in retirement and could be viewed as a relevant determinant of program benefits or taxes. Accuracy in this index would require forecasts of future mortality based on assumptions of the main determinants influencing future population deaths (i.e., medical advances, diet, income changes). Such forecasts would require a clear consensus about these factors and how to measure and forecast them. However, currently there is considerable disagreement among researchers in terms of their beliefs about the magnitude of mortality change in the future.<sup>55</sup> In choosing an index, such methodological issues would need to be carefully considered to maintain public support and confidence.

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<sup>54</sup>For more information on the CPI and how it overstates the true rate of inflation, see Advisory Commission to Study the Consumer Price Index, “Toward a More Accurate Measure of the Cost of Living,” Final Report to the Senate Committee on Finance, Dec. 1996; Congressional Budget Office, “Is the Growth of the CPI a Biased Measure of Changes in the Cost of Living?” (Washington, D.C., 1994). In recent years a variety of changes have been made to the CPI, including changes that in turn affect Social Security’s COLA. In addition, a new “chained” CPI reflects how consumers substitute one product for another when their relative prices change. This new CPI is not yet used by government agencies, but some reform proposals call for using a variation of it in computing COLAs.

<sup>55</sup> See Ronald D. Lee and Lawrence R. Carter, “Modeling and Forecasting U.S. Mortality,” *Journal of the American Statistical Association*, Vol. 87, No. 419, 1992; and Michael Sze, Stephen C. Goss, and Jose Gomez de Leon, “Effect of Aging Population with Declining Mortality on Social Security and NAFTA Countries,” *North American Actuarial Journal*, Vol. 2, No. 4, 1998.

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## The Treatment of Disabled and Survivor Beneficiaries Poses Challenges When Modifying the Indexing

Under the current structure of the U.S. Social Security system, the OASI and DI programs share the same benefit formula. Thus, any changes that affect retired workers will also affect survivors and disabled workers. However, the circumstances facing these beneficiaries differ from those facing retired workers. For example, the disabled worker's options for alternative sources of income, especially earnings-related income, to augment any reduction in benefits are likely to be more limited than are those for the retired worker. Further, DI beneficiaries enter the program at younger ages and may receive benefits for many years. As a result, disabled beneficiaries could be subject to benefit changes for many years more than those beneficiaries requiring benefits only in retirement.<sup>56</sup>

These differing circumstances among beneficiaries raise the issue of whether any proposed indexing changes, or any other benefit changes, should be applied to disabled worker and survivor beneficiaries, as well as to retired worker beneficiaries.<sup>57</sup> If disabled worker beneficiaries are not subject to indexing changes applied to retirees, benefit levels for disabled workers could ultimately be higher than those of retired workers. This difference in benefit levels would occur because disabled workers typically become entitled to benefits sooner than retired workers, and thus any reductions in their replacement factors would be smaller. Such a differential could increase the incentive for older workers to apply for disability benefits as they near retirement age.

Excluding the disability program from indexing changes has implications for solvency and raises implementation issues. If the indexing changes are not applied to the disability program, even larger benefit reductions or revenue increases would be needed to achieve fiscal solvency. Since the OASI and DI programs share the same benefit formula, excluding disabled worker beneficiaries from indexing changes might also necessitate the use of two different benefit formulas or require a method to recalculate benefits in order to maintain different indexing in each program. Such changes could lead to confusion among the public about how the programs operate, which may require significant additional public education.

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<sup>56</sup> For more information on the effects of reform on the DI program and beneficiaries, see [GAO-01-35](#).

<sup>57</sup> Some proposals have suggested reducing the disabled worker benefit only at the time of conversion from DI to retired worker status, but only in proportion to the percentage of their potential working years that occurred in a nondisabled state.

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## Concluding Observations

Indexing has played an important role in the determination of Social Security's benefits and revenues for over 30 years. As in other countries seeking national pension system reform, recent proposals to modify the role of indexing in Social Security have primarily focused on addressing the program's long-term solvency problems. In theory, one index may be better than another in keeping the program in financial balance on a sustainable basis. However, such a conclusion would be based on assumptions about the future behavior of various demographic and economic variables, and those assumptions will always have considerable uncertainty. Future demographic patterns and economic trends could emerge that affect solvency in ways that have not been anticipated. So, while indexing changes may reduce how often Congress needs to rebalance the program's finances, there is no guarantee that the need will not arise again.

Yet program reform, and the role of indexing in that reform, is about more than solvency. Reforms also reflect implicit visions about the size, scope, and purpose of the Social Security system. Indexing initial benefits, existing benefits, tax rates, the maximum taxable earnings level, or some other parameter or combination will have different consequences for the level and distribution of benefits and taxes, within and across generations and earnings levels. These questions relate to the trade-off between income adequacy and benefit equity.

In the final analysis, indexing, like other individual reforms, comes down to a few critical questions: What is to be accomplished or achieved, who is to be affected, is it affordable and sustainable, and how will the change be phased in over time? Although these issues are complex and controversial, they are not unsolvable; they have been reconciled in the past and can be reconciled now. Indexing can be part of a larger, more comprehensive reform package that would include other elements whose cumulative effect could achieve the desired balance between adequacy and equity while also achieving solvency. The challenge is not whether indexing should be part of any necessary reforms, but that necessary action is taken soon to put Social Security back on a sound financial footing.

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## Agency Comments

We provided a draft of this report to SSA and the Department of the Treasury. SSA provided technical comments, which we have incorporated as appropriate.



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We are sending copies of this report to the Social Security Administration and the Treasury Department, as well as other interested parties. Copies will also be made available to others upon request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>. Please contact me at (202) 512-7215, if you have any questions about this report. Other major contributors include Charles Jeszeck, Michael Collins, Anna Bonelli, Charles Ford, Ken Stockbridge, Seyda Wentworth, Joseph Applebaum, and Roger Thomas.

A handwritten signature in black ink that reads "Barbara D. Bovbjerg". The signature is written in a cursive style with a large, looped initial "B".

Barbara D. Bovbjerg  
Director, Education, Workforce,  
and Income Security Issues

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# Appendix I: Methodology

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## Microsimulation Model

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### Description

Genuine Microsimulation of Social Security and Accounts (GEMINI) is a microsimulation model developed by the Policy Simulation Group (PSG). GEMINI simulates Social Security benefits and taxes for large representative samples of people born in the same year. GEMINI simulates all types of Social Security benefits, including retired worker, spouse, survivor, and disability benefits. It can be used to model a variety of Social Security reforms including the introduction of individual accounts.

GEMINI uses inputs from two other PSG models, the Social Security and Accounts Simulator (SSASIM), which has been used in numerous GAO reports, and the Pension Simulator (PENSIM), which has been developed for the Department of Labor. GEMINI relies on SSASIM for economic and demographic projections and relies on PENSIM for simulated life histories of large representative samples of people born in the same year and their spouses.<sup>58</sup> Life histories include educational attainment, labor force participation, earnings, job mobility, marriage, disability, childbirth, retirement, and death. Life histories are validated against data from the Survey of Income and Program Participation, the Current Population Survey, Modeling Income in the Near Term (MINT3),<sup>59</sup> and the Panel Study of Income Dynamics. Additionally, any projected statistics (such as life expectancy, employment patterns, and marital status at age 60) are, where possible, consistent with intermediate cost projections from Social Security Administration's Office of the Chief Actuary (OCACT). At their best, such models can provide only very rough estimates of future incomes. However, these estimates may be useful for comparing future incomes across alternative policy scenarios and over time.

GEMINI can be operated as a free-standing model or it can operate as a SSASIM add-on. When operating as an add-on, GEMINI is started automatically by SSASIM for one of two purposes. GEMINI can enable the

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<sup>58</sup> While these models use sample data, our report, like others using these models, does not address the issue of sampling errors. The results of the analysis reflect outcomes for individuals in the simulated populations and do not attempt to estimate outcomes for an actual population.

<sup>59</sup> MINT3 is a detailed microsimulation model developed jointly by the Social Security Administration, the Brookings Institution, RAND, and the Urban Institute to project the distribution of income in retirement for the 1931 to 1960 birth cohorts.

SSASIM macro model to operate in the Overlapping Cohorts (OLC) mode or it can enable the SSASIM micro model to operate in the Representative Cohort Sample (RCS) mode. The SSASIM OLC mode requests GEMINI to produce samples for each cohort born after 1934 in order to build up aggregate payroll tax revenues and OASDI benefit expenditures for each calendar year, which are used by SSASIM to calculate standard trust fund financial statistics. In either mode, GEMINI operates with the same logic, but typically with smaller cohort sample sizes in OLC mode than in the RCS or stand-alone-model mode.

For this report we used GEMINI to simulate Social Security benefits and taxes primarily for 100,000 individuals born in 1985. Benefits and taxes were simulated under our tax increase (promised benefits) and proportional benefit reduction (funded benefits) benchmarks (described below) and various indexation approaches.

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**Assumptions and Limitations**

To facilitate our modeling analysis, we made a variety of assumptions regarding economic and demographic trends. In choosing our assumptions, we focused our analysis to illustrate relevant points about distributional effects and hold equal as much as possible any variables that were either not relevant to or would unduly complicate that focus. As a result of these assumptions, as well as issues inherent in any modeling effort, our analysis has some key limitations, especially relating to risk and changes over time.

**2005 Social Security Trustees' Assumptions**

The simulations are based on economic and demographic assumptions from the 2005 Social Security trustees' report.<sup>60</sup> While the 2006 trustees' report has been released, the assumptions have changed very little from the 2005 assumptions. We used trustees' intermediate assumptions for inflation, real wage growth, mortality decline, immigration, labor force participation, and interest rates.

**Distributional Effects Over Time**

We simulated benefits for individuals born in 1955, 1970, 1985, and 2000. However, the majority of our figures focus on individuals born in 1985 because all prospective indexing changes would be almost fully phased in for these individuals. However, the distributional effects might change

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<sup>60</sup> The Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds, *The 2005 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds* (Washington, D.C.: Mar. 23, 2005).

over time. This is because each index phases in over time and reduces the primary insurance amount (PIA) formula factors (or increases the Old-Age and Survivors Insurance (OASI) and Disability Insurance (DI) taxes) at different rates. For example, individuals in the 1955 cohort that survive to age 65 do so in the year 2020, so the benefit reductions (or tax increases), which we specify to begin sometime between 2006 and 2012, depending on the scenario, have only been implemented for about 8 to 14 years. Additionally, members of the cohort that become disabled might become disabled prior to the implementation of annual PIA reductions or tax increases. Such issues become less pronounced with the younger cohorts.

### Pre-retirement Mortality

To capture the distributional impact of pre-retirement mortality, we calculated benefit-to-tax ratios and lifetime benefits for all sample members who survived past age 24. However, our measure of well-being, lifetime earnings, may not be the best way to assess the well-being of those who die before retirement. Some high-wage workers are classified as low lifetime earners simply because they did not live very long, and consequently our analysis overstates the degree to which those who die young are classified as low earners. As a result, our measures underestimate the degree to which Social Security favors lower earners under all of the scenarios we analyze.<sup>61</sup>

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### Description of Alternative Policy Scenarios

#### CPI Indexing

To simulate consumer price indexing (CPI) indexing, which essentially links the growth of initial benefits to changes in the CPI, we successively modified the PIA formula replacement factors (90, 32, and 15) beginning in 2012, reducing them successively by real wage growth in the second prior year. This specification mimics provision B6 of the August 10, 2005 memorandum to SSA’s Chief Actuary regarding the provision requested by the Social Security Advisory Board (SSAB), which is an update of provision 1 of Model 2 of the President’s Commission to Strengthen Social Security (CSSS).<sup>62</sup> As noted in the CSSS solvency memorandum from SSA’s Chief Actuary, “[t]his provision would result in increasing benefit levels for individuals with equivalent lifetime earnings across generations (relative

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<sup>61</sup> For benefit-to-tax ratios we followed the methodology followed in [GAO-04-747](#); see appendix I of this report for more detail.

<sup>62</sup> See page 3 of <http://www.ssab.gov/documents/advisoryboardmemo—2005tr—08102005.pdf> for description of the provision. For the original provision from the President’s Commission to Strengthen Social Security, see page 4 of [http://www.ssa.gov/OACT/solvency/PresComm\\_20020131.pdf](http://www.ssa.gov/OACT/solvency/PresComm_20020131.pdf).

to the average wage level) at the rate of price growth (increase in the CPI), rather than at the rate of growth in the average wage level as in current law.”

This provision as specified and scored by OCACT in the SSAB memo would increase the size of the long-range OASDI actuarial balance (reduce the actuarial deficit) by an estimated 2.38 percent of taxable payroll. Using the overlapping cohort mode of SSASIM, we estimated this provision as increasing the size of the long-range OASDI actuarial balance by 2.43 percent of taxable payroll, or 5 basis points more than the OCACT scoring.

## Mortality Indexing

To simulate mortality indexing, which links the growth of initial benefits to changes in life expectancy to maintain a constant life expectancy at the normal retirement age, we successively modified the PIA formula replacement factors (90, 32, 15) beginning in 2009, reducing them annually by multiplying them by 0.995. This specification mimics provision 1 of Model 3 of CSSS.<sup>63</sup> The CSSS solvency memorandum notes that the 0.995 successive reduction “reduces monthly benefit levels by an amount equivalent to increasing the normal retirement age (NRA) for retired workers by enough to maintain a constant life expectancy at NRA, for any fixed age of benefit entitlement.”<sup>64</sup>

This provision as specified and scored—using the intermediate assumptions of the 2001 trustees’ report—in the CSSS memo by SSA’s Office of the Chief Actuary would reduce the size of the long-range OASDI actuarial balance (reduce the actuarial deficit) by an estimated 1.17 percent of taxable payroll. Using the overlapping cohort mode of SSASIM and specifications, which mimic the intermediate assumptions of the 2005 trustees’ report, we estimated this provision as increasing the size of the long-range OASDI actuarial balance by 1.39 percent of taxable payroll, or 22 basis points more than the earlier OCACT scoring.

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<sup>63</sup> For more information on provision 1 or Model 3, see page 8 of the CSSS proposal at [http://www.ssa.gov/OACT/solvency/PresComm\\_20020131.pdf](http://www.ssa.gov/OACT/solvency/PresComm_20020131.pdf).

<sup>64</sup> We chose the CSSS specification because it was already scored and readily available. Other constructions or interpretations of a mortality index are certainly possible. For example, life expectancy at birth or some other age could be used. Further, life expectancy could be defined as period or cohort. A period life table represents the mortality conditions at a specific point in time, whereas a cohort table depicts the mortality conditions of a specific group of individuals born in the same year or series of years.

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Dependency Indexing

**Benefits**

To simulate so-called dependency indexing of benefits, which links the growth of initial benefits to changes in the dependency ratio, we successively modified the PIA formula replacement factors (90, 32, and 15) beginning in 2010, by reducing them annually by an index that follows the inverse of the increase in the aged dependency ratio from 2 years prior. For example, the reduction for 2010 is given by dividing the 2009 PIA formula factors (90, 32, and 15) by 1.0098, which is rate of increase from 2007 to 2008.<sup>65</sup>

This provision as specified has not been scored by OCACT. Using the overlapping cohort mode of SSASIM and specifications that mimic the intermediate assumptions of the 2005 trustees' report, we estimated this provision as increasing the size of the long-range OASDI actuarial balance by 3.78 percent of taxable payroll.

**Taxes**

To simulate so-called dependency indexing of payroll taxes, which links the growth of payroll taxes to changes in the dependency ratio, we increased the initial OASI and DI tax rates (both employer and employee combined) in 2009 by a cumulative index that increases annually by the rate of increase in the aged dependency ratio from 2 years prior. For example, the increase for 2010 is given by multiplying the 12.4 percent tax rate (employer and employee combined—10.60 percent for OASI and 1.80 percent for DI) by 1.0098—the rate of increase from 2007 to 2008—to arrive at a rate of 10.70 percent for OASI and 1.82 percent for DI. By 2050 the cumulative index is 1.863, and the tax rates (employer and employee combined) are 19.75 percent for OASI and 3.35 percent for DI.

This provision as specified has not been scored by OCACT. Using the overlapping cohort mode of SSASIM and specifications that mimic the intermediate assumptions of the 2005 trustees' report, we estimated this provision as increasing the size of the long-range OASDI actuarial balance by 6.98 percent of taxable payroll.

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<sup>65</sup> The aged dependency ratio is 0.204 and 0.206 under the intermediate assumptions of the 2005 Trustees' report for 2007 and 2008, respectively.

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Scaling to Achieve Comparable Levels of Solvency over 75 Years

We modified the aforementioned CPI, mortality, and dependency indexes to “scale” them to achieve comparable levels of solvency over a 75-year period—the same actuarial period used by OCACT in trustees’ reports and solvency memorandums.<sup>66</sup> To scale the proposals, we modified the PIAs (or OASI and DI tax rates in the case of the aged dependency ratio tax increase index) by a scaled factor equal to the inverse of the percentage of solvency attained by the original, unscaled version of the proposal. For each year in the 75-year period, the scaling factor is multiplied by the percentage point difference between the unscaled PIA factors and the factors prior to implementation of the proposal (i.e., 90, 32, and 15).<sup>67</sup> The application of the so-called scaling factor to the PIA factors (or OASDI tax rates) conveniently modifies the index in such a way that 75-year actuarial balance is 0.<sup>68</sup>

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<sup>66</sup> Though we do not present SSASIM or GEMINI results for the progressive CPI index, we also scaled this proposal. For an OCACT scoring of this proposal, which was the basis of our SSASIM OLC estimates for the scaled and unscaled versions presented in the report, see provision B7 of the August 10, 2005 OCACT memo at <http://www.ssab.gov/documents/advisoryboardmemo--2005tr--08102005.pdf>. To scale this scenario, we consulted with OCACT and only scaled the third and fourth PIA formula factors, as these were the only factors reduced in the original provision. This effectively sped up the rate of indexing so that the benefit reductions were faster than pure price indexing across generations of steady maximum earners. Additionally, we had to slightly raise the scaling value for this scenario because the third and fourth formula factors would need to have been of a negative value beginning in 2065. However, we censored negative values at zero and raised the scaling factor by one percentage point to achieve a 75-year actuarial balance of 0 for the scaled version of progressive CPI index.

<sup>67</sup> In the case of the aged dependency ratio tax increase index, the increase from the initial OASI and DI tax rates is multiplied by the scaling factor—again, represented by the inverse of the percentage of solvency attained by the index.

<sup>68</sup> Despite a similar 75-year actuarial balance across the indexes studied, each index may have a unique balance in the 75th year because of the unique timing of the benefit reductions (or tax increases) of each index.

**Table 4: Application of So-called Scaling of PIA Factors for Aged Dependency Ratio Benefit Reduction Index: An Example Using 2050 PIA Formula Factors**

Step	Description	PIA formula factor or calculation	PIA formula factor or calculation	PIA formula factor or calculation
1	PIA formula factors in 2009	90.0	32.0	15.0
2	PIA formula factors in 2050	48.3	17.2	8.1
3	Difference between factors in 2050 and initial factors (i.e., the factors in 2009 or prior)	41.7	14.8	6.9
4	Scaling factor <sup>a</sup>	.508	.508	.508
5	Difference multiplied by scaling factor (i.e., step 3 * step 4)	21.2	7.5	3.5
6	New, so-called “scaled” PIA formula factors (i.e., step 1–step 5)	68.8	24.5	11.5

Source: GAO.

<sup>a</sup>The aged dependency benefit reduction index increases the 75-year OASDI actuarial balance by 3.78 percent of taxable payroll. This is 196.9 percent of 1.92 percent of taxable payroll, which is the amount required to produce a 75-year actuarial balance of 0 under the intermediate assumptions of the 2005 trustees’ report. The inverse (i.e., 1/x) of 196.9 percent is 50.8 percent.

## Data Reliability

To assess the reliability of simulated data from GEMINI, we reviewed PSG’s published validation checks, examined the data for reasonableness and consistency, performed sensitivity analysis, and compared our solvency estimates, where applicable, with published results from the actuaries at the Social Security Administration.

PSG has published a number of validation checks of its simulated life histories. For example, simulated life expectancy is compared with projections from the Social Security trustees; simulated benefits at age 62 are compared with administrative data from SSA; and simulated educational attainment, labor force participation rates, and job tenure are compared with values from the Current Population Survey. We found that simulated statistics for the life histories were reasonably close to the validation targets.

For sensitivity analysis, we simulated benefits and taxes for policy scenarios under a number of alternative specifications, including limiting the sample to those who survive to retirement. Our findings were consistent across all specifications.



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## Benchmark Policy Scenarios

According to current projections of the Social Security trustees for the next 75 years, revenues will not be adequate to pay full benefits as defined by the current benefit formula. Therefore, estimating future Social Security benefits should reflect that actuarial deficit and account for the fact that some combination of benefit reductions and revenue increases will be necessary to restore long-term solvency.

To illustrate a full range of possible outcomes, we developed hypothetical benchmark policy scenarios that would achieve 75-year solvency either by only increasing payroll taxes or by only reducing benefits.<sup>69</sup> In developing these benchmarks, we identified criteria to use to guide their design and selection. Our tax-increase-only benchmark simulates “promised benefits,” or those benefits promised by the current benefit formula, while our benefit-reduction-only benchmarks simulate “funded benefits,” or those benefits for which currently scheduled revenues are projected to be sufficient. Under the latter policy scenarios, the benefit reductions would be phased in between 2010 and 2040 to strike a balance between the size of the incremental reductions each year and the size of the ultimate reduction.

SSA actuaries scored our original 2001 benchmark policies and determined the parameters for each that would achieve 75-year solvency.<sup>70</sup> Table 5 summarizes our benchmark policy scenarios. For our benefit reduction scenarios, the actuaries determined these parameters assuming that disabled and survivor benefits would be reduced on the same basis as retired worker and dependent benefits. If disabled and survivor benefits were not reduced at all, reductions in other benefits would be greater than shown in this analysis.

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<sup>69</sup>These benchmarks were first developed for our report [GAO-02-62](#). We have since used them in other studies, including [GAO-03-310](#); GAO, *Social Security Reform: Analysis of a Trust Fund Exhaustion Scenario*, [GAO-03-907](#) (Washington, D.C.: July 29, 2003); GAO, *Social Security and Minorities: Earnings, Disability Incidence, and Mortality Are Key Factors That Influence Taxes Paid and Benefits Received* [GAO-03-387](#) (Washington, D.C.: Apr. 23, 2003); and [GAO-04-747](#).

<sup>70</sup>The Social Security actuaries provided these scorings for a previous report and used assumptions from the 2001 trustees’ report. The actuaries did not believe it was necessary to provide new scorings using updated assumptions for the purposes of our study, since the assumptions and the estimates of actuarial balance on which they are based have changed little from the 2001 report. In particular, they did not believe that the differences in assumptions would materially affect the shape of the distribution of benefits, which is the focus of our analysis. All estimates related to the indexing scenarios and benchmark policy scenarios were simulated using the SSASIM OLC mode.

**Table 5: Summary of Benchmark Policy Scenarios**

Benchmark policy scenario	Description	Phase-in period	Ultimate new benefit reductions <sup>a</sup> (percent)
Tax increase only (promised benefits)	Increases payroll taxes in 2006 by amount necessary to achieve 75-year solvency (0.98 percent of payroll each for employees and employers)	Immediate	0
Proportional benefit reduction (funded benefits)	Reduces benefit formula factors proportionally across all earnings levels	2010-2040	25

Source: GAO.

<sup>a</sup>These benefit reduction amounts do not reflect the implicit reductions resulting from the gradual increase in the full retirement age that has already been enacted.

**Criteria**

According to our analysis, appropriate benchmark policies should ideally be evaluated against the following criteria:

1. *Distributional neutrality*: The benchmark should reflect the current system as closely as possible while still restoring solvency. In particular, it should try to reflect the goals and effects of the current system with respect to redistribution of income. However, there are many possible ways to interpret what this means, such as
  - a. producing a distribution of benefit levels with a shape similar to the distribution under the current benefit formula (as measured by coefficients of variation, skewness, kurtosis, and so forth),
  - b. maintaining a proportional level of income transfers in dollars,
  - c. maintaining proportional replacement rates, and
  - d. maintaining proportional rates of return.
  
2. *Demarcating upper and lower bounds*: These would be the bounds within which the effects of alternative proposals would fall. For example, one benchmark would reflect restoring solvency solely by increasing payroll taxes and therefore maximizing benefit levels, while another would solely reduce benefits and therefore minimize payroll tax rates.

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3. *Ability to model:* The benchmark should lend itself to being modeled within the GEMINI model.
  4. *Plausibility:* The benchmark should serve as a reasonable alternative within the current debate; otherwise, the benchmark could be perceived as an invalid basis for comparison.
  5. *Transparency:* The benchmark should be readily explainable to the reader.

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**Tax-Increase-Only, or  
“Promised Benefits,”  
Benchmark Policies**

Our tax-increase-only benchmark would raise payroll taxes once and immediately by the amount of Social Security’s actuarial deficit as a percentage of payroll. It results in the smallest ultimate tax rate of those we considered and spreads the tax burden most evenly across generations; this is the primary basis for our selection. The later that taxes are increased, the higher the ultimate tax rate needed to achieve solvency, and in turn the higher the tax burden on later taxpayers and lower on earlier taxpayers. Still, any policy scenario that achieves 75-year solvency only by increasing revenues would have the same effect on the adequacy of future benefits in that promised benefits would not be reduced. Nevertheless, alternative approaches to increasing revenues could have very different effects on individual equity.

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**Benefit-Reduction-Only, or  
“Funded Benefits,”  
Benchmark Policies**

We developed alternative benefit reduction benchmarks for our analysis. For ease of modeling, all benefit reduction benchmarks take the form of reductions in the benefit formula factors; they differ in the relative size of those reductions across the three factors, which are 90, 32, and 15 percent under the current formula. Each benchmark has three dimensions of specification: scope, phase-in period, and the factor changes themselves.

**Scope**

For our analysis, we apply benefit reductions in our benchmarks very generally to all types of benefits, including disability and survivors’ benefits as well as old-age benefits. Our objective is to find policies that achieve solvency while reflecting the distributional effects of the current program as closely as possible. Therefore, it would not be appropriate to reduce some benefits and not others. If disabled and survivor benefits were not reduced at all, reductions in other benefits would be deeper than shown in this analysis.

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Phase-in Period

We selected a phase-in period that begins with those becoming initially entitled in 2010 and continues for 30 years. We chose this phase-in period to achieve a balance between two competing objectives: (1) minimizing the size of the ultimate benefit reduction and (2) minimizing the size of each year's incremental reduction to avoid "notches," or unduly large incremental reductions. Notches create marked inequities between beneficiaries close in age to each other. Later birth cohorts are generally agreed to experience lower rates of return on their contributions already under the current system. Therefore, minimizing the size of the ultimate benefit reduction would also minimize further reductions in rates of return for later cohorts. The smaller each year's reduction, the longer it will take for benefit reductions to achieve solvency, and in turn the greater the eventual reductions will have to be. However, the smallest possible ultimate reduction would be achieved by reducing benefits immediately for all new retirees by 13 percent; this would create a notch.

In addition, we feel it is appropriate to delay the first year of the benefit reductions for a few years because those within a few years of retirement would not have adequate time to adjust their retirement planning if the reductions applied immediately. The Maintain Tax Rates (MTR) benchmark in the 1994-1996 Advisory Council report also provided for a similar delay.<sup>71</sup>

Finally, the timing of any policy changes in a benchmark scenario should be consistent with the proposals against which the benchmark is compared. The analysis of any proposal assumes that the proposal is enacted, usually within a few years. Consistency requires that any benchmark also assumes enactment of the benchmark policy in the same time frame. Some analysts have suggested using a benchmark scenario in which Congress does not act at all and the trust funds become exhausted.<sup>72</sup> However, such a benchmark assumes that no action is taken while the proposals against which it is compared assume that action is taken, which is inconsistent. It also seems unlikely that a policy enacted over the next few years would wait to reduce benefits until the trust funds are exhausted; such a policy would result in a sudden, large benefit reduction and create substantial inequities across generations.

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<sup>71</sup>Advisory Council on Social Security. *Report of the 1994-1996 Advisory Council on Social Security*, Vols. 1 and 2. Washington, D.C.: Jan. 1997.

<sup>72</sup>See [GAO-03-907](#), in which we analyzed such a policy scenario under a congressional request.

Defining the PIA Formula Factor Reductions

When workers retire, become disabled, or die, Social Security uses their lifetime earnings records to determine each worker’s PIA, on which the initial benefit and auxiliary benefits are based. The PIA is the result of two elements—the Average Indexed Monthly Earnings (AIME) and the benefit formula. The AIME is determined by taking the lifetime earnings record, indexing it, and taking the average of the highest 35 years of indexed wages.<sup>73</sup> To determine the PIA, the AIME is then applied to a step-like formula, shown here for 2006.

$$\begin{aligned}
 \text{PIA} = & 90\% \cdot (\text{AIME}_1 \leq \$656) \\
 & + 32\% \cdot (\text{AIME}_2 > \$656 \text{ and } \leq \$3955) \\
 & + 15\% \cdot (\text{AIME}_3 > \$3955)
 \end{aligned}$$

where  $\text{AIME}_i$  is the applicable portion of AIME.

All of our benefit-reduction benchmarks are variations of changes in PIA formula factors.

**Proportional reduction:** Each formula factor is reduced annually by subtracting a constant proportion of that factor’s value under current law, resulting in a constant percentage reduction of currently promised benefits for everyone. That is,

$$F^i_{t+1} = F^i_t - (F^i_{2006} \cdot x)$$

where

$F^i_t$  represents the three PIA formula factors in year t and

$x$  = constant proportional formula factor reduction.

The value of  $x$  is calculated to achieve 75-year solvency, given the chosen phase-in period and scope of reductions.

<sup>73</sup> The highest 35 years of salary are used in the calculation of a retired worker benefit. The disabled worker benefit is calculated using the number of years between the age of entitlement and age 21, divided by 5.

The formula for this reduction specifies that the proportional reduction is always taken as a proportion of the current law factors rather than the factors for each preceding year. This maintains a constant rate of benefit reduction from year to year. In contrast, taking the reduction as a proportion of each preceding year's factors implies a decelerating of the benefit reduction over time because each preceding year's factors gets smaller with each reduction. To achieve the same level of 75-year solvency, this would require a greater proportional reduction in earlier years because of the smaller reductions in later years.

The proportional reduction hits lower earners harder than higher earners because the constant x percent of the higher formula factors results in a larger percentage reduction over the lower earnings segments of the formula. For example, in a year when the cumulative size of the proportional reduction has reached 10 percent, the 90 percent factor would then have been reduced by 9 percentage points, the 32 percent factor by 3.2 percentage points, and the 15 percent factor by 1.5 percentage points. As a result, earnings in the first segment of the benefit formula would be replaced at 9 percentage points less than the current formula, while earnings in the third segment of the formula would be replaced at only 1.5 percentage points less than the current formula.<sup>74</sup>

Table 6 summarizes the features of our benchmarks.

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<sup>74</sup>Other analyses have addressed the concern about the effect of the proportional reduction on low earners by modifying that offset to apply only to the 32 and 15 percent formula factors. The MTR policy in the 1994 to 1996 Advisory Council report used this approach, which in turn was based on the individual account (IA) proposal in that report. However, the MTR policy also reflected other changes in addition to PIA formula changes.

**Table 6: Summary of Benchmark Policy Scenario Parameters**

Benchmark policy scenario	Phase-in period	Annual PIA factor reduction (percentage point)			Ultimate PIA factor (2040) (percent)		
		90 percent factor	32 percent factor	15 percent factor	90 percent factor	32 percent factor	15 percent factor
Tax increase only (promised benefits)	2006	0	00	0	90.00	32.00	15.00
Proportional benefit reduction (funded benefits)	2010-2040	0.74	0.26	0.12	67.07	23.85	11.18

Source: GAO's analysis as scored by SSA actuaries.

Note: Annual PIA factor reductions rounded to the nearest hundredth of a percent.

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# Appendix II: Background on Development of Social Security's Indexing Approach

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Social Security did not originally use indexing to automatically adjust benefit and tax provisions; only ad hoc changes were made. The 1972 amendments provided for automatic indexing of benefits and taxes for the first time, but the indexing approach for benefits was flawed, introducing potential instability in benefit costs. The 1977 amendments addressed those issues, resulting in the basic framework for indexing benefits still in use today.

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## Program Did Not Use Indexing until 1970s

Before the 1970s, the Social Security program did not use indexing to adjust benefits or taxes automatically. For both new and existing beneficiaries, benefit rates increased only when Congress voted to raise them. The same was true for the tax rate and the cap on the amount of workers' earnings that were subject to the payroll tax. Under the 1972 amendments to the Social Security Act, benefits and taxes were indexed for the first time, and revisions in the 1977 amendments created the basic framework still in use today.

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## Ad Hoc Benefit and Tax Changes Had Sporadic Effects

Until 1950, Congress legislated no changes to the benefit formula of any kind. As a result, average inflation-adjusted benefits for retired workers fell by 32 percent between 1940 and 1949. Under the 1950 amendments to the Social Security Act, these benefits increased 67 percent in 1 year. Afterward, until 1972, periodic amendments made various ad hoc adjustments to benefit levels. Economic prosperity and regular trust fund surpluses facilitated gradual growth of benefit levels through these ad hoc adjustments.<sup>75</sup> In light of the steady growth of benefit levels, the 1972 amendments instituted automatic adjustments to constrain the growth of benefits as well as to ensure that they kept pace with inflation. Table 7 summarizes the history of benefit increases before 1972. It illustrates that between 1940 and 1971, average benefits for all current beneficiaries tripled while prices nearly doubled and wages more than quintupled.<sup>76</sup> Some benefit increases were faster and some were slower than wages increases.

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<sup>75</sup>Until the 1970s, trust fund projections were routinely exceeded at least in part as a result of actuarial methods that assumed no growth in average earnings.

<sup>76</sup>These estimates of average benefit increases include both existing and initial benefits.



**Appendix II: Background on Development of  
Social Security's Indexing Approach**

**Table 7: Percentage Increases in OASI Benefits, Prices, and Wages, by Effective Date of OASI Change, 1950-1971**

Date of change <sup>a</sup>	Increase in OASI benefit		Increase in consumer price index		Increase in average wages	
	Since prior amendment <sup>b</sup>	Since January 1940	Since prior amendment	Since January 1940	Since prior amendment	Since January 1940
September 1950	81.3 <sup>c</sup>	81.3	75.5 <sup>c</sup>	75.5	148.8 <sup>c</sup>	148.8
September 1952	14.1	106.9	9.3	91.8	12.5	179.9
September 1954	13.3	134.3	0.5	92.8	7.7	201.5
January 1959 (1958)	7.7	152.4	7.9	108.0	19.4	259.9
January 1965	7.7	171.9	7.9	124.5	22.3	340.2
February 1968 (1967)	14.2	210.5	9.3	145.4	18.0	419.4
January 1970 (1969)	15.6	258.9	10.8	171.8	12.2	482.8
January 1971	10.4	296.2	5.2	185.9	5.3	513.7

Source: Martha Derthick, *Policymaking for Social Security*, The Brookings Institution, Washington, D.C., 1979, p. 276. Reprinted with permission of the Brookings Institution Press, and GAO analysis.

<sup>a</sup>Year of enactment, if different from year in which change took effect, is in parentheses.

<sup>b</sup>Average increases for current beneficiaries, that is, people who were on the rolls. At the same time, increases approximately equal to these were promised by statutory formula, to active workers.

<sup>c</sup>Percentage increase since January 1940, when OASI benefits were first paid.

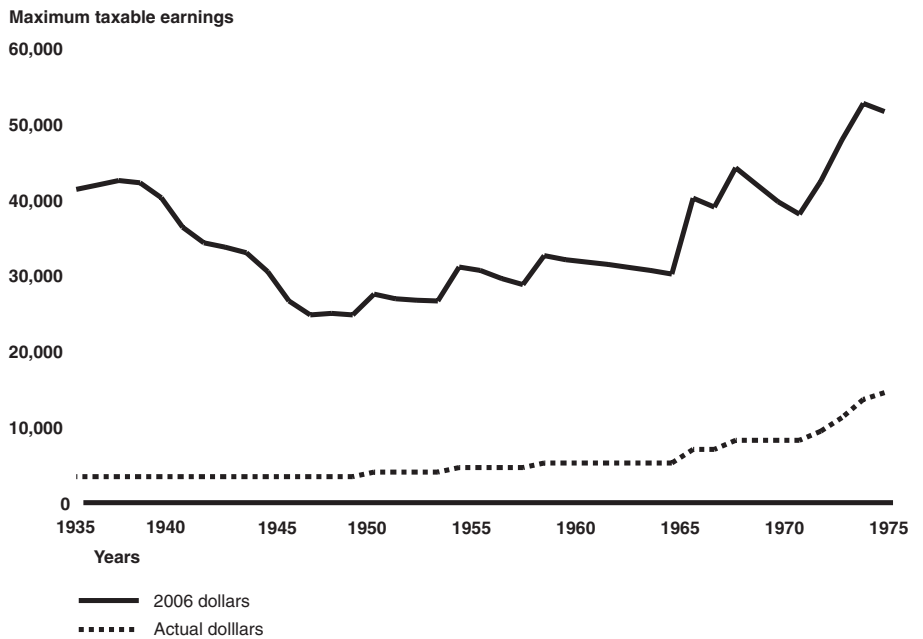
On the revenue side, payroll tax rates have never been indexed. However, Social Security's revenue also depends on the maximum amount of workers' earnings that are subject to the payroll tax. This cap is technically known as the contribution and benefit base because it limits the earnings level used to compute benefits as well as taxes.<sup>77</sup> Just as with benefits, the maximum taxable earnings level did not change until the 1950 amendments even as price and earning levels were increasing. From 1940 to 1950, the inflation-adjusted value of the cap fell by over 40 percent. Also, until the 1972 amendments, adjustments to the maximum taxable earnings level were made on an ad hoc basis. With the enactment of the 1972 amendments, the maximum taxable earnings level increased automatically based on increases in average earnings. Figure 9 shows the inflation-adjusted values for the maximum taxable earnings level before automatic adjustments took effect in 1975.<sup>78</sup> Figure 10 shows that as a

<sup>77</sup>The contribution and benefit base reflects the program's role of only providing for a floor of protection.

<sup>78</sup>In 2006, the maximum taxable earnings cap is set at \$94,200.

result of the fluctuations in the maximum taxable earnings level, the proportion of earnings subject to the payroll tax varied widely before indexing, ranging from 71 to 93 percent.

**Figure 9: Inflation-Adjusted Values of the Maximum Taxable Earnings Level before Automatic Adjustments, 1937-1975**



Source: SSA, and GAO analysis.

Note: The maximum taxable earnings level is the level at which earnings are subject to the payroll tax.

Figure 10: Percentage of Total Covered Earnings below Social Security's Maximum Taxable Earnings Level, 1937-2005



Source: SSA.

## Indexing in 1972 Amendments Built on Previous Ad Hoc Benefit Increases

The 1972 amendments, in effect, provided for indexing initial benefits twice for new beneficiaries. The indexing changed the benefit formula in the same way that previous ad hoc increases had done.

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## Approach Used for Ad Hoc Benefit Increases

Before the 1972 amendments, benefits were computed essentially by applying different replacement factors to different portions of a worker's earnings. For example, under the 1958 amendments, a workers' PIA<sup>79</sup> would equal

58.85 percent of first \$110 of average monthly wages plus  
21.40 percent of next \$290,

where the 58.85 and 21.40 percents are the replacement factors that determine how much of a worker's earnings will be replaced by the Social Security benefit.<sup>80</sup> Subsequent amendments increased benefits by effectively increasing the replacement factors. For example, the 1965 amendments increased benefits by 7 percent for a given average monthly wage by increasing the replacement factors by 7 percent to 62.97 from 58.85 and to 22.9 percent from 21.4.<sup>81</sup> The automatic adjustments under the 1972 amendments increased these same replacement factors according to changes in the CPI. These changes in the benefit computation applied equally to both new and existing beneficiaries.<sup>82</sup>

To illustrate how the benefit formula worked, take, for example, a worker with an average monthly wage of \$200 who became entitled in 1959 (when the 1958 amendments first took effect). The PIA for this worker would be

58.85 percent of \$110 plus  
21.4 percent of the average monthly wage over \$110,  
that is,  $\$200 - \$110 = \$90$ , which equals  
 $\$64.74 + \$19.26 = \$84.00$ .

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<sup>79</sup> The PIA is the monthly amount payable to a retired worker who begins to receive benefits at normal retirement age or (generally) to a disabled worker. This is also the amount used as a base for computing all types of benefits payable on the basis of one individual's earnings record.

<sup>80</sup> The declining replacement factors for higher levels of earnings made the formula progressive.

<sup>81</sup> When the maximum taxable earnings level increased, a new replacement factor would be applied to the newly covered portion of earnings. For example, the 1965 amendments increased the maximum taxable earnings from \$4,800 to \$6,600. Accordingly, the benefit formula added a new component, with a replacement factor of 21.4 percent for the next \$150 of average monthly wages.

<sup>82</sup> The fact that benefits were changed for both new and current beneficiaries using the same computations came to be known as "coupling" of benefit increases.

When the 1965 amendments took effect, this same beneficiary would have the PIA recalculated using the new formula. Assuming no new wages, the average monthly wage would still be \$200, and the new PIA would be

62.97 percent of \$110 plus  
22.9 percent of the average monthly wage over \$110,  
that is,  $\$200 - \$110 = \$90$ , which equals  
 $\$69.27 + \$20.61 = \$89.88$ ,  
which is 7 percent greater than the previous \$84.00.

Now consider the example of a new beneficiary, who became entitled in 1965 (when the 1965 amendments first became effective). For the purposes of this illustration, to reflect wage growth, assume this worker had an average monthly wage of \$240.00, or 20 percent more than our previous worker who became entitled in 1959. For this new beneficiary, the PIA in 1965 would be \$99.04, which, as a result of the wage growth, is much more than 7 percent higher than the initial benefit for the worker in 1959.

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## 1972 Amendments Introduced Indexing

The 1972 amendments provided for automatic indexing of benefits and taxes for the first time. The indexing approach for benefits was flawed and raised issues that the 1977 amendments addressed; these issues help explain the basic framework for indexing benefits still in use today. In particular, the indexing approach in the 1972 amendments resulted in (1) double-indexing benefits to inflation for new beneficiaries though not for existing ones and (2) a form of bracket creep that slowed benefit growth as earnings increased over time. Within a few years, the problems raised by the double indexing under the 1972 amendments became apparent, with benefits growing far faster than anticipated.

Under the 1972 amendments, indexing the replacement factors in the benefit formula to inflation had the effect of indexing twice for new beneficiaries. First, the increase in the replacement factors themselves reflected changes in the price level. Second, the benefit calculations were based on earnings levels, which were higher for each new group of beneficiaries, partially as a result of inflation.<sup>83</sup> Thus, benefit levels grew

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<sup>83</sup>Part of the growth in wages reflects inflation. Wage growth makes the average monthly earnings for a new year's group of beneficiaries higher on average than for the previous year's group.

for each new year's group of beneficiaries because both the benefit formula reflected inflation and their higher average wages reflected inflation. For existing beneficiaries who had stopped working, the average earnings used to compute their benefits did not change, so growth in earnings levels did not affect their benefits and double indexing did not occur. Once the double indexing for new beneficiaries was understood, the need became clear to index benefits differently for new and existing beneficiaries, which was referred to as "decoupling" benefits.

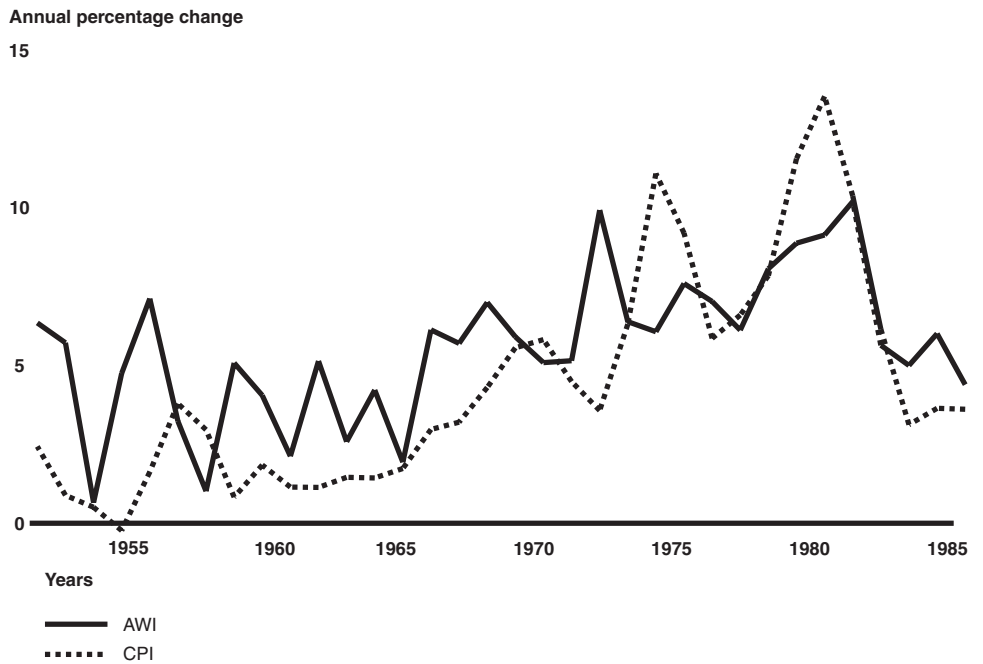
The effect of double indexing on replacement rates could be offset by a type of "bracket creep" in the benefit formula, depending on the relative values of wage and price growth over time. Bracket creep resulted from the progressive benefit formula, which provided lower replacement rates for higher earners than for lower earners. As each year passed and average earnings of new beneficiaries grew, more and more earnings would be replaced at the lower rate used for the upper bracket, making replacement rates fall on average, all else being equal.

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## Indexing Approach Introduced Potential Instability in Benefit Costs

The combination of double indexing and bracket creep implied in the 1972 amendments introduced a potential instability in Social Security benefit costs. Price growth determined the effects of double indexing, and wage growth determined the effects of bracket creep. The extent to which bracket creep offset the effects of double indexing depended on the relative values of price growth and wage growth, which could vary considerably. Had wage and price growth followed the historical pattern at the time, benefits would not have grown faster than expected and replacement rates would not have risen; the inflation effect and the bracket creep effect would have balanced out. However, during the 1970s, actual rates of inflation and earnings growth diverged markedly from past experience (see fig. 11), with the result that benefit costs grew far faster than revenues.

**Figure 11: Changes in Average Wage Index and Consumer Price Index, 1951-1985**



Source: SSA and US Bureau of Labor Statistics.

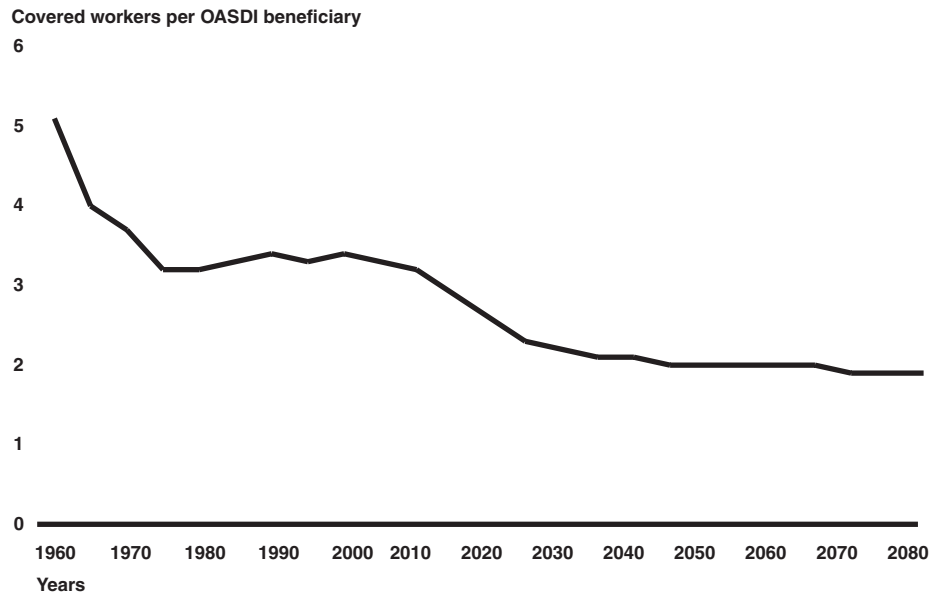
In contrast, an indexing approach that stabilized replacement rates would help to stabilize program costs. To illustrate this, annual benefit costs can be expressed as a fraction of the total taxable payroll in a given year, that is, total covered earnings.<sup>84</sup> In turn, this can be shown to relate closely to replacement rates.

$$\begin{aligned} & \frac{\text{Total benefits}}{\text{Total covered earnings}} \\ &= \frac{\text{Number of beneficiaries} \times \text{Average benefit}}{\text{Number of workers} \times \text{Average taxable earnings}} \\ &= \frac{\text{Number of beneficiaries}}{\text{Number of workers}} \times \frac{\text{Average benefit}}{\text{Average taxable earnings}} \end{aligned}$$

<sup>84</sup> In a pay-as-you-go system, the payroll tax would equal annual benefit costs as a percentage of payroll.

While not precisely a replacement rate, the second term on the last line above—the ratio of the average benefit to average taxable earnings—is closely related to the replacement rates provided under the program. While replacement rates are now relatively stable after the 1977 amendments, it is the first term on the last line above—the ratio of beneficiaries to workers—that has been increasing and placing strains on the system's finances. The inverse of this is the ratio of covered workers to beneficiaries. While 3.3 workers support each Social Security beneficiary today, only 2 workers are expected to be supporting each beneficiary by 2040. (See fig. 12.)

**Figure 12: Social Security Workers per Beneficiary**



Source: SSA.

Note: This is based on the intermediate assumptions of the 2006 Social Security trustees' report.



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