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# ISSUE BRIEF

AMERICAN ACADEMY *of* ACTUARIES

## An Actuarial Perspective on the 2005 Social Security Trustees Report

Each year, the Board of Trustees of the Old-Age, Survivors, and Disability Insurance (“Social Security”) Trust Funds reports on the program’s financial condition. The trustees’ report is generally about 200 pages of text and tables that present in great detail the trustees’ assessment of the financial condition of Social Security over the next 75 years. The trustees also present additional measures of the financial status of Social Security beyond the traditional 75-year projection period, as well as a broader discussion of the uncertainty surrounding all such projections.

This issue brief provides an actuarial perspective on the most recent report, together with sufficient background material for readers to obtain a good understanding of (1) what the trustees are saying about the future financial condition of Social Security and (2) the limitations of the trustees’ assessment. The debate over Social Security’s financial condition has raised many important questions. The American Academy of Actuaries, a nonpartisan professional association of actuaries from all practice areas in the United States, offers this issue brief to address some of the questions that have been raised.

### Key Findings from the 2005 Trustees’ Report

The trustees’ report shows financial projections based on three sets of assumptions. The projections based on the intermediate assumptions are the trustees’ best estimate. Those projections show the following:

- **Key Dates:**

- In 2017, benefits and administrative expenses are first expected to exceed tax income; to continue full payment of scheduled benefits, the program would have to begin drawing upon trust fund assets, although initially it would be sufficient to draw only on current interest income.

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- In 2027, the amount needed to continue full payment of benefits and administrative expenses is expected to exceed tax receipts plus interest on the assets, thus requiring redemption of securities held in the trust funds and drawing down the dollar level of trust fund assets.

- In 2041, the Social Security trust funds are expected to become exhausted—that is, all accumulated assets are used up—and tax income alone would not be sufficient to pay benefits in full.

- These key dates are each one year earlier than the corresponding dates in the 2004 trustees' report, although such small changes do not indicate a substantial change in the financial status of Social Security. In fact, these dates are identical with the corresponding dates projected for the 2002 report.

- **Actuarial Balance:** An actuarial deficit (negative actuarial balance) of 1.92 percent of taxable payroll is projected for the long-range 75-year period, 2005-79. This represents the net difference between a summarized income rate of 13.87 and a summarized cost rate of 15.79, both expressed as a percent of taxable payroll. Social Security is said to be out of close actuarial balance over that period because the actuarial deficit is more than 5 percent of the summarized cost rate. In 2041, when the trust funds are expected to become exhausted, tax revenues are projected to cover only 74 percent of costs.
- **Magnitude of Changes Required:** Social Security has a long-range actuarial deficit of 1.92 percent of taxable payroll. In other words, if action were taken this year, long-range actuarial balance could be achieved if the combined employee-employer payroll-tax rate, currently 12.40 percent, were increased immediately by 1.92 percentage points to 14.32 percent. Long-range actuarial balance could also be achieved with an immediate across-the-board benefit cut of about 13 percent for all current and future recipients.

Of course, nobody is proposing to cut benefits immediately, especially not for current beneficiaries, but to the extent the effective date is delayed, the greater the magnitude of the required changes. On the other hand, if the changes themselves were targeted to occur at some future date, like 2017 or 2041, then the magnitude of the required changes would be the same, regardless of when legislation is enacted into law.

- **Sustainability:** Immediate one-time changes, such as the 13 percent across-the-board cut discussed above, could restore solvency for the next 75 years. However, at the end of the 75-year period, a substantial imbalance would again exist. Changes that match, year-by-year, revenues and benefits more closely can restore solvency beyond the 75-year time horizon. This approach would meet the criteria for “sustainable solvency” (i.e., positive trust funds as a percent of the annual cost of the program through 2079 that are stable or rising at the end of the period).
- **Cost vs. GDP:** The cost of Social Security (total scheduled benefits plus expenses) rises from 4.3 percent of the gross domestic product (GDP) in 2005 to about 6.4 percent by the end of the 75-year projection period. Even though the projected date of exhaustion for Social Security's trust funds remains over three decades in the future, Social Security still faces long-term financial problems. This conclusion is consistent with those reached in reports from the past 10 years. While insolvency is not imminent, the program will have long-range financial shortfalls under the trustees' best-estimate assumptions. The fundamental demographic forces that are expected to cause long-term financial problems for Social Security have not changed.

## Measures of Unfunded Obligations

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Social Security's long-term unfunded obligations may be expressed in several ways. One way is to place a dollar value on the excess, on a present-value basis, of future cost (primarily scheduled benefit payments) over the current trust funds' balance plus future income (primarily payroll taxes). Because of the size of the Social Security system and the long-term nature of its obligations, these unfunded obligation figures are very large, in the trillions of dollars, which can make it difficult for the public to readily assess the true solvency of the system. A better way is to express the unfunded obligations as a percentage of the present value of future taxable payroll. This percentage represents how much the employer-employee tax rate, currently 12.4 percent of taxable payroll, would need to be raised to eliminate Social Security's long-term deficit. The unfunded obligations may also be expressed as a percentage of the GDP of the nation's economic output. While putting the unfunded obligations in this context does not make Social Security's long-term problems any less serious, it gives the public a better idea of the magnitude of the steps that need to be taken to solve them.

### **Open-Group Basis Over 75 Years**

Social Security is funded on a modified pay-as-you-go basis. This means the benefits of a given generation of workers are paid primarily by taxes levied on succeeding generations of workers. This makes it appropriate to measure Social Security's unfunded obligation on an "open-group" basis, which includes the taxes and benefits of workers expected to enter the system in the future. Since workers receive benefits after they pay taxes, excluding future new entrants would ultimately lead to a situation where the valuation includes workers receiving benefits, but not the active workers paying for those benefits. The result would not be an appropriate measure of Social Security's unfunded obligation.

Traditionally, Social Security's unfunded obligation has been measured over a 75-year valuation period. This period was chosen because it includes the entire future lifetimes of nearly all current participants. The trustees report that the system's unfunded obligation over the next 75 years is \$4.0 trillion in discounted present value. This unfunded obligation represents 1.8 percent of taxable payroll, and 0.6 percent of GDP over the valuation period. Although the dollar amount of this unfunded obligation is \$0.3 trillion higher than shown in the 2004 report, this growth is essentially due entirely to (1) adding the additional deficit year 2079 to the valuation period, and (2) changing the date to which all future amounts are discounted, the valuation date, from January 1, 2004 to January 1, 2005. The measures for this 75-year unfunded obligation relative to taxable payroll and GDP are unchanged from the corresponding figures shown in the 2004 report.

### **Open-Group Basis with Infinite Time Horizon**

The trustees also report the system's unfunded obligation on an open-group basis with an infinite time horizon. At first glance, calculating Social Security's obligation over the infinite future provides a fuller picture of the future shortfall; plus this measure eliminates the issue of adding an additional year of financial shortfall with each new report. This does not mean the unfunded obligation on an infinite-future basis will not increase on a dollar basis. In fact, it is expected to increase each year with the full annual interest rate; but because the present value of taxable payroll and GDP also increase with interest each year, the unfunded obligation as a percentage of taxable payroll and GDP is expected to remain relatively stable. Many observers question the reliability or usefulness of calculating Social Security's unfunded obligation over 75 years, given the uncertainty of economic and demographic trends over such a long period. Calculations over an infinite period are even less reliable. The resulting uncertainty limits the value of the infinite time horizon projection to policymakers.

The system's unfunded obligation on an infinite-future basis is \$11.1 trillion in present discounted value. This represents 3.5 percent of taxable payroll and 1.2 percent of GDP on the same infinite-future basis. In other words, an immediate increase in the payroll tax rate from 12.4 percent to 15.9 percent would be expected to eliminate Social Security's projected actuarial deficit for all time under the intermediate assumptions. The unfunded obligation on an infinite-future basis is nearly three times the 75-year deficit on a present-value dollar basis, but only about twice as high as a percentage of payroll or as a percentage of GDP. Again, while the present value dollar amount of this unfunded obligation has grown since the 2004 report due to the change in the valuation date, the relative measures for the size of this problem remain unchanged since last year.

### **Generational Breakdown of the Infinite-Horizon Unfunded Obligation**

The trustees also provide a breakdown of the infinite-horizon unfunded obligation into the components attributable to the taxes and benefits of (1) individuals age 15 or older on the valuation date (sometimes called the "closed-group" unfunded obligation) and (2) individuals under 15 and not yet born. The amounts are \$12.0 trillion and -\$0.9 trillion, respectively. The latter figure suggests that workers in the second group are projected not only to pay for their own benefits, but also to contribute \$0.9 trillion toward the benefits of current workers and retirees. However, this analysis is only appropriate for programs that are intended to be fully financed on an advance-funded basis. The generational breakdown is not appropriate for the current Social Security system, because the intention of the modified pay-as-you-go funding scheme is that benefits for current workers be paid for primarily by future generations of workers.

## **Changes Since the Previous Report**

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### **Changes in Benefit and Tax Provisions of the Law**

The trustees' report indicates that no legislative changes that would have a significant effect on Social Security's finances over the long term were enacted since last year's report.

### **Changes in the Projection Period**

As each year passes, the long-range 75-year projection period moves forward one year; that is, the first year from the previous year's projection period becomes part of the past, and a new 75th year is added at the end of the previous projection period. Thus, for the 2005 report, the year 2079 has been added to the projection period. Benefit payments and administrative expenses in that year are expected to exceed income by 5.70 percent of taxable payroll. Spread over the entire 75-year projection period (and combined with other, less significant "valuation period" effects) this increases the overall actuarial deficit by about 0.07 percent of taxable payroll.

### **Changes in Assumptions and Methods**

Because the trustees cannot know what the future will bring, they must make assumptions about economic and demographic factors that affect Social Security's financial condition. The nature of these assumptions and how they affect the results of the projections are discussed in detail in the Academy's issue brief, *Assumptions Used to Project Social Security's Financial Condition*.

Over the years, several independent panels of experts have evaluated the reasonableness of the trustees' assumptions. The last such panel to report was convened in 2003 under the auspices of the Social Security Advisory Board, a governmental body that advises the Commissioner of Social Security. The 2003 panel made recommendations for changes in a variety of assumptions. The recommended changes included in particular (1) a more rapid reduction in mortality rates (with a corresponding increase in life expectancy); (2) an increase in the assumed levels of net immigration; (3) modifications to projected labor force participation rates; (4) an increase in the assumed ultimate rate of increase in productivity, as well as minor changes to the linkages between productivity and the annual real wage differential (expected increases in the national average wage, adjusted for inflation) that would result in an increase in the ultimate annual real wage differential from 1.1 percentage points to 1.3 percentage points; and (5) a decrease in the assumed ultimate annual rate of increase in the consumer price index (CPI). In addition, the panel made suggestions for improving the models used to project future Social Security costs.

Such changes would have differing impacts on Social Security's financial position. For example, increases in life expectancy would raise program costs because people receive benefits longer; while increases in assumed net immigration would on the whole improve the program's financial status because of the immediate impact of net immigration in generating a larger labor force. Much later, however, there would be the offsetting costs of paying benefits to these workers when they retire. Increases in the ultimate real wage differential would strengthen program financing because the resulting increases in payroll taxes occur sooner than increases in benefit costs.

As in the past, the trustees are considering the recommendations of the 2003 panel, and will adopt those portions of the recommendations that, in the judgment of the trustees, are appropriate. One such change that was made for the 2004 report was a decision to reduce the ultimate assumed value for the annual rate of increase in the CPI from 3.0 percent to 2.8 percent. Independent of the 2003 panel recommendations, the trustees did make some minor adjustments to their intermediate assumptions for the current report reflecting recent revisions in population data from the Census Bureau, lower short-term real interest rates, and recent disability experience. In addition, the trustees' projections reflect the effects of several methodological improvements and updates of program data based on recent experience. All these assumption changes together, combined with incremental improvements in the projection methodology, decreased the actuarial deficit by about 0.03 percent of taxable payroll.

The net result of these changes in assumptions and methods and the change in the long-range valuation period, discussed above, is a small increase in the 75-year actuarial deficit, from 1.89 percent of taxable payroll in 2004 to 1.92 percent of taxable payroll in 2005.

## **Beyond Solvency**

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While 2041 is certainly important as the year when the combined Social Security trust funds are expected to exhaust their assets, another important milestone is expected in 2017. Until that year, tax revenue is expected to exceed benefit payments and administrative expenses. This excess currently is invested in special-issue government securities that are held by the trust funds. But Social Security's outgo will begin rising more rapidly than its tax income in 2009. Beginning in 2017, benefit payments and administrative expenses are expected to exceed tax revenue, largely due to the rapid increase in the number of baby boomers leaving the workforce and receiving benefits. Initially, interest on trust funds' securities will be sufficient to cover the shortfall, but beginning in 2027 securities in the trust funds will need to be redeemed to generate sufficient cash to pay benefits.

Unless Congress acts to reduce Social Security’s anticipated long-range deficit, all the government securities held by the trust funds must gradually be redeemed and converted to cash by 2041. The federal government could raise the large amounts of cash needed by selling comparable government securities to the public, by raising other taxes, or by reducing other expenditures. Over the years following 2017, the accumulating Social Security cash requirements could place a severe strain on the federal government’s finances. How the government raises the funds to redeem the government securities held in Social Security’s trust funds depends on many factors, such as the surplus/deficit situation for the rest of the federal government, the size and growth rate of the economy, and the attractiveness of U.S. government securities in the international financial market.

## Beyond the Best Estimate

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### Low-Cost and High-Cost Projections

Because of the inherent uncertainty of events occurring as long as 75 years into the future, for purposes of the annual report, the trustees make three projections based on three sets of assumptions: intermediate (best estimate), low-cost, and high-cost. The intermediate projection underlies the findings described above. The following table summarizes the ultimate, long-range value of some of the key economic and demographic assumptions under the intermediate, low-cost, and high-cost assumptions:

<b>Ultimate Value</b>	<b>Intermediate</b>	<b>Low-Cost</b>	<b>High-Cost</b>
Total fertility rate (children per woman)	1.95	2.2	1.7
Average annual reduction in age-sex-adjusted death rates from 2029 to 2079	0.71%	0.33%	1.23%
Annual net immigration	900,000	1,300,000	672,500
Period Life expectancy at birth in 2079 (in years) <sup>†</sup>			
Male	81.7	78.3	86.2
Female	85.2	82.2	89.3
<b>Annual change in:</b>			
Average wage in covered employment	3.9%	3.4%	4.4%
Consumer Price Index	2.8%	1.8%	3.8%
Real-wage differential	1.1%	1.6%	0.6%
Productivity (total U.S. economy)	1.6%	1.9%	1.3%
Annual labor force growth	0.2%	0.6%	-0.3%
Unemployment rate	5.5%	4.5%	6.5%
Annual interest rate on new treasury securities	5.8%	5.5%	6.0%

<sup>†</sup> The period life expectancy at age 0 represents the average number of years of life if a group of persons age 0 were to experience the mortality rates for that year over the course of their lives (i.e., if there were no future mortality improvement).

Under the low-cost assumptions, the trust funds remain solvent over the entire 75-year projection period. This result reflects a number of factors, including: an ultimate annual real-wage differential of 1.6 percentage points, versus 1.1 percentage points for the intermediate assumptions, and an average annual labor-force increase trending toward 0.6 percent, versus 0.2 percent for the intermediate assumptions. Other important differences between the intermediate and low-cost assumptions are the fertility rate (average number of children born to a woman in her lifetime), which rises to 2.2 in the low-cost set but declines to 1.95 in the intermediate set, and period life expectancy at birth, which is 78.3 years in 2079 in the low-cost set but 81.7 years in the intermediate set for males (and 82.2 year in the low-cost set and 85.2 years in the intermediate set for women).

Under the high-cost assumptions, the trust funds are exhausted in 2030, eleven years earlier than under the intermediate assumptions. Under this scenario, the annual real-wage differential settles at 0.6 percent, and the

labor force actually begins contracting by 0.3 percent annually late in the projection period. The fertility rate falls to 1.7, and the period life expectancy in 2079 rises to 86.2 years for men and 89.3 for women.

### Sensitivity Analysis

While the trustees consider the projections based on the intermediate assumptions to be their best estimate, they believe that the other assumption sets are within the range of reasonable expectation. And, of course, any combination of assumptions from the three sets also falls within this range. To facilitate analysis of other combinations of assumptions, the trustees also include in their report a “sensitivity analysis,” which examines the effects of changes in each of the major assumptions by considering the impact of changing each assumption in isolation from the intermediate level to the low-cost and high-cost level.

The trustees provide such analyses for eight different demographic, economic, and program-specific assumptions in a detailed appendix to the report. The following table summarizes the results for three particular key assumptions:

<b>Assumption</b>	<b>Intermediate</b>	<b>Low-Cost</b>	<b>High-Cost</b>
<b>Total fertility rate:</b>			
Ultimate assumption (children per woman)	1.95	2.2	1.7
75-year actuarial balance	-1.92%	-1.64%	-2.22%
Year of combined trust fund exhaustion	2041	2041	2041
<b>Reduction in death rates:</b>			
Average annual reduction in total age-sex adjusted death rates between 2004 and 2079	0.72%	0.30%	1.27%
75-year actuarial balance	-1.92%	-1.33%	-2.63%
Year of combined trust fund exhaustion	2041	2044	2038
<b>Real-wage differential:</b>			
Ultimate assumption (average wage increase minus 2.8% CPI increase)	1.1%	1.6%	0.6%
75-year actuarial balance	-1.92%	-1.39%	-2.45%
Year of combined trust fund exhaustion	2041	2047	2037

When the full set of assumptions are changed simultaneously, the resulting low-cost and high-cost projections would result in changing the negative actuarial balance from 1.92 percent to a positive balance of 0.38 percent and a negative balance of 4.96 percent respectively.

### Stochastic Analysis

It is not surprising that expert opinions differ about the best assumptions to use for projecting the future financial condition of Social Security. Some observers argue that the trustees’ intermediate assumptions are too pessimistic and thus overstate the program’s financial problems. These observers usually argue that the trustees’ assumptions about the performance of the economy are too pessimistic, because the trustees fail to take into account adjustments in productivity and labor-force participation rates that they believe are likely to occur as the population ages. Others argue that the intermediate assumptions understate the severity of Social Security’s financial problems. In particular, these observers often claim that the trustees are understating how long people will live in the future.

Because reasonable disagreement can exist as to the validity of the various assumption sets, prior technical panels have recommended that the trustees consider performing a stochastic analysis of the trust funds’ future financial condition as an adjunct to the traditional deterministic valuation. Such stochastic techniques enable modelers to attach probability measures to a range of possible outcomes, which they hope will suggest the likelihood of such outcomes. Beginning in the 2003 report, the trustees presented the results of their first effort to

develop such stochastic models of trust fund operations. In 2005 the trustees continue to present such results, but those results are still labeled as preliminary, in part because the period used in the analysis of the historical variability of key parameters is relatively homogeneous and may not reflect the full range of potential variability. As was done in the 2004 report, the stochastic model results in the 2005 report are centered on the intermediate results from the 2005 report. As in the 2003 and 2004 reports, the analysis indicates that the range of likely outcomes is much narrower than the range indicated by the low-cost and high-cost assumption sets. Consequently, the trustees continue to qualify their results by stating that the variation indicated by their stochastic model "...should be viewed as the minimum plausible variation for the future. Substantial shifts, as predicted by many experts and as seen in prior centuries, are not fully reflected in the current model."

## Conclusion

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The projected financial condition of the Social Security program under the intermediate assumptions of the 2005 trustees' report is quite similar to that shown in the 2004 report. The projected date of trust fund exhaustion moved up one year from 2042 to 2041, and the size of the actuarial deficit over the 75-year projection period has increased slightly. The 2005 report also projects that trust fund expenditures will exceed tax income beginning in 2017. If this occurs, Social Security will start putting demands on the Treasury to begin redeeming securities held in its trust funds. Thereafter, the projected shortfall of tax income will rise, reaching almost 6 percent of payroll by 2079. All this assumes that future demographic and economic experience will follow the intermediate assumptions (and that the Social Security Act is not changed). Given the uncertainty of the future over the next 75 years, many other reasonable scenarios are possible. Under some, Social Security's financial problems disappear, while under others they become much worse.



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