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An Actuarial Perspective on the 2008 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, graphs, and tables that present in great detail the trustees' assessment of the financial condition (actuarial status) of Social Security over the next 75 years. The trustees also present a broader discussion of the uncertainty surrounding these projections, plus additional measures of the financial status of Social Security beyond the traditional 75-year projection period.

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 Social Insurance Committee of 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 2008 Trustees' Report

The trustees' report shows financial projections of the Social Security Trust Funds based on three sets of assumptions: intermediate or best estimates, low-cost, and high-cost (see Page 6 for further discussion). 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 of the combined trust funds 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.
- 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 combined trust fund assets.
- In 2041, the combined 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. At the time of trust fund exhaustion, continuing tax income would be sufficient to pay 78 percent of the

cost for benefits scheduled under current law.

- These key dates are the same as the corresponding dates in the 2007 trustees' report.
- In 2082, the 75th projection year, the shortfall of tax income would be 4.20 percent of payroll, allowing payment of 75 percent of the cost for scheduled benefits. This shortfall is a full 1 percentage point smaller than the shortfall of 5.20 percent of payroll estimated for 2081 in the 2007 report, which would have only allowed for payment of roughly 70 percent of the cost for scheduled benefits. As indicated in the 2008 report, this improvement is principally the result of changes in methods and assumptions used to project immigration.

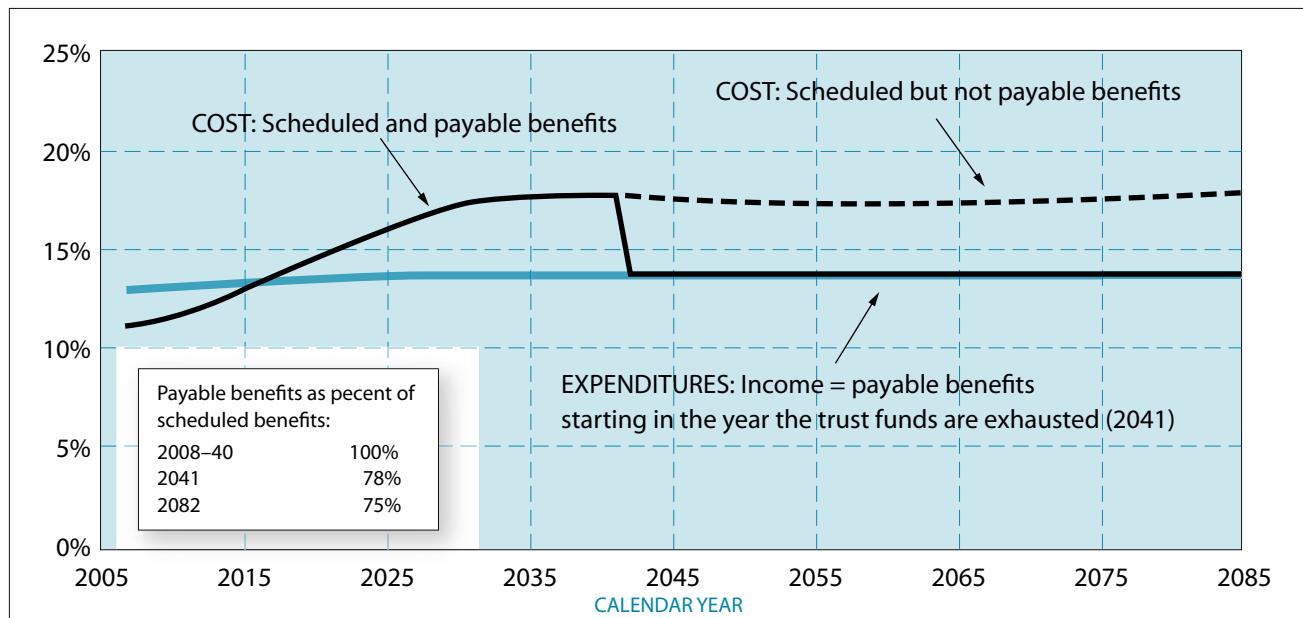
summarized cost rate. The actuarial deficit was 1.95 percent in the 2007 report and has been in the range of 1.70 percent to 2.19 percent for the prior ten reports.

Magnitude of Changes Required

Social Security has a long-range actuarial deficit of 1.70 percent of taxable payroll. Just as an example, 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 1.70 percentage points to 14.10 percent. Long-range actuarial balance could also be achieved with an immediate across-the-board benefit cut of about 11.5 percent for all current and future recipients.

Of course, nobody is proposing to cut ben-

Figure 1: Projected Social Security Annual Cost and Tax Income as a Percentage of Taxable Payroll



Actuarial Balance

An actuarial deficit (negative actuarial balance) of 1.70 percent of taxable payroll is projected for the long-range 75-year period, 2008 to 2082. This represents the difference between a summarized income rate of 13.94 and a summarized cost rate of 15.63, 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

benefits by 11.5 percent immediately, especially not for current beneficiaries. And nobody is proposing an immediate payroll tax rate increase on the order of 1.70 percent. In fact, most policymakers agree that current beneficiaries and those near retirement should not be affected. Any change in benefit levels and/or tax rates that saved the same total amount over the next 75 years would do the job, even if benefits and tax rates were not affected until 2017, or even 2041. However, imple-

menting benefit cuts or tax increases sooner that would save an equivalent amount over the next 75 years would allow the aforementioned benefits cuts and/or tax increases to be spread over more generations.

Sustainability

Immediate one-time changes, such as the 11.5 percent across-the-board cut discussed above, could restore solvency for the next 75 years. However, such approaches would involve very large accumulations in the trust funds that would then be spent down by the end of the 75-year period, leaving, once again, a substantial imbalance between annual cost and tax income. Changes that match year-by-year revenues and benefits more closely can avoid this “boom-bust” scenario and restore solvency beyond the 75-year time horizon. This approach would meet the criteria for “sustainable solvency,” i.e., that the trust funds not only remain solvent through 2082, but are stable or rising as a percent of annual cost at the end of that period. Because the projected shortfall for 2082 is smaller than in last year’s report, the magnitude of changes needed to achieve sustainable solvency is somewhat less than indicated by the intermediate projections in the 2007 report.

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 2008 to almost 6.1 percent in 2035, and then declines to 5.8 percent by the end of the 75-year projection period. This is an improvement when compared with corresponding projections from last year. As mentioned above, this improvement is principally the result of changes in immigration methods and assumptions.

The projected date of exhaustion for Social Security’s trust funds remains over three decades in the future and 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 ex-

pected to cause long-term financial problems for Social Security have not changed.

Measures of the Unfunded Obligation

Social Security’s long-term unfunded obligation 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 severity of the financial shortfall for the system. A better way is to express the unfunded obligation 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 obligation may also be expressed as a percentage of the GDP, or the nation’s total economic output. While putting the unfunded obligation 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 states that the system's unfunded obligation over the next 75 years is 1.6 percent of taxable payroll, or 0.6 percent of GDP. In discounted present value as of Jan. 1, 2008, this amounts to \$4.3 trillion. The dollar amount of this unfunded obligation is actually \$0.4 trillion lower than shown in the 2007 report. The \$4.7 trillion dollar amount in the 2007 report was expected to increase by about \$0.4 trillion due to advancing the valuation date by one year and including the additional year 2082. However, changes in data, methods, and assumptions more than offset this increase.

Open-Group Basis With Infinite-Horizon

The trustees also report the system's unfunded obligation on an open-group basis with an infinite-horizon. At first glance, calculating Social Security's obligation over the infinite future provides a fuller picture of the future shortfall. This measure also 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-horizon projection to policymakers. (For additional details on these limitations see the Social Insurance Committee's letter to the Trustees of the Social security System—2003) (http://www.actuary.org/pdf/socialsecurity/tech_dec03.pdf)

The system's unfunded obligation on an infinite-future basis is 3.2 percent of payroll, or 1.1 percent of GDP. In other words,

an immediate increase in the payroll tax rate from 12.4 percent to 15.6 percent would be expected to eliminate Social Security's projected actuarial deficit for all time under the intermediate assumptions. These estimated infinite-horizon measures relative to taxable payroll or GDP actually declined when compared to estimates presented in the 2007 report. In present discounted value, the infinite-horizon unfunded obligation amounts to \$13.6 trillion, which is the same amount as estimated for the 2007 report. The change to the later valuation date (Jan. 1, 2008), taken alone, increased the measured unfunded obligation by about \$0.7 trillion. However, changes in data, methods, and assumptions offset all of this increase. The unfunded obligation on an infinite-future basis is slightly over 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.

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 \$15.2 trillion and -\$1.5 trillion, respectively. The latter figure suggests that workers in the second group are projected to pay, in present value, taxes that are approximately \$1.5 trillion more than the cost of providing benefits they are scheduled to receive over the infinite future. However, this analysis is only appropriate as a measure of financial status 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 approach is that benefits for current workers be paid for primarily by future generations of workers.

Changes Since the Previous Report

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 2008 report, the year 2082 has been added to the projection period. Scheduled benefit payments and administrative expenses in that year are expected to exceed income by 4.20 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 0.06 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 2004*. (http://www.actuary.org/pdf/socialsecurity/assumptions_0104.pdf)

In the 2008 report, most key demographic and economic assumptions were unchanged from the 2007 report. The primary exception relates to the assumed ultimate annual net legal immigration, which was increased to 750,000 in the intermediate assumptions, up from 600,000 assumed in the 2007 report. This change, along with a small increase in the assumed average annual reduction in death rates and changes in starting values for the demographic assumptions, resulted in no net change in the long-range actuarial balance. Changes in starting values for

the economic assumptions and in the near-term transition to the ultimate economic assumptions also resulted in no change in the long-range actuarial balance. Finally, several methodological improvements and updates of program-specific data combined to result in an improvement in the actuarial balance of 0.32 percent of taxable payroll. The most significant of these changes, which accounted for most of the improvement in the actuarial balance, is a major revision in the methods used for projecting undocumented and temporary legal immigration.

The net result of these changes in assumptions, methods, and starting data, and the change in the long-range valuation period, discussed above, is a reduction in the 75-year actuarial deficit, from 1.95 percent of taxable payroll in 2007 to 1.70 percent of taxable payroll in 2008.

Beyond Solvency

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 excess of tax income over outgo will begin to decline in 2011. Beginning in 2017, benefit payments and administrative expenses are expected to exceed tax revenues, primarily because the large number of baby boomers leaving the workforce and receiving benefits will not be matched by the smaller generations that follow them into the workforce. Initially, interest on the 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 the end of 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 international financial markets.

Beyond the Best Estimate

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. Table 1 summarizes the ultimate, long-range value of some of the key economic and demographic assumptions under the intermediate, low-

cost, and high-cost assumptions.

Under the low-cost assumptions, the actuarial balance is higher than under the intermediate assumptions, changing from negative 1.70 percent to positive 0.57 percent of taxable payroll, and 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 0.8 percent, versus 0.4 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 2.3 in the low-cost set but declines slightly to 2.0 in the intermediate set, and period life expectancy at birth, which is 78.8 years in 2082 in the low-cost set but 82.6 years in the intermediate set for men; and 82.3 years in the low-cost set but 85.7 years in the intermediate set for women.

Under the high-cost assumptions, the negative actuarial balance is higher, equal-

Table 1: Long Range Value of Key Economic and Demographic Assumptions

Ultimate Value	Intermediate	Low-Cost	High-Cost
Total fertility rate (children per woman)	2.0	2.3	1.7
Average annual reduction in age-sex-adjusted death rates from 2032 to 2082	0.73%	0.32%	1.21%
Annual net immigration (in thousands)	1,070	1,375	790
Period Life expectancy at birth in 2082 (in years)†			
Male	82.6	78.8	86.6
Female	85.7	82.3	89.2
Annual Change in:			
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)	1.7%	2.0%	1.4%
Annual labor force growth (2070 through 2082)	0.4%	0.8%	-0.1%
Unemployment rate	5.5%	4.5%	6.5%
Annual interest rate on new Treasury securities issued to the trust funds	5.7%	5.4%	5.9%

†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).

ing 4.66 percent of taxable payroll, and the trust funds are exhausted in 2031, 10 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 0.1 percent annually late in the projection period. The fertility rate falls to 1.7, and the period life expectancy in 2082 rises to 86.6 years for men and 89.2 years 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. Table 2 summarizes

the results for three particular key assumptions.

When all the assumptions are changed simultaneously, the resulting low-cost and high-cost projections result in changing the negative actuarial balance from 1.70 percent to a positive balance of 0.57 percent and a negative balance of 4.66 percent, respectively.

Stochastic Analysis

Not surprisingly, 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 underestimate 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

Table 2: Analysis of Three Key Demographic, Economic, and Program-specific Assumptions

Ultimate Value	Intermediate	Low-Cost	High-Cost
Total fertility rate			
Ultimate assumption (children per woman)	2.0	2.3	1.7
75-year actuarial balance	-1.70%	-1.36%	-2.06%
Year of combined trust fund exhaustion	2041	2041	2041
Reduction in death rates			
Average annual reduction in total age-sex adjusted death rates between 2007 and 2082	0.75%	0.30%	1.26%
75-year actuarial balance	-1.70%	-1.09%	-2.32%
Year of combined trust fund exhaustion	2041	2044	2039
Real-wage differential			
Ultimate assumption (average wage increase minus 2.8% CPI increase)	1.1%	1.6%	0.6%
75-year actuarial balance	-1.70%	-1.12%	-2.28%
Year of combined trust fund exhaustion	2041	2048	2037

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. For an explanation of the differences between a deterministic valuation and a stochastic analysis, see the Academy's issue brief *A Guide to the Use of Stochastic Models in Analyzing Social Security*. (http://www.actuary.org/pdf/socialsecurity/model_1005.pdf)

Beginning in the 2003 report, the trustees presented the results of their first effort to develop such stochastic models of trust fund operations. In 2008, 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. The stochastic model results in the 2008 report are centered on the intermediate results from the 2008 report. As in the 2003 to 2007 reports, the analysis indicates that the ranges of likely outcomes are narrower for some measures and wider for others than the range indicated by the low-cost and high-cost assumption sets. The trustees, however, caution 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

The projected financial condition of the Social Security program as measured by the long-range actuarial balance under the intermediate assumptions of the 2008 trustees' report is substantially improved when compared to that shown in the 2007 report. While 2041 remains as the projected year of trust fund exhaustion, the size of the actuarial deficit over the 75-year projection period is decreased substantially. This improvement is principally the result of changes in

immigration methods and assumptions. The 2008 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 U.S. Treasury to begin redeeming securities held in its trust funds. Thereafter, the projected cash flow shortfall will rise, reaching 4.20 percent of payroll for 2082. 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. The projected exhaustion date for Social Security's trust funds may be over three decades in the future, but Social Security still faces long-term financial problems. The need for timely and effective action to make Social Security not only solvent, but also sustainable, is demonstrated by the findings in the trustees' report. The sooner reforms are enacted, the more gradual and flexible they can be, and the more advance notice can be provided to those who will be affected.

Note: All numbers presented in this brief are from the 2008 OASDI Trustees Report (<http://www.ssa.gov/OACT/TR/TR08/index.html>).



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