

The US Social Security System: Solvency and Sustainability

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Many nations' social security systems face potential financial strains in future years. Demographic trends with improving mortality rates are adding years to life expectancy. Combined with the effects of trends in birth rates, many systems are projecting increases in the ratio of beneficiaries to active workers. When expressed as a percentage of gross domestic product, these trends typically translate into increasing costs of sustaining social security programs. Some alarmist prognosticators, reminiscent of Thomas Malthus some 200 years ago, predict that the active working population will not be able to support ongoing social security systems at their current level. Malthus incorrectly predicted that agricultural output would not be sufficient to sustain population growth and raised the specter of mass starvation. Malthus underestimated human ingenuity and growth in industrial productivity, which rose to the challenge and met the requirements of a growing population. A major unknown factor that is virtually impossible to predict is the future growth in national productivity. If productivity growth through innovation and technological change exceeds the modest expectations of today's social security actuaries and economists, it is possible that the anticipated demographic and financial strains now projected will be satisfactorily absorbed as a by-product of economic expansion.

There are many ways to mitigate the effect of demographic forces and financial strains on social security systems. The most frequently proposed include increasing payroll taxes, applying general tax revenues, modifying benefit amounts or eligibility conditions, changing the indexing basis for computing benefits and raising the retirement age. These are difficult choices that may prove to be politically sensitive. The course of action adopted for the US social security system is to raise the retirement age. Beginning in 2003, this will increase gradually from 65 to become 67 in 2027. If, due to demographic trends, anticipated long-range deficits persist in the US system, it is very likely that the transition to age 67 will be accelerated. It is also probable that the normal retirement age will ultimately be raised to above 67, possibly to age 70. Early retirement benefits will continue to be available upon retirement at age 62 or later, but the reduction in benefits will be gradually changed – from 20% to an ultimate level of 30%.

While virtually every nation's social security system will face the inevitable demographic pressures and financial strains in future years, there appears to be growing acceptance for the concept of raising the retirement age as the most acceptable way of mitigating the effect of these factors and sustaining the systems in their present form.

HISTORY OF US SOCIAL SECURITY

The US social security system was created when Congress passed the Social Security Act in 1935. Initially, the system, which became effective in 1937, comprised the Old-Age and Survivors (OASI) program, providing retirement income benefits to workers age 65 and older. The system was expanded in 1939 to cover dependents and survivors. Then in 1956 the Disability Insurance (DI) program was added to provide income to disabled workers and in 1958 it was extended to provide benefits to dependents of disabled workers.

The social security system is financed by payroll taxes assessed equally on employers and employees. In 2002 OASI payroll taxes are set at a combined employer and employee rate of 10.6% of earnings up to a limit of US\$84,900*. The corresponding DI payroll tax rate for 2002 is 1.8%, making the combined OASDI tax rate 12.4%.

In 2001 the total benefit payments from the OASDI trust funds amounted to US\$432 billion for 46 million beneficiaries. The average monthly benefit of all retired workers in 2002 amounts to US\$874 and for all disabled workers the average monthly benefit is US\$815. An estimated 153 million workers had earnings covered by social security in 2001.

SOCIAL SECURITY FINANCIAL PROJECTIONS

The financial condition of the US social security system, comprising the OASI and DI trust funds, is presented in the annual reports of the Board of Trustees. Each year, the trustees report on the financial operations of the trust funds, assumptions about the future and projections of future financial status. The trustees present the results of long-range actuarial estimates,

* £1 = US\$1.56; €1 = US\$0.99 as at 11 October 2002

extending up to 75 years, of the annual income rates, cost rates and balances for the OASI trust fund, the DI trust fund and the combined OASDI funds.

For the purpose of preparing the long-range actuarial estimates, the social security actuaries utilize demographic assumptions and methods relating to mortality, fertility and immigration to develop total population estimates. They also utilize economic assumptions and methods relating to productivity, inflation, average earnings, real-wage differentials, the labor force, unemployment, gross domestic product and interest rates.

In the introduction to the annual reports, the trustees state:

“Although, in general, a greater degree of certainty can be presumed for projections encompassing the next few years than for a period as long as the next 75 years, any estimation of future experience is uncertain. Therefore three alternative sets of demographic, economic, and program-specific assumptions are used to show a range of possible outcomes for all projections. The *Intermediate* set of assumptions reflects the trustees’ best estimates of future experience; the *Low-cost* is more optimistic, and the *High-cost* alternative more pessimistic for the trust funds’ future financial outlook.”

After projecting the system’s income, expenditure and assets at various future points of time within the next 75 years, the social security actuaries present the projection results in terms of annual income rates, cost rates and balances. The annual income rate is the ratio of income from revenues, comprising payroll tax contributions and income from the taxation of benefits, to the OASDI taxable payroll for the year. The annual cost rate is the ratio of the cost – comprising outgo and expenditures for benefits, administrative expenses and other disbursements – of the program to the taxable

payroll for the year. In this particular context, the “balance” is simply the difference between the income rate and the cost rate for a specific year.

The next step in preparing the results of the 75-year projections is the development of summarized income rates, cost rates and balances. The summarized rates represent the projected annual figures on a present-value basis for various periods within the overall 75-year projection period. Results are presented for 25-year, 50-year and 75-year projection periods, representing cash-flow from income and costs without having regard to the initial trust fund balance, any minimum target level for the trust fund assets or the adequacy of the trust fund to meet scheduled benefit payments.

The next step involves modifying the summarized income rates and cost rates to include the effect of the initial trust fund balance and to maintain a minimum target trust fund balance equal to one year’s outgo for benefits and expenses at the end of the projection period. The difference between the summarized income rates and summarized cost rates with these trust fund adjustments is referred to as the “actuarial balance.” This is a measure of the surplus or deficit of the system and is widely regarded as the principal quantitative measure of the adequacy of the financial viability of the system. The results of projections of the summarized income rates, cost rates and actuarial balances on this basis for 25, 50 and 75 years on each of the three official deterministic sets of assumptions are shown in TABLE 1 below. The extent of the increasing divergence of the low-cost and high-cost projections from the intermediate projection as the projection period is extended from 25 years to 50 and then to 75 years is evident from these results.

THE CONCEPT OF ACTUARIAL SOLVENCY

While the level of the actuarial balance reported by the trustees is a well-established measure of the financial viability of the US social security system, it does not give

TABLE 1 Summarized Income Rates, Cost Rates and Actuarial Balances
(25-year, 50-year and 75-year projection periods as a percentage of taxable payroll)

<i>Deterministic projection basis</i>	<i>Projection period</i>	<i>Income rate</i>	<i>Cost rate</i>	<i>Actuarial balance</i>	<i>Divergence from intermediate</i>
	<i>Years</i>	<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>
Low-cost basis	25	14.17	11.87	2.30	1.07
	50	13.74	12.92	0.82	1.77
	75	13.60	13.16	0.44	2.31
Intermediate basis	25	14.21	12.98	1.23	
	50	13.82	14.77	-0.95	
	75	13.72	15.59	-1.87	
High-cost basis	25	14.28	14.36	-0.08	-1.31
	50	13.92	17.13	-3.21	-2.26
	75	13.87	18.87	-5.00	-3.13

Source: Table IV.B8 of the 2002 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds

any indication of the extent of the solvency of the system, i.e. the degree to which asset-income is projected to be available to meet liability-outgo. The trustees routinely report the calendar year in which the trust fund is projected to become “exhausted.” In more conventional actuarial terms, this is the end year of the period for which the system is at least 100% solvent.

To arrive at a measure of conventional actuarial solvency, it is necessary to remove the present value of the minimum target fund balance of one year’s outgo for benefits and expenses from the reported summarized cost rates. The trustees report this exact adjustment to the summarized cost rates, excluding the minimum target fund ending balance, to arrive at a “summarized disbursement rate.” It is then possible to derive a conventional measure of actuarial solvency by comparing the summarized income rates to the summarized disbursement rates over 25, 50 and 75 years. These actuarial solvency percentage ratios are shown in TABLE 2 overleaf, which shows the summarized present values of income and disbursement rates and the corresponding solvency ratio percentages at five-year intervals for projection periods from 25 to 75 years on each of the three deterministic projection bases. It may be seen from TABLE 2 that the solvency ratio exceeds 100% for the full 75-year projection period on the low-cost basis. The solvency ratio exceeds 100% for more than 40 years on the intermediate basis and exceeds 100% for more than 25 years on the high-cost basis.

It should be noted that the solvency ratios, as computed, are based on income rates and disbursement rates that are related to the payroll tax rates and scheduled benefits under the Social Security Act as amended. Obviously, scheduled benefits under present law may only be paid if there are sufficient assets in the trust fund from which to make the full scheduled benefit payments. Additionally, the income rate includes a small element of income from the taxation of scheduled benefits that would be realized only if the scheduled benefits were in fact paid. If the trust fund assets were to ever become exhausted, the scheduled benefits under the present Law would either be reduced or delayed, or the Law might be amended in some respect to modify payroll taxes and/or scheduled benefits. However, the concept of solvency, based on the present values of scheduled income and disbursement rates, is a valid measure of the capacity of the projected asset-income stream to meet the projected liability-outgo stream. This solvency measure is adopted as the basis for further analysis with regard to the nature of the divergence characteristics of the actuarial solvency ratios under each of the three official deterministic assumption sets or scenarios.

Interestingly, the word “solvency” does not seem to appear anywhere in the 208-page 2002 Annual Report of the Board of Trustees. The term “actuarial balance” used by the trustees is, perhaps, something of a misnomer, since it does not measure the balance of asset-income and liability-outgo. Strictly speaking, “actuarial balance,” as used by the trustees, is a modified measure of actuarial surplus or deficit for the system, subject to the constraint of maintaining an additional liability for the minimum trust fund balance equal to one year’s estimated outgo at the end of a projection period.

If the actuarial balance concept, as used in the trustees’ reports, were to be modified by removing the requirement for maintaining the minimum trust fund balances, and expressed as a percentage of the summarized income rates, the modified actuarial balance percentage would then become the complement of the actuarial solvency ratio. From an actuarial and statistical standpoint, the actuarial solvency percentage ratio is a preferable, more meaningful, readily comprehensible measure and is less likely to be misinterpreted or misrepresented than the actuarial balance concept utilized in the trustees’ reports.

DIVERGENCE OF ACTUARIAL SOLVENCY RATIOS

The extent of the divergence between the low-cost and high-cost solvency ratios provides a useful measure of the range of plausible outcomes around the intermediate best estimate. The divergence in the solvency ratio percentages is 20.25% for 25 years, 25.12% for 50 years and 29.96% for 75 years, as shown in TABLE 3 overleaf.

The semi-range – or one half of the divergence between the low-cost and high-cost solvency ratios – is a practical measure of the plausible expected variation around the intermediate solvency ratio. At 25 years, the solvency ratio could be regarded as 114.41% plus or minus 10.13%; at 50 years as 95.11% plus or minus 12.56% and at 75 years as 88.80% plus or minus 14.98%, as shown in TABLE 3.

To put the semi-range divergence (SRD) percentage into a standardized perspective relative to the intermediate solvency ratio (ISR) percentage, it is useful to compute the SRD/ISR percentage ratios; these are 8.85% at 25 years, 13.21% at 50 years and 16.87% at 75 years. By converting this sequence of ratios to a base of 100 at 25 years, it is possible to develop an index of the increasing divergence characteristics at successive points along the projection period; this index is 149 at 50 years and 191 at 75 years. The index is a quantitative measure of the phenomenon sometimes referred to as “an increasing funnel of doubt.” The reciprocal of this index might appropriately be described as an index of relative reliability or credibility. The values of this index of relative credibility (IRC) are 100 at 25 years, 67 at 50 years and 52 at 75 years. These various statistics are also presented in TABLE 3.

SUSTAINING THE SYSTEM

The 75-year projections on the intermediate basis indicate that, although the system is solvent for the next 40 years, there is a potential long-range deficit beyond 40 years. If the intermediate projection assumptions prove accurate, in order to sustain the system in its present form, it will then be necessary to modify the payroll tax rate or the level of benefits. However, recent experience has been favorable in terms of extending the future period for which the system is expected to remain solvent. A payroll tax increase of 0.87% for employers and employees would serve to extend the projected period of solvency to 75 years. Other modifications to the computation of primary benefits, such as changing from full wage-indexing to price-indexing, would result in long-range solvency and continuing sustainability of the system.

RAISING THE RETIREMENT AGE

When the social security system first began paying monthly retirement benefits, a normal retirement age of 65 was established. US social security law has been amended to increase the normal retirement age gradually from 65 to 67, effective from 2003. The retirement age remains at 65 for those born in 1937 or earlier, then increases by two months for each year of birth after 1937 until reaching 66 for those born in 1943. The retirement age remains at 66 for those born from 1943 to 1954 and then increases by two months for each year of birth after 1954 until reaching 67 for those born in 1960 or later.

In order to mitigate the long-range actuarial deficit, there are proposals to increase the retirement age beyond 67 and to accelerate the phase-in to 67. The retirement age could be established on a flexible basis so that life expectancy at retirement would remain constant from year to year, life expectancy at age 65 now being 18 years. This method would decrease the projected deficit, because the payout period for benefits would remain the same while the period over which payroll taxes would be paid would increase. The retirement age might alternatively be set so that the life expectancy at retirement would remain constant as a percentage of the average working lifetime for which payroll taxes are paid. The rationale for raising the

TABLE 2

Summarized Income Rates and Disbursement Rates (as a percentage of taxable payroll and solvency ratio percentages)

Projection period	Low-cost basis			Intermediate basis			High-cost basis		
	Income rate	Disbursement rate	Solvency ratio	Income rate	Disbursement rate	Solvency ratio	Income rate	Disbursement rate	Solvency ratio
Years	%	%	%	%	%	%	%	%	%
25	14.17	11.39	124.41	14.21	12.42	114.41	14.28	13.71	104.16
30	14.06	11.74	119.76	14.07	12.94	108.73	14.18	14.43	98.27
35	13.96	12.05	115.85	13.98	13.41	104.25	14.10	15.10	93.38
40	13.88	12.32	112.66	13.91	13.83	100.56	14.03	15.72	89.25
45	13.80	12.54	110.05	13.86	14.20	97.61	13.97	16.29	85.76
50	13.74	12.73	107.93	13.82	14.53	95.11	13.92	16.81	82.81
55	13.69	12.88	106.29	13.79	14.81	93.11	13.89	17.28	80.38
60	13.65	12.98	105.16	13.76	15.04	91.49	13.86	17.71	78.26
65	13.62	13.04	104.45	13.74	15.22	90.28	13.85	18.08	76.60
70	13.60	13.07	104.06	13.73	15.36	89.39	13.86	18.40	75.33
75	13.60	13.05	104.21	13.72	15.45	88.80	13.87	18.68	74.25

Source: 25-, 50- and 75-year income and disbursement rates from Table IV.B8 of the 2002 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds. Income and disbursement rates for other projection periods are estimated, except income rates on intermediate basis for other projection periods are from Table IV.B6 of the Trustees' Report.

TABLE 3

Analysis of Solvency Ratio Percentages

Projection period	Intermediate solvency ratio percentage (ISR)	Solvency ratio percentage divergence high to low	Semi-range divergence high to low (SRD)	High to intermediate divergence range	Low to intermediate divergence range	SRD/ISR ratio	SRD/ISR ratio index	Index of relative credibility
Year	%	%	%	%	%	%		
25	114.41	20.25	10.13	10.25	10.00	8.85	100	100
30	108.73	21.49	10.75	10.46	11.03	9.89	112	89
35	104.25	22.47	11.23	10.87	11.60	10.77	122	82
40	100.56	23.41	11.71	11.31	12.10	11.64	132	76
45	97.61	24.29	12.15	11.85	12.44	12.45	141	71
50	95.11	25.12	12.56	12.30	12.82	13.21	149	67
55	93.11	25.91	12.95	12.73	13.18	13.91	157	64
60	91.49	26.90	13.45	13.23	13.67	14.70	166	60
65	90.28	27.85	13.93	13.68	14.14	15.43	174	57
70	89.39	28.73	14.37	14.06	14.67	16.08	182	55
75	88.80	29.96	14.98	14.55	15.41	16.87	191	52

retirement age is that it addresses the long-range deficit while responding to the many changing demographic factors.

CURRENT DEBATE OVER FUTURE STRUCTURE

In recent years, politically-inspired opponents of social security have undertaken a campaign to change the fundamental nature of the US social security system by creating individual accounts from payroll tax contributions to replace the guaranteed benefits under the present system. These opponents claim that the long-range actuarial deficit beyond 40 years makes the system unsustainable and they use the term "bankrupt" to describe the financial condition of the system, even though it is more than 100% solvent for the next 40 years and 89% solvent for the next 75 years. Based on this political mission to make radical changes to the social security system, a presidential commission was appointed in 2001 to evaluate potential ways to create a system of individual accounts as part of the social security system by diverting payroll taxes into a form of savings account. A co-chairman of this commission began the proceedings with an infamous and widely-condemned statement that, "Social Security is broke." While the world has become accustomed to political spin, this deliberate political distortion served to backfire on the commission that duly delivered a report with three alternative proposals for introducing individual accounts. None of the proposals appear to be financially viable or politically acceptable and no serious debate is likely before the November congressional elections since incumbent Republicans are fearful of debating the issue and losing votes at the polls.

The commission's proposals have been countered by strong opposition from those who favor preserving the structure of the existing social security system. The specific counter-arguments include the fact that the present system provides a large element of insurance for disability and survivors' benefits (typically for widows and orphans). It also provides important protection

against inflation with its index-linked cost-of-living adjustments and provides lifetime protection against longevity risk for those who survive beyond their cohort's life expectancy. The system also represents a strong social contract between generations and, importantly, provides an element of cross-subsidy between the higher-income and lower-income groups of individuals. A system of individual accounts would sacrifice these existing features in pursuit of accumulating individual account balances that in turn would be subjected to investment risk and the volatility of stock market returns including downside potential.

GLOBAL STANDARD FOR MEASURING COSTS

There is an inherent flaw in the concept of measuring costs of social security systems in relation to the active labor force. A commonly used metric is the ratio of the number of beneficiaries to the number of active workers. This metric is often cited to predict dire consequences for social security systems as the ratio is projected to increase over time due to demographic trends. A more meaningful metric is obtained by relating the cost of social security systems to a country's gross domestic product. This puts social security costs worldwide in proper perspective and context and is a useful guide in making policy decisions concerning the allocation of national resources. Only when long-range projections of costs associated with national priorities, such as health, education, welfare, social security, environmental protection and national defense, have been made can the appropriate policy decisions be taken as to how the available economic resources should be allocated between the various national priorities. Ω

The views expressed in this article are the author's own and are not necessarily the same as those of the United States Social Security Administration or the American Academy of Actuaries.