Social Security Goes Stochastic

The 2003 Social Security Trustees Report contains a significant new development in terms of the methodology for the program's financial projections. For the first time, the trustees have included 75-year stochastic projections that provide an array of results with associated probability measures indicating the likelihood of various outcomes that differ from the trustees' central best estimate. While the introduction of stochastic methodology is a welcome development, it is important to note certain caveats concerning the interpretation of the published results. The 2003 report explains that the stochastic model is in fact only a preliminary model and is subject to further development and modifications. It may also be noted that the stochastic results published in the 2003 report are based on the previous year's data and assumptions and are not strictly comparable with the conventional projection results shown in the 2003 report, although the differences between the 2002 and 2003 results are not particularly significant. Of more importance is the fact that the basis for the stochastic projections reflects certain prior experience of the program but does not capture the full extent of the array of plausible future outcomes related to various economic and demographic scenarios. The relevant comment by the trustees states: "The variation indicated should be viewed as the minimum plausible potential 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."

The standard results from the 2003 Trustees Report disclose an actuarial balance deficit of 1.92% of covered payroll as the best estimate, and low-cost and high-cost estimates of a 0.42% surplus and a 5.07% deficit respectively. These results differ slightly from the results from the 2002 Trustees Report amounting to a 1.87% deficit as the best estimate and a 0.44% surplus for the low-cost projection and a 5.00% deficit for the high-cost projection. The principal results of the stochastic projections in the 2003 Trustees Report are based on a set of 5000 simulations with allowance for a certain degree of variability in the levels of mortality, fertility, immigration, real wages, consumer price index, unemployment, trust fund real yield rates, and disability incidence and recovery rates. Other elements, such as labor force participation rates, retirement rates, marriage and divorce rates were not represented as stochastic variables. The stochastic projections of the actuarial balance are presented for the 50th, 10th and 90th, and the 2.5th and 97.5th percentiles of the probability distribution. For the 50th percentile, the deficit was projected as 1.92% of covered payroll. For the 10th and 90th percentiles, the deficit was projected as 3.28% and 0.71% of covered payroll. For the 2.5th and 97.5th percentiles, the deficit was projected as 4.07% and 0.17% of covered payroll. The divergences in the actuarial balance as between the 10th and 90th percentiles (80% confidence interval) and as between the 2.5th and 97.5th percentiles (95% confidence interval) are 2.57% and 3.90% respectively. By contrast, the divergence for the deterministic low-cost and high-cost projections from the 2002 Trustees Report was 5.44%. These results clearly indicate that the preliminary stochastic projections produce a much narrower spread of results for the range of likely outcomes than the deterministic projections.

So how are these results to be interpreted and how are they relevant to public policy considerations affecting the future of the Social Security program? It is important to note that the stochastic projection model is a work-in-progress and that it will be further developed and refined in future years. More variable elements may be included and a broader array of future plausible outcomes will be recognized, possibly utilizing "regime-switching" techniques that capture alternative sets of future economic and demographic scenarios that are not reflected in the recent historical experience of the program. Other stochastic models have been developed for the purpose of projecting the array of plausible future outcomes for the financial condition of the Social Security program, specifically a Congressional Budget Office Long Term Model, a Simulation Model developed by the Social Security Administration Policy Simulation Group and a model developed by independent researchers Tuljapurkar and Lee. The results from these three other models differ because of the varying approaches they adopt and the assumptions each model makes. Further research and development should be encouraged and some effort might be made to reconcile the various approaches and the results achieved. The Social Security Administration Office of Policy has stated "Which approach and assumptions are best suited for Social Security policy analysis remains an open question and further research is needed before the promise of stochastic modeling is fully realized. Despite this caveat, stochastic modeling methods are already shedding new light on the range and distribution of trust fund outcomes that might occur in the future."