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THE NATURE AND EVOLUTION OF SOCIAL SECURITY PROJECTION METHODOLOGIES

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Background

Planning and development for any enterprise, whether public or private, requires realistic and credible assessment of both past experience and future prospects. In the case of Social Security, a universal national program, the assessment of future prospects starts with reasonable projections of the entire population and economy. For decades, the Office of the Chief Actuary at the Social Security Administration has developed and evolved methodologies for making baseline projections of the Social Security program. These methodologies apply assumptions that are recommended to and approved by the Social Security Board of Trustees.

Since the actuaries made the first projections, which occurred even before enactment of the Social Security Act in 1935, the methodologies have evolved continuously. The interested reader can follow this development through the Actuarial Studies and Notes available at http://www.ssa.gov/oact/pubs.html. Also available from this site are:

- The Annual Report of the Board of Trustees on the actuarial status of the program, for each year back to 1941; and
- Extensive model documentation and documentation of the key assumptions used in the projections for the last several annual reports.

For several decades, intensive review from technical panels has influenced the evolution of the projection methods. Every four years, the independent Social Security Advisory Board (before 1994, the Quadrennial Advisory Councils) has selected the members of these technical panels from the nation's most knowledgeable demographers, economists, and actuaries. Reports of technical panels appointed by the Advisory Board dating back to 1999 are available at http://www.ssab.gov/Publications/BySubject.aspx. In addition, since 2006 the methods and projections developed by the Office of the Chief Actuary have been subject to annual full scope audit by a major independent accounting firm, as required by the Federal Accounting Standards Advisory Board. The annual Social Security Performance and Accountability Reports contain these auditor's reports. The projections and methods have received unqualified opinions every year. This level of oversight, as well as complete transparency in assumptions and methods, contributes to the high level of confidence among policymakers that the projections in the Annual Trustees Reports provide a credible and reasonable basis for assessing the actuarial status of the program and possible changes to the program.

In addition to the oversight described above, the Office of the Chief Actuary maintains contact with the academic and research communities on a constant basis, exploring possible additions and modifications to the evolving methods. Two substantial methodological changes implemented recently are (1) the development of comprehensive stochastic modeling as an additional illustration of uncertainty, introduced in the 2003 Trustees Report, and (2) a restructuring of the projection methodology for immigration flows, introduced in the 2008 Trustees Report. As time and resources allow, the actuaries carefully analyze the recommendations and new concepts developed by the research community and make changes to reflect the best of those concepts. The actuaries generally make changes in projection methodologies in measured and incremental steps, keeping in mind the importance of these projections in national policy and the potential impact of large changes from one report to the next.

A January 5, 2013 op-ed in the New York Times by Gary King and Samir Soneji, entitled "Social Security: It's Worse Than You Think" (http://www.nytimes.com/2013/01/06/opinion/sunday/social-security-its-worse-than-you-think.html?smid=pl-share) provides an interesting case study of this process. King and Soneji developed their own projection methodology for mortality and made a series of assertions in their op-ed about the methods used by the Office of the Chief Actuary. As with all new entrants into this field of analysis, their work may ultimately provide value in the continuing evolution of our methods. However, the assertions in their op-ed require some response and clarification.

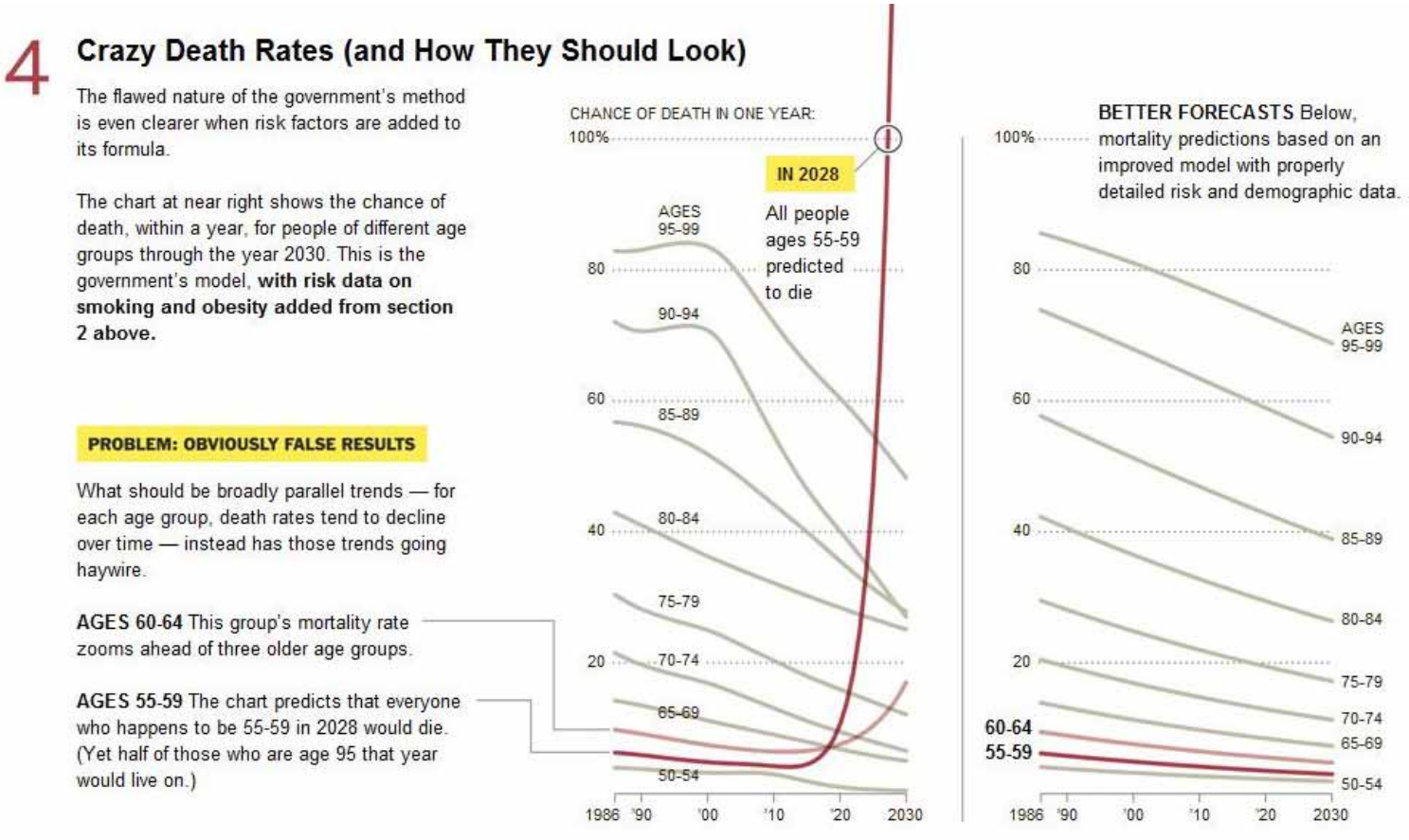
Case Study: Analysis of Assertions by King and Soneji

In their op-ed, King and Soneji state that the combined Social Security Trust Funds will deplete their reserves in 2031, which is two years earlier than shown in the 2012 Trustees Report under intermediate assumptions. They assert that this difference is attributable to the Office of the Chief Actuary's use of mortality projection methods that "were outdated and omitted crucial health and demographic factors." These are serious charges and deserve exploration.

The essence of King and Soneji's assertion is their misimpression that the Office of the Chief Actuary's mortality projection methods do not reflect the effects of smoking and obesity. In fact, both smoking and obesity are already reflected in historical data and the actuaries' projection methods. King and Soneji develop a projection they refer to as "Crazy Death Rates" by, in some way, adding their estimated effects for smoking and obesity to the actuaries' projections. This addition therefore "double counts" the effects of smoking and obesity and yields truly "crazy" results. Panel 4 below shows both these "crazy" results and King and Soneji's own projections, which they call "better forecasts." This panel is copied directly from material accompanying the op-ed (http://www.nytimes.com/interactive/2013/01/06/sunday-review/social-securitys-flawed-forecasting.html?smid=pl-share).

The comparison provided in Panel 4 is highly misleading and inaccurate. For example:

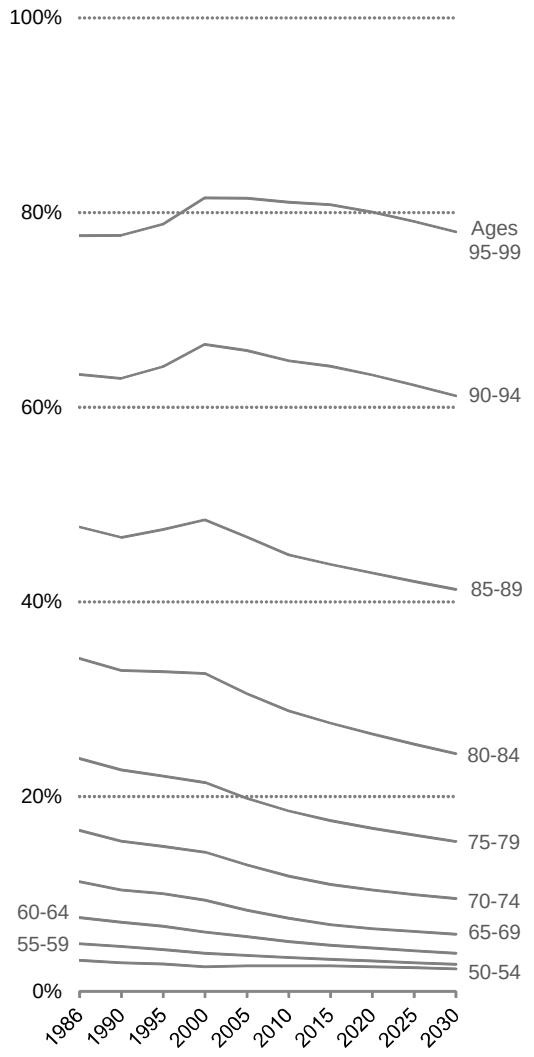
- The left panel of mortality projections bears no resemblance to the mortality projections the actuaries developed for the 2012 or prior Trustees Reports.
- The label for the data values is "chance of death in one year." However, the values presented are probabilities of death in *five years*.
- Values shown for historical years of "better forecasts" do not agree with actual historical data.



Panel 4 reproduced from the op-ed by King and Soneji in NYT January 5, 2013

In contrast, Figure 1 below shows the actual projections of mortality rates used for the intermediate assumptions in the 2012 Trustees Report, along with actual historical rates.

Figure 1. Social Security Trustees' Official Projection of Unisex 5-Year Death Rates: 2012 Trustees Report



Comparing the death rates used in the 2012 Trustees Report to King and Soneji's "better forecasts" is instructive. The Trustees' historical death rates for ages 65 and older in years 1986 through 2007 reflect actual complete data for individuals who are both enrolled in Medicare and eligible for a Social Security benefit. These data are widely recognized as the most reliable U.S. mortality data available for advanced ages; the National Centers for Health Statistics use these data for developing the United States Decennial Life Tables. Historical death rates below age 65 reflect State death report data and census population data. The historical patterns of death rates at all ages are markedly different from King and Soneji's "better forecasts." Because (1) King and Soneji's historical death rates are inaccurate, and (2) any reasonable projection of future mortality rates must be based on historical rates, we are skeptical about the nature of their projections for the future.

As best we can tell from a visual interpretation of the "better forecasts," King and Soneji's projections of mortality for 2030 appear to result in higher death probabilities than in the 2012 Trustees Report for ages 55 through 84. All else being equal, this suggests lower life expectancies and lower Social Security cost under the "better forecasts," rather than the higher cost they assert. King and Soneji's projected mortality rates above age 84 are indeed lower than those in the 2012 Trustees Report for 2030, but, again, the indicated historical basis for their rates at these higher ages makes the levels of their death rate projections highly questionable.

As mentioned earlier, King and Soneji suggest that the actuaries' method for projecting mortality does not reflect smoking and obesity. Clearly, there is a misunderstanding here. The method employed by the Office of the Chief Actuary incorporates five well-defined groups of causes of death for which national statistics are available on a time-series basis. These cause groups allow the actuaries to decompose past changes in death rates by age and gender and to develop assumptions for projection into the future. The cause groups include cancer and respiratory disease, which are associated with smoking, and cardiovascular disease, which is associated with obesity. Therefore, any attempt to overlay the Trustees' mortality projections with some external assessment of smoking or obesity would introduce duplication to the Trustees' assumptions – and would yield results that King and Soneji appropriately call "crazy."

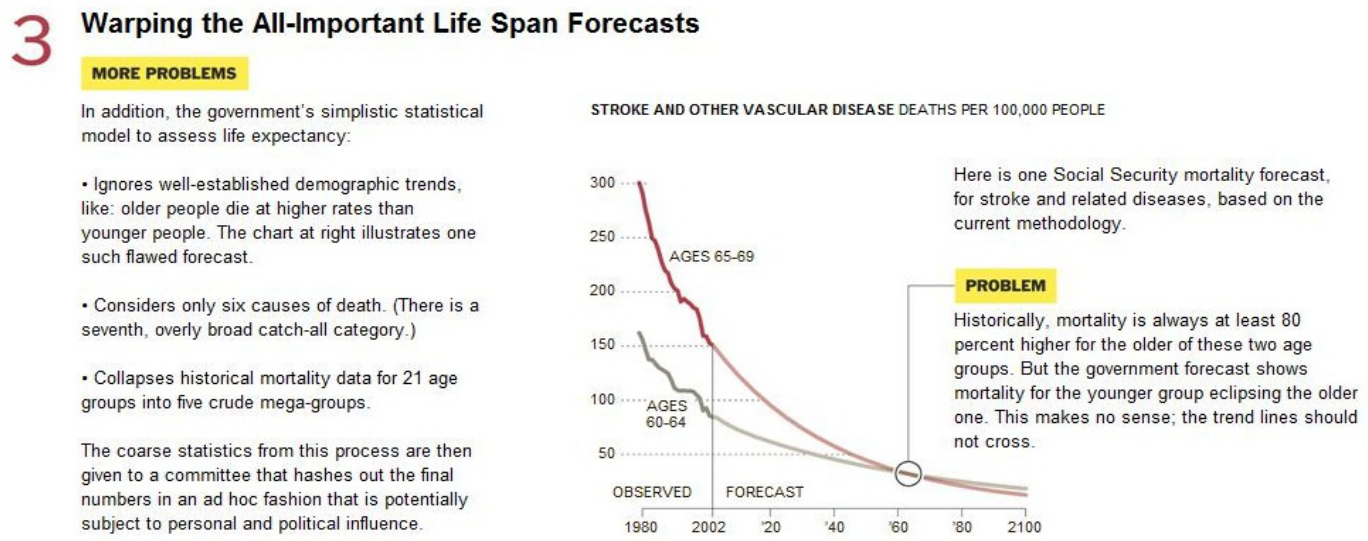
The cause-group methods employed by the Office of the Chief Actuary allow the actuaries and the Trustees to incorporate trends other than those in smoking and obesity. There are innumerable potential factors that may affect future mortality trends, including the future level of spending and commitment to health care research and services in the United States. The Trustees cannot base mortality projections on simple extrapolations of past trends when they expect underlying conditions to change in the future. For example, it is not plausible that health care spending, when expressed as a percentage of GDP, will rise at the same rate in the future that it has in the past several decades. This and other factors are so complex and uncertain that judgment is ultimately essential in setting assumptions and developing methods. Even in King and Soneji's simple model, the authors must make judgments about the timing and lags between observed trends in smoking and obesity and death rates. In the model employed by the Office of the Chief Actuary, the actuaries consider many more factors, and so the judgments required are more complex.

King and Soneji go further in their allegations, asserting that the actuaries' methods for projecting mortality "are prone to error and to potential interference from political appointees." As for accuracy of the projections, the facts speak for themselves. As an example, the actuaries projected in the 1983 Trustees Report that unisex life expectancy at age 65 would rise from 16.3 years in 1980 to 18.8 years in 2010. The 2012 Trustees Report indicates that the estimated unisex life expectancy at age 65 for 2010 was 18.7 years. The allegation regarding political interference is difficult to understand. First, while the Board of Trustees is comprised of six political appointees, the two Public Trustees are from two different political parties. Second, the transparency of the mortality improvement assumptions and the actuaries' methods would make any politically motivated manipulation immediately apparent. Third, the Chief Actuary is required by law to certify as to the reasonableness of these assumptions and methods in the Trustees Report. There is simply no basis for any allegations of political bias in the projections, and it is irresponsible to suggest otherwise.

In an attempt to expose shortcomings in the actuaries' methods, King and Soneji carefully selected a particular example from among the many age-sex-cause specific mortality trends. Panel 3 from the graphic section accompanying their op-ed, copied below, points to a crossover in death rates between two age groups for a single cause group, after 2060, using the projections from the 2002 Trustees Report. Note that the assumptions for specific causes and age groups are not intended to be precise "forecasts" or predictions, but rather general trend expectations. The assumptions provide a first step in developing total projected death rates by age and gender, which are essential in projecting the cost of Social Security. (Additional steps include analyzing the resulting combined death rates and their implied rates of improvement and smoothing these rates.) Figure 1 shown above clearly indicates the reasonableness of the actuaries' projections of mortality by age group. King and Soneji's own "better forecasts" of 5-year death probabilities are similar overall to the Trustees' projections by 2030, but are higher than the Trustees' projections for ages 55 through 84 and lower for higher ages.

Finally, it is important to note that the projections developed by the Office of the Chief Actuary for the Trustees Reports are intended to reflect all aspects of future possible trends in demographic, economic, and programmatic factors, given current Social Security law. The 2011 Technical Panel suggested faster mortality improvement, but also made many other suggestions, resulting in an overall projection that was slightly more *optimistic* than the Trustees' intermediate projection. The 2011 Technical Panel's assumptions resulted in the combined Social Security Trust Fund reserves depleting one year *later* than projections using the Trustees' assumptions. King and Soneji estimate trust fund reserve depletion 2 years *earlier* than the Trustees' projection, with the only change being the mortality methods. Uncertainty exists in any projection of future events. Both the Technical Panel results and those by King and Soneji are within the range of reasonable uncertainty as specified in the Trustees Report, and therefore should cause no alarm.

The Office of the Chief Actuary considers the work of demographers and other social scientists in our continual evolution of projection methods. We look forward to future contributions by King and Soneji.



Panel 3 reproduced from the op-ed by King and Soneji in NYT January 5, 2013