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Fertility Projections for Social Insurance Symposium at the SOA Annual Meeting

by Sari Harrel



The first “Fertility Projections for Social Insurance Symposium” was held on Nov. 14 to 15, 2005 as part of the Annual Meeting of the Society of Actuaries in New York City. The symposium originated from a call for papers (by the Committee on Social Security of the SOA) on fertility and immigration factors affecting social insurance projections. The purpose of the symposium was to discuss fertility rate projections and their relative importance compared to other assumptions for social insurance projections. The focus of the symposium was mainly on the United States and Canada; however, perspectives were also presented on the United Kingdom and the Czech Republic.

The panelists and audience included leading social insurance actuaries, students, academics, demographers and statisticians. Chief and deputy chief social insurance actuaries who presented were Stephen Goss, Chief Actuary of the U.S. Social Security Administration, Alice Wade, Deputy Chief Actuary for Long-Range Actuarial Estimates of the Social Security Administration; Jean-Claude Ménard; Chief Actuary of the Canada Pension Plan; Pierre Plamondon, Chief Actuary of the Québec Pension Plan; and Chris Daykin, Government Actuary of the U.K. Government Actuary’s Department. The symposium comprised five sessions and covered historical overviews, projections, drivers, methodologies and alternative approaches to fertility rate projections.

The first session introduced attendees to a primer on fertility rates with a focus on experience in Canada and the United States and a comparison with other countries. The historical experience presented for Canada and the U.S. emphasized the significant declines in total fertility rates that have occurred in both countries since the baby boom to current levels of about 1.5 and 2.0 children per female, respectively. (The typical summary fertility rate index, the total fertility rate is the sum of the age-specific fertility rates experienced in a specific calendar year; this contrasts with a cohort fertility rate that refers to a cohort of females born in the same year.) In addition, both countries have seen increases in the age at motherhood as fertility rates for those above age 30 have risen. International comparisons of fertility rates showed that the U.S. has a relatively high fertility rate compared to other developed countries. The current projections were discussed for the Canada Pension Plan and the U.S. Old-Age, Survivors and Disability Insurance Program. Sensitivity tests performed on demographic and economic assumptions were discussed, and the resulting beneficiary dependency ratios and financial impacts were shown. The aim of these tests was to show the relative demographic and financial impacts of varying one assumption compared to another. Over the long term, fertility rates were highly significant.

The second session described in detail the drivers of fertility rates. A wave theory of fertility was explained, whereby small cohorts and large cohorts follow each other in succession and are driven by relative economic advantages or disadvantages. Material wealth of a cohort relative to its parents was explained as affecting marriage, fertility, female labor force participation and higher education. The historical shift in perception of children as being economic assets to being economic liabilities was noted as affecting fertility. Next, a comparison was presented of recent trends in fertility rates between Canada and the United States. Notable differences between the two countries include differences between teenage pregnancy rates, abortion rates, marriage versus common-law unions, religious observance and levels of unemployment. It was indicated that the majority of the difference in the total fertility rate is attributed to the much lower Canadian rates for women aged 15 to 29. Comparisons were also

presented between foreign-born versus Canadian-born women, immigrant generations and ethno-racial groups. The increasing importance of immigration to Canada for its population growth was shown, as natural increase is projected to turn negative after the year 2020. This session ended with an analysis of the effect of childbearing age on Social Security projections in the United States. It was observed that the average age at first-time motherhood has increased in the United States and that this trend is present across racial groups and in other countries. In addition to causes already mentioned, another cause cited was the increased use of assisted reproductive technologies. It was also noted that the delay in childbearing could increase the generational period length, and thus old-age dependency ratios and finally, the financial costs to Social Security.

Projection methodologies were described next for social insurance schemes in Québec, the United States and the United Kingdom. The difficulty in projecting fertility rates was illustrated by actual versus expected experience for the United Kingdom. Approaches presented included a combination of run-off triangle techniques, analysis of underlying drivers and historical trends, projection of trends using interpolation to ultimate rates, comparisons with number of intended births, and birth parity modeling. The variability of projections was illustrated by deterministic variants and stochastic modeling. Methodologies were also explained in terms of their components, namely measurement, modeling, judgment and level of detail. One view expressed was that deterministic variants tend either to overstate or understate fertility for extended periods of time, and as such, a better way to incorporate variability would be by a model using a stochastic renewal process. Random scenarios generated by stochastic models without renewal processes were thought to have some of the same drawbacks as deterministic variants.

The fourth session covered alternative approaches, measurement and uncertainty for the future. Sources of uncertainty were identified as accuracy and reliability of data, types of drivers and relationships between them, and duration and shifts in trends. It was noted that uncertainty may also apply to population characteristics, ultimate fertility rates, and distributions of total and age-specific rates over time. An estimate was given of the total U.S. cohort fertility rates for females born in the 1980s as 2.15 per female. An illustrative example was given in the form of a case study of the U.S. Hispanic population and the associated sources of uncertainty. As well, current

and alternative approaches to presenting uncertainty for social insurance projections were discussed. One approach discussed was based on the probability of birth order, that is, the probability of having a second birth given a first birth, and so on. Another presentation covered various models that have been proposed for fertility projections. It was noted that all developed countries have followed a similar development in fertility (the demographic transition) due to similar structural, cultural and technological changes.

The fifth and last session consisted of additional financial projections for the Canada Pension Plan followed by an open discussion between the panelists and the audience. Various topics were discussed through questions and answers. The results of a questionnaire handed out earlier in the symposium were also discussed. The questionnaire asked what the ultimate total fertility rate (TFR) might be for Canada and the United States, whether the probability distribution surrounding the value was balanced or skewed, and in what year the ultimate rate would be reached. The results indicated that the attendees thought that the current estimates of the chief actuaries of the SSA and the CPP were quite reasonable, with the average ultimate TFR surveyed of 1.94 (range of 1.6 to 2.1) and 1.69 (range of 1.4 to 2.0) for the U.S. and Canada, respectively. While for the U.S. the general feeling was that the TFR distribution was symmetric, for Canada two-thirds felt that the fertility distribution was more likely to be skewed high (a fatter tail to the right). A consensus was that the average time until the ultimate TFR would be achieved was about 10 years. Evaluations of the symposium and suggestions for future symposia regarding social insurance were also sought.

The symposium provided a great opportunity to share knowledge and exchange ideas about the fertility assumptions for social insurance projections. If you have any suggestions for future symposia or would just like to get involved with the Committee on Social Security, please contact Sam Gutterman at: sam.gutterman@us.pwc.com.

All of the presentations are available in .pdf format from the archived continuing education presentations/handouts page of the SOA's website: http://handouts.soa.org/conted/cearchive/ce_archivedlist.htm. The sessions were also audio-recorded, and both the presentations and recordings are available on CD-ROM for purchase from Netsymposium. Purchase information for the CD-ROMs of the Annual Meeting may be found at: <http://www.netsymposium.com/index.php?select=association&data=88>. □

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