Longevity Assumption

Alternative model for projecting future mortality improvements in Switzerland
As required by most accounting standards (e.g. IAS 19, ASC 715), an entity shall determine its mortality assumptions by reference to its best estimate of the mortality of plan members both during and after employment. Furthermore, in order to estimate the ultimate cost of the benefits payable by its plan, an entity is often required to also take into consideration expected changes in mortality, for example by modifying standard mortality tables with estimates of mortality improvements.

The mortality tables are therefore based on the following two elements:

- A base mortality table (BVG/LPP 2015, based on the observation of 15 large pension schemes between 2010 and 2014).

- Future mortality improvements (requiring the use of an extrapolation model).

Currently, future mortality improvements are widely determined using the 2015 Menthonnex model (developed by J. Menthonnex and the Swiss Federal Statistical Office). These factors are part of the standard publication of the BVG 2015 tables. Lately, investigations have been launched into alternative ways of extrapolating future mortality improvements in an effort to improve the transparency, flexibility, and accuracy of the projections. The model developed by the Continuous Mortality Investigation (CMI) is such an alternative.

Below we present an illustration of the most recent CMI-style mortality improvements (CMI_2016) for Switzerland along with an overview of the resulting cohort life expectancies as compared with other recently published Swiss mortality projections. The information may be useful when setting assumptions for year-end 2017 or 2018 budgets in accordance with ASC 715, IAS 19, or any other accounting standards with similar requirements for assumptions setting (e.g. IPSAS).

The CMI carries out research into mortality and morbidity experience and is wholly owned by the Institute and Faculty of Actuaries (IFoA) in the UK. The CMI has a long history of carrying out authoritative and independent mortality research, as well as the production of base mortality tables and mortality improvement projection models which are widely used by UK life insurers and pension funds. The CMI is regarded around the world as being one of the leading bodies in terms of quality, depth and breadth of analysis of mortality across insurance companies and pension schemes.
The CMI publishes a mortality projections model that is updated annually to reflect emerging population data. Although the CMI publishes a version of its model calibrated to UK data, the model itself can be calibrated to data from any country. Indeed it is worth noting that:

- The CMI model has been applied to regions other than the UK by international longevity reinsurers assessing appropriate longevity assumptions, and;
- The recent Society of Actuaries’ RPEC projections of pension mortality uses a model based on the CMI model.

Accordingly, we have tested the CMI model calibrated to Swiss data specifically to reflect and project features specific to Switzerland. This communication is thus based on the data for Switzerland published by the Human Mortality Database (HMD\(^1\)), an ongoing research project that relies to a large extent on the data from the Swiss Federal Statistical Office (FSO).

Although the CMI model has many parameters, the CMI provides a “Core” version that essentially leaves one parameter to be set by the user: the long-term mortality improvement rate (LTR). Modelling mortality improvements is well known to be sensitive to the particular model adopted and to its various parameters, and the CMI model is no exception, as illustrated by the LTR for instance.

It should not be assumed that differences in the application of the CMI model invalidate other projections however, rather that they represent alternative benchmarks.

That said, while information about expected mortality improvements can be helpful, the actual circumstances in the future may differ in a material way from those assumed. As with all actuarial assumptions and methods, decisions should be made based on each organization’s relevant facts and circumstances. Appropriate sign-off of assumptions should be sought from your auditors.

**Actual past and future projected CMI mortality improvements for Switzerland**

- The *actual past* (smoothed to remove the annual noise that would otherwise obscure the long term pattern of mortality development) and *projected future* annual improvements are shown below in the form of a “heat map”. Warmer (darker red) / cooler (lighter red) regions on the heat map indicate more / less significant mortality improvements respectively.

- Mortality improvement is calculated as the proportionate reduction in the mortality rate for an individual age \( x \) between time \( t - 1 \) and \( t \), e.g. age 45 between 2017 and 2018.

\(^1\) [http://www.mortality.org/](http://www.mortality.org/)
Heat map of male Swiss mortality improvement with future based on CMI model (LTR 1.50%)

- Smoothed actual past mortality improvements are indicated on the left part of the chart (i.e. left of the black vertical line), while future projected mortality improvements are indicated until 2050 on the right part of the chart (i.e. right of the black vertical line).

Heat map of female Swiss mortality improvement with future based on CMI model (LTR 1.50%)
The CMI model is able to identify cohort effects where there may have been particularly low or high mortality improvements in the past and incorporate this into the future projection. A “cohort” in this context is a group of individuals born around the same time. Cohort features can be identified on heat maps by diagonal features running from bottom left to top right. This is a widely recognized feature which is observed in most European developed countries. Neither the J. Menthonnex method nor the VZ method (using a Nolfi projection model) make allowance for cohort-based mortality improvements – see appendix for heat maps in respect of the J. Menthonnex method and the VZ method.

Cohort life expectancies at age 65 as compared with other recently published Swiss mortality projections (base mortality: BVG 2015)

- For males / females respectively aged 65, cohort life expectancy is projected to increase by around 1.7 years / 1.8 years from 21.7 years / 23.6 years in 2016 to 23.4 years / 25.4 years over the following 20 years in accordance with the above CMI – LTR 1.50 % approach.

- The cohort life expectancies at age 65 shown above are calculated by applying the mortality improvement rates under each method to the BVG 2015 tables (base mortality).

- Note that when decreasing the LTR from 1.50 % p.a. to 1.25 % p.a., the CMI cohort life expectancies in 2016 decrease by approximately 0.1 to 0.2 years for males and females. See appendix for heat maps in respect of the final CMI_2016 model with a LTR of 1.25 % p.a. for Switzerland.

It should be pointed out that the long-term rate of mortality improvements remains a hypothetical rate: it cannot be predicted with certainty as it ultimately depends on factors that are inherently difficult to forecast (e.g. evolution of the general standards of living, access to healthcare, changes in behavior, levels of obesity, smoking…).

Appropriate sign-off of the LTR should be sought from your auditors. Based on our internal research (which we carried out using a number of different approaches such as literature review, sensitivity analysis, back-testing, benchmarking and discussions with experts), an LTR in the range of around 1.00 % p.a. to 2.00 % p.a. may be considered reasonable, with a central best estimate of around 1.50 %. In that context, a rate of 1.75 % p.a. / 1.25 % p.a. may be considered to be more / less conservative respectively for Switzerland.

We hope you find this information helpful. If you have questions, please contact your local Aon Hewitt consultant.
Appendix

Heat map of male Swiss mortality improvement with future based on CMI model (LTR 1.25%)

Heat map of female Swiss mortality improvement with future based on CMI model (LTR 1.25%)
Heat map of male Swiss mortality improvement with future based on Menthonnex model

Heat map of female Swiss mortality improvement with future based on Menthonnex model
Heat map of male Swiss mortality improvement with future based on VZ model

Heat map of female Swiss mortality improvement with future based on VZ model
Contact Information

Aon Suisse SA
Avenue Edouard-Dubois 20
2000 Neuchâtel

Aon Suisse SA
Avenue Edouard Rod 4
Case postale 1203
1260 Nyon 1

Aon Schweiz AG
Lagerstrasse 33
8048 Zürich
+41 (0) 58 266 10 11

swissnews@aonhewitt.com
aon.ch
About Aon Switzerland Ltd.

Aon is the leading global provider of risk management, insurance and reinsurance brokerage, and human resources solutions and outsourcing services.

We have over 50,000 colleagues working in more than 120 countries. In Switzerland, Aon includes Aon Benfield, Aon Hewitt and Aon Risk Solutions, with nearly 350 colleagues in Zug, Basel, Lugano, Neuchâtel, Nyon and Zurich.

About Aon Hewitt

Aon Hewitt advises around 500 clients, providing comprehensive single-source solutions for all aspects of their pensions administration. Our services include consulting (pension actuary services), administration and management, and investment consulting for pension funds. At Aon Hewitt, we integrate extensive expertise and specialised knowledge with efficient processes and a global network, to deliver effective, reliable services for our clients.

We have nearly 145 colleagues working for you in our offices in Zurich, Nyon and Neuchâtel. For more information about Aon Hewitt, please visit www.aon.ch.

Copyright 2017 Aon Switzerland Ltd.