

Accident Benefits Long Term Disability Workbook Guide

Introduction

This document describes the layout and functionality of the Canadian Institute of Actuaries (CIA) Research Paper on Accident Benefits Long Term Disability Microsoft Excel workbook called *CIA_AB_LTD_2019_Tables.xlsx*. The workbook was developed by the KPMG team to calculate survival rates and annuity factors based on the final selected survival models. These survival models were developed using generalized linear models (GLM) assuming a Poisson distribution with log link function and hinge point(s).

Any use or reliance on this workbook by any third party is done at their own risk. KPMG will not be liable for the consequences of any third party acting upon or relying upon any information or conclusions contained in this workbook. Users should be knowledgeable in long term disability products and the calculation of long term disability reserves, survival rates, and annuity factors. Users are encouraged to familiarize themselves with the methodology used to derive the various values throughout the workbook.

The workbook is being released with no cell protections. Any user modifications to the workbook is the user's responsibility. It is designed to run on Excel 2013 and later.

Any questions, feedback or suggested corrections regarding the workbook should be directed to Sherry Feng, who may be reached at 416-476-2988, or by email, shihweifeng@kpmg.ca.

The remainder of this document describes the content of the various tabs comprising the workbook.

Tab: Dashboard

This tab has three functions. The *Single Model* button will generate the survival table and the annuity table based on the specified user inputs provided in cells C3 to C7 and C11. The *Single Annuity* button will calculate an annuity amount for a specific age and duration instead of generating the full survival and annuity tables. Specified inputs are required in cells C3 through C11. The *All Models* button will generate every possible model combination (region/insurer, type/age) based on the specified input, which are provided in cells C5, C6, and C11.

The following list describes the required inputs:

- *Region (cell C3)*. The user can select *GTA* and *Non-GTA* regions.
- *Insurer Type (cell C4)*. The user can select *Group* and *Non-Group* insurers.
- *Gender (cell C5)*. The user can select *Female* and *Male* genders.
- *Coverage Type (cell C6)*. The user can select *Income Replacement Benefits*, *Caregiver Benefits*, and *Non-Earner Benefits* for the coverage type.

- *Maximum Attainable Age (in Years) (cell C7)*. For coverage type *Income Replacement Benefits*, the user must input a whole number between 80 and 120 years, inclusive. For the coverages *Caregiver Benefits* and *Non-earner Benefits*, the input will automatically be set to 80 years and cannot be changed.
- *Age (cell C8)*. The user can select a specific age at which the annuity amount will be calculated. For the coverages *Income Replacement Benefits* and *Non-earner Benefits*, the difference between the maximum attainable age and the age chosen to calculate the annuity must be at least four (4). For the coverage type *Caregiver Benefits*, the user can input a whole number between 16 and 80 years inclusive. If, however, the age chosen is greater than 75, the annuity amount will be calculated based on the survival probability of a 75-year old individual. This will cause the annuity amount to be a bit more conservative than the true age.
- *Duration (in Months) (cell C9)*. The user can select a specific duration (in months) at which the annuity amount will be calculated. The input must be a whole number greater than or equal to one (1) and cannot go beyond the maximum attainable age.
- *Weekly Payment (cell C10)*. The user can select any amount that will then be multiplied by the specific annuity factor calculated.
- *Constant Force of Discounting (cell C11)*. The constant force of discount has to be a number between 0.00% and 20.00% inclusively.

Tab: Explanatory Variables

This tab presents the five (5) models and the estimated parameters for each model.

Tab: Template 1

This tab contains the template for the survival table generated from the *Single Model* and *All Models* buttons. It also contains the parameter options for the input table on the Dashboard starting in column BK.

Tab: Template 2

This tab contains the formulas to generate the annuity table for the *Income Replacement Benefits* coverage type.

Tab: Template 3

This tab contains the formulas to generate the annuity table under the *Caregiver Benefits* and *Non-earner Benefits* coverage types.

Generated Worksheets Naming Convention

The first item in the name of the generated tabs will either be the suffix “SurvT” or “ResvT” for the survival table and for the reserving table respectively. The next item will be the model chosen (i.e. “Model3”). The third item is the gender chosen. The fourth item is the maximum attainable

age (in years). The fifth item is the discount rate chosen. The final item is the coverage type. For the survival table of the third model with the gender being male, the maximum attainable age being 80 years, 0% constant force of discount and the coverage type being caregiver benefits, the worksheet will be named "SurvT.Model3.M.80.0.CB."