Data Tables in Anylogic Model.

The model contains several input tables, each of them is described below. Note that these tables are read from the initialization\_tables excel file.

The UN tables from which these tables derive you find in the Folder UN data tables.

**death\_rate\_cdr**

This table presents the values of the central death rate per gender, period, and 5-year age group. The values were taken from the UN tables “WPP2019\_MORT\_F17\_2\_ABRIDGED\_LIFE\_TABLE\_MALE” and “WPP2019\_MORT\_F17\_2\_ABRIDGED\_LIFE\_TABLE\_FEMALE”, column “Central death rate m(x,n)”. At the moment, it is the death rate that gives the best results. It represents the probability of an agent dying according to its age, gender, and period. Note that in this table, there is an extra group, the group 0-0.5. This group was created because of the adjustments done to the mortality process by David. In the model, after being born, there is an immediate chance of dying. The values in this “0-0.5” group represent this chance. These values were calculated using the UN tables and column values as follows: “ [ Number of deaths d(x,n) – ( Number of survivors l(x) - Number of person-years lived L(x,n) ) ] / Number of person-years lived L(x,n) ]”

**death\_rate\_survival\_ratio**

This tables also represents values for the probability of an agent dying according to its age, gender, and period. However, these values were recalculated from the values of “Survival ratio S(x,n)” column given in the UN tables. Given that these values represent the survival probability in a 5-year period, the recalculation was done to calculate the probability of dying per single year during a period. This calculation had the formula “ 1 – SurvivalRatio ^ 1/AgeInterval ”; where age interval is 5 (5-year groups). There are two important things to note in these tables. First, as in the previous table, there is an extra group, group 0-0.5. These values were calculated using the UN tables and column values as follows: “ 1 - Number of person-years lived L(x,n) ) / 100,000”. Second, the 0-1 and the 1-4, are now only one group, the 0-4 group. The value of this group was calculated as 1 – SurvivalRatio\_1-4\_Group ^ 1/5.

**fertility rate**

This table gives the probability of a female giving birth according to her age (15-49) and period. These values were taken from the UN table “WPP2019\_FERT\_F07\_AGE\_SPECIFIC\_FERTILITY”. Note that these figures are given by 5-year age groups in the UN table, but in the input table they are specified by single-year age groups. The values are the same anyhow.

**init\_age\_dist\_1950\_un\_fem / init\_age\_dist\_1950\_un\_mal**

These tables are the initial age distributions for males and females in 1950 (as of 1st of July). The values were taken from the UN tables “WPP2019\_INT\_F03\_2\_POPULATION\_BY\_AGE\_ANNUAL\_MALE”, “WPP2019\_INT\_F03\_2\_POPULATION\_BY\_AGE\_ANNUAL\_FEMALE”.

**net\_in\_mig\_age\_gender\_prop / net\_out\_mig\_age\_gender\_prop**

These tables indicate the proportion (percentage) of in/out male/female migrants belonging to a specific age group and period. These proportions were calculated from the tables in the file “wpp2019\_NOR\_NMig”. The procedure was the following. The MediumMigration Sheet presents tables with the Net Migration figures broken down by period, gender, and age group. Negative numbers represent out net migration and positive in net migration. From these figures, we derived two tables, net in and out migration (by period, gender and age group), and then I calculated the in/out migrants proportion by dividing the figures in each age group cell by the total. Note that this tables start in Period 1900-1904. Disregard these initial periods, these are approximations I do not remember how I calculated. But it does not matter, they are not used in the model. You can delete them.

**net\_out\_migration\_per\_period / net\_in\_migration\_per\_period**

These are the total number of net in/out migrants per period broken by gender. Like the previous tables, they were calculated from the tables in files “wpp2019\_NOR\_NMig”. Only one of these tables is used in the model, the net\_out\_migration\_per\_period. It is used to know the number of agents that will be tagged at the beginning of each period and that are removed each half year thereafter, see function “Set\_out\_migrant\_pop\_period”.

**net\_out\_migration\_per\_year / net\_in\_migration\_per\_year**

The tables were again calculated from tables in files “wpp2019\_NOR\_NMig”. The first two columns of these tables are not used anymore; anyhow, I briefly describe them. The extrapolated counts were calculated to smooth the arrival/leaving of migrants per year. The proportions are calculated from the extrapolated figures (extrapolated\_count\_per\_year/ by\_total\_in\_period).

The columns used are the 1st half and 2nd half; derived from the even counts column. The even counts is the total number of in/out migrants per period divided by 5 (years in the period). Whenever this number is not a multiple of 5, the high and low values alternate, with the center of gravity in the middle year.  For example, a total of 30 over five years was distributed as 6,6,6,6,6; 29 as 6,6,5,6,6; 28 as 6,5,6,5,6; 27 as 5,6,5,6,5, and 26 as 5,5,6,5,5. The numbers per year were further divided in 1st and 2nd half of the year. When these yearly numbers were not even, floor/ceiling rounding was alternated between years.

**Sex\_Ratio\_At\_Birth**

These values were calculated from the values in the table “WPP2019\_FERT\_F02\_SEX\_RATIO\_AT\_BIRTH” and represent the proportion of males at birth. The UN table gives the number of males births per females births. So, the proportion is the value given by the UN divided by this same value plus one. For example if the number is 1.06 males births per 1 female birth, the proportion is then 1.06 / (1.06 + 1).

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