- Extracted UNPD census counts, these are available in 1975, 1985, 1996 and 2006
  - why in Mark's *PopReconstruct* package the census data for Burkina Faso females are in 1975, 1985 1995 and 2006? Are the data WPP estimates instead of raw census counts?
  - For census rounds in 1985, 1996 and 2006, there are multiple entries that correspond to slightly different time within the year, e.g. there are 2 records for the number of age 10-14 in 1985, one at 1985.946, and the other one at 1985.955
  - Used De-jure population counts as De-facto is only available in 1996 and 2006
  - Used the WPP population estimates for 1960 as baseline population counts
  - Are these counts adjusted for possible biases and undernumeration already?
  - Tried to extract population counts for single year of age but it is not available for 1975 (thats I got no data for 1975 the other day when you shared your query)
- Moved to doing 5 ages x 1 year instead of 5x5 as census data are not always 5 years apart
- Used IGME ${}_5q_0$ estimates as priors for the parameter in LogQuad Model in 2 ways (below)
- Estimated g_x are more extreme and unreasonable ☹, will try to fit only from 1975-2006 and see if anything changes
- will compare estimated ${}_5q_0$ with the IGME estimates, but based on a quick skim shows that the 2nd prior gives estimates closer to the IGME input

1. AR(1) around IGME estimates

Let $\hat{q}_t$ be the IGME estimates for ${}_5q_0$ in the t-th year. Then the prior on h in the LogQuad Model is

$$\begin{aligned} h_1 &= \log(\hat{q}_1) + y_1 \\ h_2 &= \log(\hat{q}_2) + y_2 \\ &\vdots \end{aligned}$$

and

$$\begin{aligned} y_1 &= \varepsilon_1 \\ y_2 &= \rho y_1 + \sqrt{(1-\rho^2)}\,\varepsilon_2 \\ &\vdots \end{aligned}$$

where $\boldsymbol{\varepsilon}_t \sim N(0, \sigma^2)$, i.e. $\boldsymbol{h}_t - \log(\hat{\boldsymbol{q}}_t) \sim AR(1)$.

2. Pulled towards IGME estimates

$$\begin{aligned} h_1 &= \log(\hat{q}_1) + \varepsilon_1 \\ h_2 &= (1-\rho)\log(\hat{q}_2) + \rho\, h_1 + \sqrt{(1-\rho^2)}\,\varepsilon_2 \\ &\vdots \end{aligned}$$

Future h_t depend on previous h_{t-1} drawn towards the corresponding IGME estimates in the t-th year, however, prior expectations of $\boldsymbol{h}_t$ are not exactly the IGME estimates anymore.