

# Stochastic forecast of the population using models for fertility and mortality

Mare Vähi

*University of Tartu, Estonia, email: mare.vahi@ut.ee*

**Keywords:** beta-distribution, forecast, predictive distribution, uncertainty.

Probabilistic population forecast is based on stochastic population renewal using forecasts of fertility and mortality. Fitting the suitable family of distributions for modelling the changes in fertility distribution is the first step. Most commonly used distributions are beta distribution, gamma distribution and Hadwiger distribution. The beta distribution and mixtures of beta distributions show excellent fit to the one year age-specific fertility rate distributions. The second step is to estimate the parameters of the distribution of mortality. The fertility model and mortality model are then used in simulation of future fertility and mortality to obtain forecasts of the population. The method is demonstrated using Estonian data for the period 1991 - 2009.

## References

- [1] Alho, J. M., Spencer, B. D. (2005). *Statistical Demography and Forecasting*. Springer Science, New York.
- [2] Booth, H. (2006). Demographic forecasting: 1980 to 2005 in review. *International Journal of Forecasting* **22**(3), 547–581.