**Research Plan: Empirical prediction intervals for forecasts of total fertility rate**

Future paths of fertility are a key input when charting the sustainability of social security systems. In particular in low-fertility countries, sustained low and declining fertility is expected to put pressure on the key indicators of sustainability. For example, old-age support ratio and various dimensions of pension burden may increase. Hence realistic views of possible future paths of fertility, including the uncertainty regarding these paths, is critically important for economic and social planning. In this project we create, using state-of-the-art methods, one or more forecasts of period total fertility rate for Finland for the years 2023-2050, and accompany these forecasts with realistic estimates of the forecast uncertainty.

The added value, in contrast to existing predictions, is twofold. First, we critically evaluate and discuss the literature on fertility forecasting, and adopt one or more methods that are likely to be most reasonable approaches in the context of Finland that is characterized as a high-income low-fertility country with high social support for Families.

Second, we provide a realistic view on the uncertainty that characterizes our predictions. An almost universal finding of probabilistic forecasting is that model-based prediction intervals are too narrow. This holds across all social science forecasting, including forecasts of fertility rates. The result is a misleadingly confident view of the future and possibly a social security system that is not well-prepared and robust enough for the uncertain future. We approach the problem of prediction uncertainty by generating empirical prediction intervals for our forecasts. This approach circumvents the problem that key model assumptions are likely to be wrong, and has the potential to deliver realistic forecast uncertainty even when the model assumptions fail.