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Forecasting Mortality With International Linkages: A Global Vector-Autoregression Approach

Abstract

This paper proposes a multi-population Global Vector Autoregression (GVAR) mortality model, in which the joint mortality dynamics of all populations are formulated in a large vector autoregression model with a set of contemporaneous global mortality factors. By decomposing the large VAR regression into population-wise local mortality systems containing a population-specific autoregressive component and a cross-sectional component of global mortality factors, the proposed GVAR model could substantially reduce the extra estimation cost of including additional populations. Consequentially, the new GVAR model provides an efficient tool to analyze the joint mortality dynamics of a large group of populations, which has been a rather challenging task for existing VAR-type mortality models. Moreover, under fairly general assumptions, the proposed GVAR model could produce coherent projected mortality rates for any two ages and populations. Using single-age mortality data of 15 low-mortality countries as considered in Li and Lee (2005), we find that the global factors have substantial impacts on mortality improvements of individual populations. Furthermore, we show that the proposed GVAR model could produce satisfying mortality forecasts under various settings.