Causes-of-Death Mortality: What Can Be Learned from Cointegration

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Modeling mortality and longevity risks is critical to pricing longevity products. It has challenged practitioners and academics alike, because of first the existence of common stochastic trends, and second the unpredictability of an eventual mortality improvement in some age groups.

When considering cause-of-death-mortality rates, both aforementioned trends are additionally affected by the cause of death. Over the last century, the assumption has been usually made that causes of death are independent, even though it is well-known that dependencies exist. Recent developments in econometrics allow, through Vector Error Correction Models (VECM), to model multivariate dynamic systems including time dependency between economic variables.

Common trends that exist between the variables may then be highlighted, the relation between these variables being represented by a long-run equilibrium relationship. In this work, VECM are developed for causes-of-death mortality.

We analyze the five main causes of death across nine major countries. Our analysis reveals that long-run equilibrium relationships exist between the five main causes of death, improving our understanding of the dependence between these competing risks. Similarities between the countries under study are observed, with groups of countries having similar experience, what is further emphasized by decomposing the mortality time series into a permanent and transitory components.

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