

Stochastic Trend Models in Casualty and Life Insurance

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Abstract

Quantifying liability risk for insurance companies requires projections of distributions of future contingent costs. Past patterns are typically forecast to continue but with the possibility of deviations to various extents. Trends into future calendar years for existing populations of people or events involve inherent uncertainties, but the forecasts are needed in both casualty and life insurance, and the understanding/quantification of those uncertainties is essential to risk analysis and management. With an emphasis on the somewhat analogous issues of calendar-year payment trend in casualty and mortality trend in life, we review existing models, provide some extensions and discuss some pitfalls. In particular, we find that unrecognized time series behavior in casualty payment trends can significantly contribute to reserve risk, and provide techniques for identifying and measuring it. In life, time series in mortality trend is typically modeled, but we find that the fitting of historical calendar-year trends creates autoregressive effects in the estimated trends that may not exist in the underlying trends.

Keywords:

Loss Reserves, Mortality, Trend, Autoregressive Models, Time Series.