Estimating and Forecasting Models of Lapse Rates in the Life Insurance Industry

It is becoming increasingly significant to estimate lapse rates for the purpose of actuarial valuations since the life insurance industry is faced with adopting the cash flow pricing, lapse-supported products, and international financial reporting standards. Under these circumstances, it is also required to predict the lapse rates accurately for management planning. In this context, the report tries to estimate lapse rates by policy year, and then construct forecast models for them which are useful for the planning.

Using a dataset from the Korea Insurance Development Institute, we calculate lapse rates by policy month for six insurance products: whole life, term life, cancer insurance, fixed annuities, interest-sensitive annuities, and variable annuities. Together with the lapse rates, one of our findings is that the monthly lapse rates for protective insurances such as the first three insurance products have been less than 1 percent ever since the 41st month elapsed. The reason for this is likely that policyholders who do not surrender insurance contracts for a certain period of time generally have no such initial intentions, the so-called automatic policyholder selection. Another is that, owing to the impact of shock lapse on annuities such as the second three products, it is difficult to find stable downward trends in the lapse rates. The other is that the lapse rates in annuities are in general high in order of variable annuities, interest-sensitive annuities, and fixed annuities.

In order to construct forecast models, we make a dataset for time-series analysis with the calculated lapse rates, and then consider
univariate and multivariate time series models. The estimation results for the forecast models are as follows: In the univariate analysis for the lapse rates considering all the months elapsed, the best forecast models we got are the ARMA(6,1), ARMA(6,0), and ARMA(2,7) models for whole life insurance, fixed annuities, and interest-sensitive annuities, respectively, while those for only the 13th month elapsed are the ARMA(1,3), ARMA(1,1), and ARMA(1,1). On the other hand, in the multivariate analysis with some macroeconomic variables, the best models for all the months elapsed are the first-differenced VAR(6) model for both whole life insurance and interest-sensitive annuities, and the ADL(1,1) for fixed annuities. The best multivariate models related to the 13th month elapsed are not provided because the models do not work well as a forecast model.