

# Stochastic Threshold Models on Interest Rate

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Threshold models have been found useful in modelling nonlinearities in many financial time series. In this framework, the financial variable of interest evolves according to different dynamics, which is solely determined by the threshold regimes that the observed indicator variable falls into. This paper generalizes the threshold models to a class of stochastic threshold models, which allow for stochastic dependence of the current economic state on the threshold regimes. In a stochastic threshold model, different economic states are possible to occur within a certain threshold regime and each state occurs with some probability dependent on the threshold regime and other recently observed information. Model identification and maximum likelihood estimation are developed. An study on short-term interest rate is conducted. We find that the short-term interest rate behaves asymmetrically in a rising versus a declining market. Declining market has significantly negative duration (in "return clock") dependence and rising market has insignificantly positive duration dependence. In the comparison of generalized autoregressive conditional heteroskedasticity models, threshold autoregressive models, generalized regime-switching models and stochastic threshold models, we find that our stochastic threshold model fits the data best in terms of alternative model selection criteria and in-sample forecasting. It also provides the best out-of-sample forecasting.

**Key words:** Stochastic threshold; Short-term interest rate; Conditional volatility; Maximum likelihood

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