

Hidden Threshold models with applications to asymmetric cycles in Antarctica ice volume and US unemployment

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Thursday 23 May 2024 | 2.30 p.m.
Room Benvenuti
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Threshold models are set up so that there is a switch between regimes for the parameters of an unobserved components model. When Gaussianity is assumed, the model is handled by the Kalman filter.

The switching depends on a component crossing a boundary, and, because the component is not observed directly, the error in its estimation leads naturally to a smooth transition mechanism. A prominent example motivating thresholds is that of a cyclical time series characterized by a downturn that is more, or less, rapid than the upturn.

The situation is illustrated by fitting a model with three potentially asymmetric cycles, each with its own threshold, to observations on ice volume in Antarctica since 799,000 BCE. The model is able to produce multi-step forecasts with associated prediction intervals. A second example shows how a hidden threshold model deals with an asymmetric cycle in monthly US unemployment.



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