Title: Stochastic Catastrophe Model Cusp

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Abstract: The goal of this thesis is to analyze the stochastic cusp model. This task is divided into two main topics. The first of them concentrates on the stationary density of the cusp model and statistical testing of its bimodality, where power and size of the proposed tests are simulated and compared with the dip test of unimodality. The second main topic deals with the transition density of the stochastic cusp model. Comparison of approximate maximum likelihood approach with traditional finite difference and numerical simulations indicates its advantage in terms of speed of estimation. An approximate Fisher information matrix of general stochastic process is derived. An application of the cusp model to the exchange rate with time-varying parameters is estimated, the extension of the cusp model into stochastic bimodality model is proposed, and the measure of probability of intrinsic crash of the cusp model is suggested.

Keywords: stochastic cusp model, bimodality testing, transition density approximation