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Maximum likelihood approach for several stochastic volatility models

Jordi Camprodon, Josep Perelló

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Volatility measures the amplitude of price fluctuations. Despite it is one of the most important quantities in finance, volatility is not directly observable. Here we apply a maximum likelihood method which assumes that price and volatility follow a two-dimensional diffusion process where volatility is the stochastic diffusion coefficient of the log-price dynamics. We apply this method to the expOU, the OU and the Heston stochastic volatility models and we study their performance in terms of the log-price probability, the volatility probability, and the mean first-passage for the log-price. The approach has some predictive power on the future returns amplitude by only knowing current volatility. The assumed models do not consider long-range volatility auto-correlation and the asymetric return-volatility cross-correlation but the method still arises very naturally these two important stylized facts. We apply the method to different market indexes and with a good performance in all cases.

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