A Hybrid SLV model with Multifactor Stochastic Volatility

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Extended abstract

The need for more satisfactory pricing models has brought the attention of researchers and practitioners on Stochastic Local Volatility models. Despite the growing interest on the topic, however, it seems that no particular attention has been paid to the use of multifactor specifications for the stochastic volatility part. The additional flexibility given by this kind of approach in describing the skew dynamics becomes extremely important when we deal with the pricing of forward volatility sensitive contracts like forward start or cliquet options.

This paper tries to fill the gap: we introduce the Wishart Stochastic Local Volatility model that describes the stochastic volatility by means of a Wishart process as proposed in [4]. The goal of the new framework is twofold: adding a realistic volatility dynamics to Local Volatility models without the limitations of standard 1-factor Stochastic Volatility approaches, and improving European claims pricing performance of pure Wishart Stochastic Volatility model. The latter is quite relevant since we need to introduce stringent parameters restrictions to satisfy existence and uniqueness conditions for the solution of Wishart SDE. These conditions are required when we want to properly simulate the variance process in order to price more exotic derivatives. However such conditions are not usually met when market calibration is performed and so the resulting constrained parameters set is not able to reproduce accurately the market implied volatility surface. The additional Local Volatility component acts then as compensator.

We further present an innovative simulation scheme for the asset path in the pure stochastic volatility specification based on the approach in [1]. The simulation scheme is also used to tackle the calibration of the so-called leverage function and price derivatives in the new hybrid framework.
Keywords
Stochastic Local Volatility, Multifactor Volatility, Exotic Derivatives.

References