

Option Pricing in the Moderate Deviations Regime

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Small-time asymptotics of option prices have received considerable attention in the literature. In diffusion models, two small-time regimes have been studied extensively so far: At-the-money (related to central limit theorems) and fixed-strike out-of-the money (related to large deviations). With the present work, we aim to fill the gap in between of these regimes. We thus consider “moderately out of the money” strikes that vary with maturity. For small maturity, call prices then exhibit moderate deviations behavior, with a quadratic rate function. Our approximations are easy to evaluate numerically (which is not always the case in the large deviations regime), and involve the model parameters in a transparent way. They also reflect the market reality that strikes far out of the money are not traded at short expiry. First and higher order small-time moderate deviation estimates of call prices and implied volatility are obtained. They lead to a novel relation between implied volatility and the small-time at-the-money implied variance skew. We illustrate our results in the Heston model.

References

- [1] Friz P., Gerhold S., Pinter A., Option Pricing in the Moderate Deviations Regime. *Preprint*, 2016.