Numerical methods for the Heston model

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Acknowledgements

Any one who considers arithmetical methods of producing random digits is, of course, in a state of sin. - John von Neumann

You get pseudo-order when you seek order; you only get a measure of order and control when you embrace randomness. — Nassim Nicholas Taleb

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Abstract

The preface pretty much says it all.

Second paragraph of abstract starts here.

Dedication

You can have a dedication here if you wish.

Chapter 1

altadvisor: 'Your Other Advisor'

Chapter 2

Literature Review

Chapter 3

The Heston Model Implementation

Chapter 4

Results

We present here the results of all the implementations that were disclosed in the previous section. We perform numerical comparisons between all the methods, setting out differences accross number of simulations and timesteps.

Heston [1] gives a closed form used for comparison as the 'true' option value and enabling the results to be exposed in terms of bias[1] and RMSE (root mean square error).[2]

The simulaton experiments were performed on a notebook with an Intel(R) Core(TM) i7-4500U CPU @ 1.80GHz processor and 8GB of RAM running on a linux x86_64 based OS, Fedora 25. Codes were all written in R 3.4.1 "Single Candle" [2].

[1] $\mathbb{E}\left[\hat{\alpha} - \alpha\right]$

[2] Defined as $\sqrt{\mathbb{E}((\hat{\theta} - \theta)^2)}$

Variables	Values
dt	0.05
k	6.21
r	0.03
rho	-0.70
S	100.00
sigma	0.61
t	0.00
tau	1.00
theta	0.00
v	0.01
X	100.00

Chapter 5

Conclusion

Chapter 6

Black-Scholes formula

References

[1] S.L. Heston, A closed-form solution for options with stochastic volatility with applications to bond and currency options, Review of Financial Studies. 6 (1993) 327–343.

[2] R Core Team, R: A language and environment for statistical computing, R Foundation for Statistical Computing, Vienna, Austria, 2017.