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American stochastic volatility call option pricing: A lattice based approach

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Abstract

This study presents a new method of pricing options on assets with stochastic volatility that is lattice based, and can easily accommodate early exercise for American options. Unlike traditional lattice methods, recombination is not a problem in the new model, and it is easily adapted to alternative volatility processes. Approximations are developed for European C.E.V. calls and American stochastic volatility calls. The application of the pricing model to exchange traded calls is also illustrated using a sample of market prices. Modifying the model to price American puts is straightforward, and the approach can easily be extended to other non-recombining lattices.

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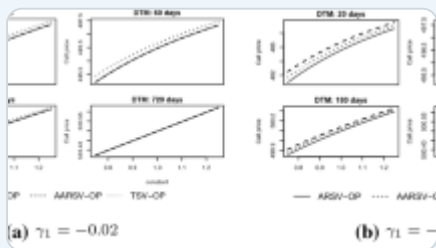
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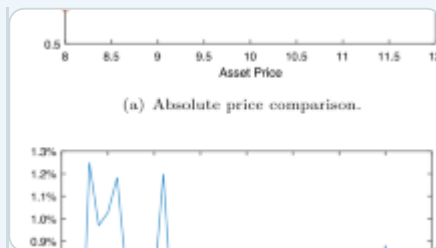
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References

Amin, K. I. and J. N. Bodurtha. (1995). "Discrete-Time Valuation of American Options with Stochastic Interest Rates," *Review of Financial Studies* 8(1), 193–234.

[Google Scholar](#)

Black, F., and M. Scholes. (1973). "The Pricing of Options and Corporate Liabilities," *Journal of Political Economy* 81, 637–59.

Boyle, P. (1977). "Options: A Monte-Carlo Approach," *Journal of Financial Economics* 4, 323-38.

[Google Scholar](#)

Boyle, P. (1988). "A Lattice Framework for Option Pricing with Two State Variables," *Journal of Financial and Quantitative Analysis* 23, 1-12.

[Google Scholar](#)

Cox, J. (1975). "Notes on Option Pricing I: Constant Elasticity of Variance Diffusions." Working Paper, Stanford University.

Cox, J., S. Ross, and M. Rubinstein. (1979). "Option Pricing: A Simplified Approach," *Journal of Financial Economics* 7, 229-63.

[Google Scholar](#)

Cox, J., and M. Rubinstein. (1985). *Options Markets*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

[Google Scholar](#)

Chesney, M., and L. Scott. (1989). "Pricing European Currency Options: A Comparison of the Modified Black-Scholes Model and a Random Variance Model," *Journal of Financial and Quantitative Analysis* 24, 267-284.

[Google Scholar](#)

de Munnik, J. (1994). "The Construction of A Path-Independent Interest Rate Tree: the Model of Heath, Jarrow, and Morton," *Advances in Futures and Options Research* 7, 135-145.

Finucane, T. (1994). "Binomial Approximations of American Call Option Prices with Stochastic Volatilities," *Advances in Futures and Options Research* 7, 113-134.

[Google Scholar](#)

Geske, R., and K. Shastri. (1985). "Valuation by Approximation: A Comparison of Alternative Option Valuation Techniques," *Journal of Financial and Quantitative Analysis* 20, 45-71.

[Google Scholar](#)

Heath, D., R. Jarrow, and A. Morton. (1992). "Bond Pricing and the Term Structure of Interest Rates: A New Methodology," *Econometrica* 60, 77-105.

[Google Scholar](#)

Heston, S. (1993). "A Closed-Form Solution for Options with Stochastic Volatility with Applications to Bond and Currency Options," *Review of Financial Studies* 6, 327-343.

[Google Scholar](#)

Ho, T., R. Stapleton, and M. G. Subrahmanyam. (1995). "Multivariate Binomial Approximations for Asset Prices with Nonstationary Variance and Covariance Characteristics," *Review of Financial Studies* 8(4), 1125-1152.

[Google Scholar](#)

Hull, J., and A. White. (1987a). "The Pricing of Options on Assets with Stochastic Volatilities," *Journal of Finance* 42, 281-300.

[Google Scholar](#)

Hull, J., and A. White. (1987b). "Hedging the Risks from Writing Foreign Currency Options," *Journal of International Money Finance* 6, 131-152.

[Google Scholar](#)

Hull, J., and A. White. (1988a). "The Use of the Control Variate Technique in Option Pricing," *Journal of Financial and Quantitative Analysis* 23(3), 237-251.

[Google Scholar](#)

Hull, J., and A. White. (1988b). "An Analysis of the Bias in Option Pricing Caused by Stochastic Volatility," *Advances in Futures and Options Research* 3, 29-61.

[Google Scholar](#)

Johnson, H., and D. Shanno. (1987). "Option Pricing When the Variance is Changing," *Journal of Financial and Quantitative Analysis* 22, 143-152.

[Google Scholar](#)

Li, A., Ritchken, P., and L. Sankarasubramanian. (1995). "Lattice Models for Pricing American Interest Rate Claims," *Journal of Finance* 50(2), 719-737.

[Google Scholar](#)

Melino, A., and S. Turnbull. (1990). "Pricing Foreign Currency Options with Stochastic Volatility," *Journal of Econometrics* 45, 239-265.

[Google Scholar](#)

Nelson, D. B., and K. Ramaswamy. (1990). "Simple Binomial Processes as Diffusion Approximations in Financial Models," *Review of Financial Studies* 3(3), 393-430.

[Google Scholar](#)

Press, W., B. Flannery, S. Teukolsky, and W. Vetterling. (1989). *Numerical Recipes: The Art of Scientific Computing*. Cambridge: Cambridge University Press.

[Google Scholar](#)

Ritchken, P., and L. Sankarasubramanian. (1995). "Volatility Structures of Forward Rates, and the Dynamics of the Term Structure," *Mathematical Finance* 5(1), 55-72.

[Google Scholar](#)

Roll, R. (1977). "An Analytic Formula for Unprotected American Call Options on Stocks with Known Dividends," *Journal of Financial Economics* 5, 251-258.

[Google Scholar](#)

Scott, L. (1987). "Option Pricing When the Variance Changes Randomly: Theory, Estimation, and an Application," *Journal of Financial and Quantitative Analysis* 22, 419-438.

[Google Scholar](#)

Stein, E., and J. Stein. (1991). "Stock Price Distributions with Stochastic Volatility: An Analytic Approach," *Review of Financial Studies* 4, 727-752.

[Google Scholar](#)

Taylor, S. (1994). "Modeling Stochastic Volatility: A Review and Comparative Study," *Mathematical Finance* 4(2), 183-204.

[Google Scholar](#)

Tian, Y. (1994). "A Reexamination of Lattice Procedures For Interest Rate-Contingent Claims," *Advances in Futures and Options Research* 7, 87-111.

[Google Scholar](#)

Wiggins, J. B. (1987). "Option Values Under Stochastic Volatility," *Journal of Financial Economics* 19, 351–372.

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