An alternative model for evaluating exchange rate derivatives with stochastic volatility

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Abstract

Heston’s paper (1993) presents a method to derive a closed-form solution for derivatives pricing when the volatility of the underlying asset follows a stochastic dynamics. His approach is appropriate for European derivatives but, unfortunately, does not provide a formula to price more complex contracts. In this paper we propose an alternative stochastic volatility model which retains many features of Heston’s model and is suitable for an easy discretization through recombining trees in the spirit of Nelson and Ramaswamy (1990). We apply the model to the USD/EURO exchange rate market. After having discussed the theoretical (distributional) properties of the model we calibrate it and construct the multinomial recombining tree. Finally, we provide a numerical comparison between prices of vanilla options obtained using the proposed model, both in continuous and discrete case, and Heston’s model.

Key words: option pricing, stochastic volatility, recombining trees

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