

Pricing American Real Options with Double Continuation Region under Heston Model

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Abstract

The classical assumption of positive interest rates in financial problems that involve taking decisions is not always realistic. In fact, endogenous negative interest rates are frequently present in this kind of problems, such as gold loans or capital investment options, that can be formulated as American options. In this framework, the presence of a double continuation region has been theoretically studied for American options with one stochastic factor.

In the present work, especially motivated by the gold loan problem, we propose a more realistic approach considering a stochastic volatility model. For American call options with negative rates, we pose the pricing problem in terms of partial differential equations (PDEs) under Heston model. Next, we propose numerical methods based on finite differences, Crank-Nicolson scheme and duality algorithms for complementarity problems, to solve American options with negative rates and one stochastic factor to illustrate the theoretical results. Using the same numerical methods, we obtain a double continuation region also in the case of stochastic volatility.

References

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