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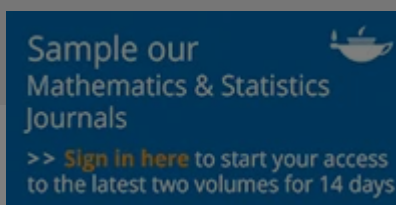
Original Articles

A Semi-Explicit Approach to Canary Swaptions in HJM One-Factor Model

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Abstract

Leveraging the explicit formula for European swaptions and coupon-bond options in the HJM one-factor model, a semi-explicit formula for 2-Bermudan options (also called

Canary options) is derived. This formula is used to compute the price of these options at any times. Since the formula is semi-explicit, it can be used to compute the price of a single numerical option or a portfolio of options. The formula is also used to compute the complex derivatives of the option price with respect to the parameters of the model. The performance of the formula is compared with the performance of the Monte Carlo simulation in a case study. The results show that the formula is much faster and more accurate than the Monte Carlo simulation. The formula is also used to compute the more favorable pricing strategy for the option holder.

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Notes

1. Bounded is too strong for the proof we use, some L^1 and L^2 conditions are enough, but as all the examples we present are bounded, we use this condition for simplicity.
2. See Hunt and Kennedy ([2000](#)) for the definition of a numeraire pair. Note that here we require that the bonds of all maturities are martingales for the numeraire pair (N, N) .
3. Matlab code available from the author.
4. There is nothing special about that date, except it is my sister's birthday!
5. As the second step is shorter (6m), the distance between points is also smaller and more than $4n+1$ final points are used.
6. It took around four hours on my computer to run the (non-optimized) code to compute π using 200 steps of precision. To the tree computation.



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