

# Determining the Form of the Short Rate Volatility Using the Approximate Formula for Pricing Zero-coupon Bonds

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We consider a well known class of one-factor interest rate models, where the short rate is driven by a mean-reverting process with a volatility proportional to a power of the short rate. The whole term structure of interest rates is obtained from the bond prices, which are solutions to a parabolic partial differential equation. Except for the special cases, its solution is not known in a closed form. In [1], the authors proposed an analytical approximation. We derive the order of accuracy of this approximation. Then we use it to find the dependence of the volatility on the interest rate from the real market data. We solve an optimization problem where we consider the differences between the real interest rates and those obtained from the model.

## References

- [1] Y. Choi and T. Wirjanto (2007) An analytic approximation formula for pricing zero- coupon bonds, *Finance Research Letters* **4**, 116–126.

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