

Proposal for Bachelor or Master Thesis

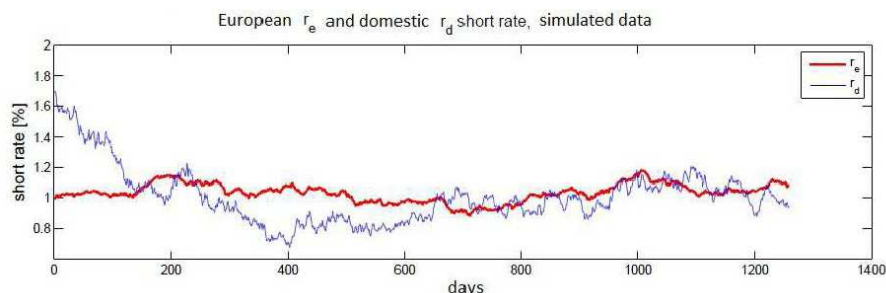
Bond pricing using short rate models and its numerical solution

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Description:

The aim of this thesis is to study interest rate models, especially short rate models and apply efficient numerical methods. The evolution of the interest rate is given as a stochastic differential equation. The bond price is given as a solution of a partial differential equation. For the Vasicek model and the Cox-Ingersoll-Ross model with zero correlation there exist closed form formulas. In other models some analytical approximations are derived. In the Figure the simulation of an evolution of two short rates is shown.



Tasks:

- study short rate models and its alternatives
- propose efficient numerical methods for the solution of the derived PDEs
- compare numerical solution with closed form formulas and analytical approximations
- numerical tests and interpretation of the results

Extensions/Alternatives:

- LIBOR market model (Brace Gatarek Musiela (BGM model))

Literature:

- D. Brigo, F. Mercurio: Interest Rate Models - Theory and Practice, With Smile, Inflation and Credit. 2nd ed., Springer Finance, 2006
- Y.K. Kwok: Mathematical Models of Financial Derivatives. 2nd ed., Springer, 2008
- N. Privault: An elementary introduction to stochastic interest rate modeling, World Scientific, 2nd ed., 2008