

# Simultaneous Multi-Parameter Choice with Applications in Inverse Option Pricing

Christopher Hofmann<sup>1</sup>, Bernd Hofmann<sup>1</sup>, Alois Pichler<sup>1</sup>

<sup>1</sup> Chemnitz University of Technology, Germany

The recovery of implied volatility and interest rate functions over a finite time interval from observed option prices is used as a benchmark problem with nonlinear forward operator to study the simultaneous recovery of multiple unknowns from given (noisy) data. We operate in the classical Black-Scholes model and recover a pair of unknowns (i.e. volatility and interest functions) from a pair of data functions, in this case the prices of the respective call- and put options. The injectivity of the forward operator in  $L^2$ -spaces is proven and therefore guarantees the identifiability of the unknowns. Tikhonov regularization using two separate penalty terms is employed to overcome the ill-posedness and existing heuristic parameter choice rules were adapted and generalized for this particular problem with two regularization parameters. Numerical examples are provided to demonstrate these findings.

## References

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