

## Extremal martingales. Stochastic optimization and optimal stopping

L. C. G. Rogers

Statistical Laboratory, University of Cambridge, England

Availability of market prices of call options of all strikes determines the risk-neutral distribution of the underlying asset at the terminal time. Finding the maximum and minimum price of various derivatives whose prices depend on the maximal value and the terminal value (such as barrier options) has been studied in the last 15 years or so by Hobson, Cox, Obloj, Brown, and others, and some quite complete results are known. This talk takes as its starting point some older work [1] characterizing the possible joint laws of the maximum and terminal value of a martingale; this converts the problem of finding the extremal martingale into a linear programming problem, an observation which allows effective numerical solution. I hope to be able to talk about more recent work with Moritz Duembgen characterizing the possible joint distributions of the maximum, minimum and terminal value of a continuous martingale.

### References

- [1] L. C. G. Rogers (1993). The joint law of the maximum and the terminal value of a martingale. *Probability Theory and Related Fields* 95:451–466.