Duality and valuation of derivatives in a semimartingale setting

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ABSTRACT

Generally speaking the *duality principle* states that the calculation of the price of a call option in a model with price process $S_t = e^{H_t}$ (w.r.t. the measure P) is equivalent to the calculation of the price of a put option in a dual model $S'_t = e^{H'_t}$ (w.r.t. a dual measure P'). We develop the mathematical tools for the study of the duality principle in option pricing in a general semimartingale setting. A number of more sophisticated duality results are derived for a broad spectrum of *exotic options*. It is for these options where the duality principle demonstrates its full strength. In many cases it allows to reduce a problem involving joint distributions to a univariate problem. Particular cases which are studied are models driven by Lévy processes. We also discuss duality results in fixed income models. This is joint work with Antonis Papapantoleon, Wolfgang Kluge and Albert N. Shiryaev.

References

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