# Jump telegraph processes and a volatility smile

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**Abstract**

We discuss a simple class of option pricing models based on inhomogeneous telegraph processes. These models capture bullish and bearish trends as well as oversold/overbought market situations. The model under consideration is arbitrage-free if directions of jumps in stock prices are in a certain correspondence with their current velocity and interest rate behaviour. In the simplest case this model is complete. Diffusion rescaling of this model gives a natural representation of volatility. We provide explicit formulae for prices of standard European options, which permits to calculate directly implied volatilities with respect to various moneyness of the option. The notion of volatility for this model is discussed.

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