

Numerical valuation of swing options: discrete exercise rights

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Swing options are widely traded derivative contracts in the energy markets, especially the electricity market. They give the holder the right to, dynamically, buy electricity at a predetermined, fixed price and, hence, reducing exposure to strong price fluctuations. There is a constraint on the amount that can be bought by the holder at each exercise date and also during the whole contract period. In our research, we are interested in the numerical valuation of swing options. The energy price is modelled by a two factor model in order to encapsulate its mean-reversion feature. In addition, we take into the account the occurrence of price spikes as well as the possibility of negative prices as in [1]. We focus on swing options with discrete and fixed-time exercise rights, which lead us to the study of multiple parabolic partial integro-differential equations. We develop and investigate an effective finite difference approach to solve these equations numerically.

1- Eriksson, M., Lempa, J. and Nilssen, T. K., Swing options in commodity markets: a multidimensional Lévy diffusion model, *Mathematical Methods of Operations Research* 79, p. 31-67 (2013).