Convex ordering for stochastic markovian optimal control: The swing contracts case.

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Résumé

We explore various properties of the swing value function in connection with convexity. Within an ARCH model for the dynamics of the underlying asset and under mild assumptions, we establish three significant properties. Firstly, we demonstrate the convexity of the swing value function with respect to the price of the underlying commodity instrument, assuming both the payoff function and the diffusion coefficients are convex. Secondly, we establish a domination criterion that yields insights about the monotonicity of the swing value function with respect to parameters of the underlying diffusion model. Finally, we explore the one dimensional setting. Instead of an ARCH setting, we place ourselves in a more general discrete-time diffusion. In this setting, we show that, by means of Stein formula, the assumption of convexity for the diffusion coefficients may be relaxed. We also extensively discuss the main assumptions of this paper and demonstrates their validity in real-world commodity markets. Furthermore, our results can be directly applied to general stochastic (Markovian) control problems and contain a wide class of diffusion models.

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