Formulas for the Laplace Transform of Stopping Times based on Drawdowns and Drawups

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Abstract

The drawdown process is defined as the drop of the underlying asset from its running maximum. The first time to a given level of the drawdown process is usually referred to as the drawdown of that level, which we denote by $T_D$. This time is clearly related to the maximum drawdown, a widely used risk measure in finance. Similarly, a rally process is defined as the rise of the underlying asset from its running minimum and a rally is defined as the first hitting time of the rally process. Mathematicians H. Taylor and J. Lehoczky first derived the distributional properties of $T_D$ for any diffusion process. In this work, we extend their results by imposing a further condition on the order of occurrence of a drawdown and a rally. We finally discuss applications of this result in financial risk management.