

Nonparametric Estimation of Risk-Neutral Densities via Empirical Esscher Transform

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Abstract : This paper introduces an empirical version of the Esscher transform for risk-neutral option pricing. Traditional parametric methods require the formulation of an explicit risk-neutral model and are operational only for a few probability distributions for the returns of the underlying. In our proposal, we make only mild assumptions on the pricing kernel and there is no need for the formulation of the risk-neutral model for the returns. First, we simulate sample paths for the returns under the physical distribution. Then, based on the empirical Esscher transform, the sample is reweighted, giving rise to a risk-neutralized sample from which derivative prices can be obtained by a weighted sum of the options pay-offs in each path. We compare our proposal with some traditional parametric pricing methods in four experiments with artificial and real data.

Keywords : esscher transform, generalized autoregressive Conditional Heteroscedastic (GARCH), nonparametric option pricing

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