Parametric properties of semi-nonparametric distributions, with applications to option valuation

Abstract

We derive the statistical properties of the SNP densities of Gallant and Nychka (1987). We show that these densities, which are always positive, are more general than the truncated Gram-Charlier expansions of Jondeau and Rockinger (2001), who impose parameter restrictions to ensure positivity. We also use the SNP densities for option valuation. We relate real and risk-neutral measures, obtain closed-form prices for European options, and study the "Greeks". We show that SNP densities generate wider option price ranges than the truncated expansions. In an empirical application to S&P 500 index options, we find that the SNP model beats the standard and Practitioner's Black-Scholes formulas, and the truncated expansions.