Peter Friz: "On the Black-Scholes Implied Volatility at Extreme Strikes" (with S. Benaim)

Abstract:

We consider risk-neutral returns and show how their tail asymptotics translate directly to large strike asymptotics of the implied volatility smile, thereby sharpening Roger Lee's celebrated moment formula. The theory of regular variation provides the ideal mathematical framework to formulate and prove such results. In many models the tail behaviour is either known or can be derived from a moment generating function via Tauberian theory, and we shall give several examples. At last, stochastic volatility models can require a different analysis and we make the link with recent work of Lions-Musiela.