

**Indiana University-Purdue University
Indianapolis**
Department of Mathematical Sciences

STATISTICS SEMINAR

12:15pm—1:15pm, Tuesday, March 02, 2021
Zoom Meeting: Meeting ID: 751 025 519

Speaker: Ben Boukai
Department of Mathematical Sciences, IUPUI

Title: : On the Risk Neutral Distributions for Hestons
Stochastic Volatility Model

Abstract:

We consider Heston's (1993) stochastic volatility model for valuation of European options to which (semi) closed form solutions are available and are given in terms of characteristic functions. We prove that the class of scale-parameter distributions with mean being the forward spot price satisfies Heston's solution. Thus, we show that any member of this class could be used for the direct risk-neutral valuation of the option price under Heston's SV model. In fact, we also show that any RND with mean being the forward spot price that satisfies Hestons' option valuation solution, must be a member of a scale-family of distributions in that mean. As particular examples, we show that one-parameter versions of the Log-Normal, Inverse-Gaussian, Gamma, Weibull and the Inverse-Weibull distributions could serve as risk-neutral distributions for Heston's pricing model. We demonstrate the results using already published Index data with a calibrated Heston model (S&P500, Bakshi, Cao and Chen (1997), and ODAX, Mrazek and Pospil (2017)), as well as with current option market data (AMD).