Abstract

Markets are modeled as a counterparty accepting at zero cost a set of cash flows that are closed under addition, scaling and contain the nonnegative cash flows. Formulas are then provided for bid and ask prices in terms of this marketed cone. Additionally closed forms are obtained when parametric concave distortions introduced in Cherny and Madan (2009) define the marketed claims. Finally explicit expressions price call and put options at bid and ask. Three applications illustrate. The first estimates the movement of the cone through the financial crisis using data on bid and ask prices for S&P 500 index options. It is observed that the cone contracted significantly in 2008 and slowly opened up thereafter. The second application documents the improvements possible in terms of reduced ask prices by hedging at a flat Black-Scholes volatility even when the underlying assumptions for replication are violated. The third application considers a number of structured products written on daily returns to an underlying asset price and illustrates the use of our closed form expressions for the ask price as an objective function in designing hedges.

Keywords: Risk measures ▪ concave distortions ▪ acceptability index ▪ variance gamma model ▪ delta hedging ▪ structured products