Formula Option Pricing

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Abstract

Option trading existed in history for many centuries in Europe and America. It was until 1973 when the famous Black-Scholes (and Merton) model was first published that brought exponential growth for option trading, both in official exchange and OTC markets. The growth spans in multiple areas. One is in market expansion: it is now used in every major area of equity, bond, foreign exchange, credit and commodity markets. The other is in instrument type innovation: While not perfect, the mathematical Black-Scholes-Merton model laid a foundation and a framework for valuation and risk management of many complex financial (and even physical) deals. In this article we introduce two methods and algorithms to value formula options arising from the commodity industry. One method is the integration method with the aid of principal component analysis and Gauss Hermite quadrature method. The other uses Moment Matching algorithm within the Black dynamic framework. The pay off function is a structured formula with multiple commodity contracts, as well as currency conversions, involved.