

SOA Exam MFE CAS Exam 3F

2009 Edition

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Product Preview



Flashcards

Put-call parity equation for European options

- $PV(F_{0,T}) = C(K,T) - P(K,T) + PV(K)$
- $C(K,T) - P(K,T) = e^{-rT} (F_{0,T} - K)$
- $C(K,T) - P(K,T) = F_{0,T}^P - e^{-rT} K$

Steps in the calculation of the option price

- 1) Get the stock price, the strike price, the σ for the stock and the values of r and δ .
- 2) Create the up and down values for a binomial tree
- 3) Compute Δ and B for the tree, and calculate the call value as $C = \Delta S + B$.
- 4) Alternatively, you could find the risk-neutral probability p^* and calculate the call value as
$$C = e^{-rh} [C_u p^* + C_d q^*]$$

Black-Scholes formula for a European put price

$$P(S, K, \sigma, r, T, \delta) = Ke^{-rT} N(-d_2) - Se^{-\delta T} N(-d_1)$$

Distribution of a sum of normal RVs

$$\sum_{i=1}^n w_i X_i \sim N\left(\sum_{i=1}^n w_i \mu_i, \sum_{j=1}^n \sum_{i=1}^n w_j w_i \sigma_{ij}\right), \text{ where } \sigma_{ij} = \text{Cov}(x_i, x_j)$$

The Vasicek model

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$$dr = a(b - r)dt + \sigma dz$$

- **It is mean-reverting.**
- **Interest rates can become negative, and there can be unreasonable pricing of long-term bonds. (The model was developed for other reasons, not specifically for bond pricing.)**
- **The variance is constant, while one would expect interest rate variance to be larger when rates are high.**
- $\frac{1}{2}\sigma^2 \frac{\partial^2 P}{\partial r^2} + [a(b - r) - \sigma\phi] \frac{\partial P}{\partial r} + \frac{\partial P}{\partial t} - rP = 0$