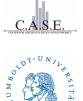
Put Option Price

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$$\begin{split} \lambda_{n+1}^1 &= \mathrm{e}^{-r\Delta t} \{ (1-p_n^1) \lambda_n^1 \} \\ \lambda_{n+1}^{i+1} &= \mathrm{e}^{-r\Delta t} \{ \lambda_n^i p_n^i + \lambda_n^{i+1} (1-p_n^{i+1}) \} \\ \lambda_{n+1}^{n+1} &= \mathrm{e}^{-r\Delta t} \{ \lambda_n^n p_n^n \} \end{split}$$

□ put option price
$$P(K, n\Delta t)$$

 $P(K, n\Delta t) = \sum_{i=0}^{n} \lambda_{n+1}^{i+1} \max(K - S_{n+1}^{i+1}, 0)$



with $K = S = S_n^i$ and $S_n^{i+1} < S_n^i < S_{n+1}^{i+1}$ we have:

$$\begin{split} P(S, n\Delta t) &= e^{-r\Delta t} [\lambda_n^1 (1 - p_n^1) \max(S - S_{n+1}^1, 0) \\ &+ \sum_{j=1}^{n-1} \{\lambda_n^j p_n^j + \lambda_n^{j+1} (1 - p_n^{j+1})\} \max(S - S_{n+1}^{j+1}, 0) \\ &+ \lambda_n^n p_n^n \max(S - S_{n+1}^{n+1}, 0)] \\ &= e^{-r\Delta t} [\lambda_n^1 (1 - p_n^1) (S - S_{n+1}^1) \\ &+ \sum_{j=1}^{n-1} \{\lambda_n^j p_n^j + \lambda_n^{j+1} (1 - p_n^{j+1})\} (S - S_{n+1}^{j+1})] \end{split}$$

$$\begin{split} P(S, n\Delta t) &= e^{-r\Delta t} \{\lambda_n^1 (1 - p_n^1)(S - S_{n+1}^1) \\ &+ [\lambda_n^1 p_n^1 + \lambda_n^2 (1 - p_n^2)](S - S_{n+1}^2) \\ &+ [\lambda_n^2 p_n^2 + \lambda_n^3 (1 - p_n^3)](S - S_{n+1}^3) \\ &+ \dots \\ &+ [\lambda_n^{i-1} p_n^{i-1} + \lambda_n^i (1 - p_n^i)](S - S_{n+1}^i) \} \\ &= e^{-r\Delta t} [\lambda_n^i (1 - p_n^i)(S - S_{n+1}^i) \\ &+ \sum_{j=1}^{i-1} \lambda_n^j \{(1 - p_n^j)(S - S_{n+1}^j) + P_n^j (S - S_{n+1}^{j+1}) \} \end{split}$$

$$P(S, n\Delta t) = e^{-r\Delta t} \{ \lambda_n^i (1 - p_n^i)(S - S_{n+1}^i) + \sum_{i=1}^{l-1} \lambda_n^j (S_n^i - F_n^i) \}$$