

END OF CHAPTER EXERCISES

Chapter 24 : VaR : Statistical Issues

Financial Engineering : Derivatives And Risk Management

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1. Explain how you would assess whether your volatility forecasts for a stock return were accurate.
2. When forecasting volatility what are the differences between a simple moving average and an EWMA?
3. Briefly explain the relative strengths and weaknesses of Monte Carlo versus stress testing.
4. In a Monte Carlo study carefully show the steps involved in calculating the VaR over a *10-day horizon*, for a long call option on a stock (assuming Black-Scholes holds).
5. How would your analysis in **question 4 above** change, if you held a portfolio consisting of one long call (on a stock) and you also held one zero coupon bond?
6. Generate 100 random observations on S_t , the stock price (with $S_0 = 100$, $\sigma = 40\%$ and $\mu = 10\%$ and the timestep $\Delta t = 0.01$ years, that is about 3.5 days). Compute in (say) Excel the EWMA forecast for the volatility of returns $\sigma_{t+1|t}$. Returns are defined as $R_{t+1} = \ln(S_{t+1}/S_t)$ and use a weighting factor of $\lambda = 0.95$ in the EWMA calculation. Produce a graph of the returns series and for the volatility of returns.
7. Calculate the VaR of a long position in one call option on a stock using MCS in say Excel (or using another software package). Assume $S_0 = 100$, $\sigma = 20\%$ pa and $\mu = 5\%$ pa. For the option assume $K = 100$, $r = 5\%$, and time to maturity is $T = 1$ (year). Divide the time period T into units of $\Delta t = 1/365$, that is 1-day. For illustrative purposes use 100 runs in the MCS.