

SMF PRACTICAL 1, 23.1.2017

Week 1: Estimation

In the Black-Scholes model, log-prices are Gaussian. So for a portfolio, log-prices are multinomial, $N(\mu, \Sigma)$ say. For iid data, the MLEs for the mean (vector) and covariance (matrix) are the population mean and the population covariance (Week 3), and these are consistent (by SLLN), tending to their normal limits at rate \sqrt{n} (MLE, regular case). For stationary time series, consistency again holds, by the Ergodic Theorem (SMF1617).

Pick four sectors of the economy, chosen to show some negative correlation (Markowitzian diversification). For each, pick four Footsie 100 stocks.

- (a) Estimate the mean and covariance.
 - (b) Comment on the covariances of stocks within and between sectors.
- Include all code, and comment on why you made the choices you did.