

## Sheet - 1

### Asset and Liability Management

1. Consider daily returns of the Exxon Mobil Corp., General Electric, AMD stocks on NYSE (symbols on Yahoo Finance: XOM, GE, AMD) from January, 1 2005 to January 1, 2007. Historical prices can be downloaded from <http://finance.yahoo.com>. Assume the following vector of weights  $w = (0.25, 0.5, 0.25)$ .
  - Evaluate the 95%VaR by using the approach of RiskMetrics.
  - Evaluate the 95%VaR by using the historical method.
  - Evaluate the 95%VaR by using the hybrid method.
2. Consider the same data of the previous exercise and assume the normal distributional assumption.
  - Evaluate the 95%VaR by using the Monte Carlo method. In order to investigate how the fluctuations of the 95%VaR change, consider samples of different sizes: 500, 1000, 5000, 10000, 20000 scenarios.
3. Consider the same data of the previous exercise and a time window for the back-testing from January, 2 2007 to January 1, 2008.
  - For each day in the time window, calculate the VaR number by using the approach of RiskMetrics.
  - Check if the loss on a given day is below or above the VaR number computed the day before. If the observed loss is larger, then we say that there is a case of an exceedance.
  - Count the number of exceedances. Check if there are too many or too few of them by verifying if the number of exceedances belong to the corresponding 95% confidence interval.

**Remark** See Chapter 6 of the book *Advanced Stochastic Models, Risk Assessment and Portfolio Optimization* by Svetlozar T. Rachev, Stoyan V. Stoyanov, Frank J. Fabozzi, Wiley, 2008. Some exercises can be solved with paper and pen, other have to be solved with the help of a PC (Excel, MATLAB, R, S-plus). The software *R* is available at <http://www.r-project.org>. For any problem or remark, do not hesitate to contact me,

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