**Work in teams of 2 people.**

Use the excel spreadsheet “Workshop8.xlsx” available in comunidad.

**Questions to be answered in the excel spreadsheet.**

We have a basket of stock for which we want to compute value-at-risk using Monte Carlo Simulation and Filtered historical Simulation. Compute the daily volatility using the Riskmetrics model, where the starting variance is 0.0004 and lambda is 0.94. Use this volatility to standardize the returns of all series.

Your portfolio is made of 10 stocks where each stock has a 10% weight in the portfolio:

|  |  |
| --- | --- |
|  | **Weight** |
| GRUPO FINANCIERO INBURSA SRIES 'O' | 10% |
| GPO FINANCE BANORTE | 10% |
| GENTERA | 10% |
| ARCA CONTINENTAL | 10% |
| COCA-COLA FEMSA 'L' | 10% |
| FOMENTO ECONOMICO MEXICANO | 10% |
| POCHTECA | 10% |
| GRUPO SALTILLO | 10% |
| CEMEX CPO | 10% |
| CONTROLADORA COMERCIAL MEXICANA | 10% |
| **Basket MEXICO** | **100%** |

1. Compute the 10x10 correlation matrix of the standardized returns using all data available
2. You are the trading analyst of an important firm and have been asked to compute the VaR for a basket of stocks called BASKET MEXICO. You want to show all that you learned at ITAM, so you implement two methodologies to compute the VaR.

Methodology 1: MonteCarlo Simulation. Using the Riskmetrics volatilities and the correlation matrix using all the data provided in the spreadsheet compute 1-day 1%VaR for June 16, 2015. Report

1. Report the 1-day riskmetrics volatilities of the 10 stocks on June 16, 2015
2. Using Cholesky decomposition (=cholesky2 function in Excel spreadsheet) report the lower triangular matrix
3. Generate 2,000 random numbers for the 10 stocks and compute the 1-day 1%VaR using the basket weights, the riskmetrics volatilities, the random numbers and the lower triangular matrix. Report he 1-day 1%VaR.

Methodology 2: Filtered Historical Simulation. Using the 1,161 historical standardized returns and the riskmetrics volatitilies for the data series, generate 2,000 FHS random numbers. Report

1. The 1-day 1% VaR using FHS for June 16, 2015. Compute the return for each of the 2,000 scenarios by using the 2,000 FHS numbers of the 10 stocks, their Riskmetrics volatilities for June 16, 2015, and the weights.

1. Perform the CFA case study using montecarlo simulations. Using 1,000 montecarlo scenarios (generate a 5x1,000 normally distributed random numbers) and assuming the following correlation matrix

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Correlation Matrix** | **Salvage Value** | **Sales in year 1** | **Unit Sales Growth** | **Sales Price** | **CashExp/TotRevenue** |
| **Salvage Value** | 1 | 0.5 | 0.5 | 0.5 | 0.5 |
| **Sales in year 1** | 0.5 | 1 | 0.5 | 0.5 | 0.5 |
| **Unit Sales Growth** | 0.5 | 0.5 | 1 | 0.5 | 0.5 |
| **Sales Price** | 0.5 | 0.5 | 0.5 | 1 | 0.5 |
| **CashExp/TotRevenue** | 0.5 | 0.5 | 0.5 | 0.5 | 1 |

Report:

* 1. What is the probability that NPV<0?
  2. What is the probability that IRR>10%?
  3. Mean of the NPV
  4. Standard deviation of NPV
  5. Skewness of NPV
  6. Kurtosis of NPV
  7. Mean of the IRR
  8. Standard deviation of IRR
  9. Skewness of IRR
  10. Kurtosis of IRR