**Value at risk**

**Definition**: Value at risk is defined as

VaR(X) = inf {xeR: P(X>x)<=1-α} = inf {xeR: Fx(x)>=α}

In the other wat VaR(X) = -Fx+(α);

Thus to define VaR numerically, we had to simulate the Probability Distribution Function F(X).

**Steps** are:

1) Define PROFIT/LOSS variable for i-number of iterations: pl(i) = path(T,i) - path(1,1) = path(T,i) - S0 that means that p/l variable value equals to difference be price of the stock simulated for time T

and the initial price of the stock

2) Having the P/L values for each i-th iteration, using the loop we discover the Probability Distribution Function of P/L variable

3) Using the loop we compare each pdf value with 1-alpha level. At first value of pdf (let it be pdf (k)): pdf (k)>1-α, we can

calculate VaR = -pl (k) that is just negative value of P/L corresponding to k-th point

4) We build probability and density distribution function on the same graph where the tree and pathes are simulated but with the opposite axis deployment - y-axis corresponds still to S-value and we plot also 10 + pl(i) while x-axis corresponds to t-value for tree and normalizing pdf (i) to lay between 0 and 0.1 instead of 0 and 1, we plot it on x-axis