athor Evgeny Kozyrev

Monte-Carlo Task Perfect art

1. The stable distribution S(α = 1.7, 0 , 1, 1) was generated according to the report Adam Misiorek, Rafał Weron "Heavy-tailed distributions in VaR calculations" http://prac.im.pwr.edu.pl/~hugo/RePEc/wuu/wpaper/HSC_10_05.pdf (page #10). I generated a variable **U** uniformly distributed on ($-\pi/2$, $\pi/2$) and an independent exponential random variable **W** with mean 1. Then I generated X = sin(1.7**U**)/cos(**U**)^[1/α]*(cos(**U** - α**U**)/**W**)^[(1-α)/α]. The required random variable of 1-day return is Y = X + 1.
2. Random choice of the **Price** on the first day.
3. Using the **Price** and vector X, the vector of prices was calculated.
4. The 10 days returns values were calculated.
5. 0.01 percentile was calculated, just by sorting 10 days returns and taking the int(751/100.+1) element.
6. This algorithm allows us to generate the required spectrum of the quantiles.
7. The remaining question is about the dependence of the method on the initial random value of the **Price.** I assume that the spectrum of the quantiles shouldn't be dependent on the **Price.** How much Monte-Carlo events we need in order to check this hypothesis.
8. I chose two different values of the **Price** (0.001 and 1000) and checked that the two massives correspond to the same generalized sample. In principle, I can use Kolmogorov-Smirnov's theorems to compare two data sets. But it looks too routine, so I have created a simplified method.
9. If the elements of none of the arrays are localized the number of MC events is sufficient. In the method I compare two vectors corresponding to different **Prices** and check how often array values are experienced. Other words, it's required that the sorted values in the vectors are similar to each other.