# 1 Year Monte Carlo Value at Risk Simulation

GBM: CDS hazard rates, equities, option spot prices

CIR: FX rates, bond spreads

Vasicek: Interest rates

We assumed that cash flows were reinvested at the risk free rate

# Historic vs MC

Historic VaR is consistently larger than MC. This implies that our modeling assumptions may underestimate the risk in our portfolio. This is most likely due to incorrect distribution assumptions underlying the risk factor processes. In the MC, the calibrated data may not capture the correlations.

# Credit Value at Risk

CreditMetrics Approach.

We split the CDS underlying and bond issuers into two separate Credit Risk calculations.

We used sector correlations as a proxy of the correlations. For the in sector correlations, we choose the smallest value such that the matrix remained positive semidefinite.

We assumed the shock occurred instantaneously because the theta was already considered in the 1 year market value at risk.

The Credit VaR for the bonds was much smaller than that of the CDS’s. For that reason, the correlation did not matter very much. We obtain a bound:

# Correlation between Market and Credit risk

Combining the inequalities:

8.917032286212245e+07 TotalVaR. 1.097049596471298e+08

# Model Vetting

Look at the distribution

Compare the VaR to the total portfolio value

Compare pricing functions to current market prices today

Compare the historical VaR to the MC VaR

Compare 1 year MC to the scaled value at risk from a 1 day simulation

Back testing

Moving window and check the number of times we breach the VaR. The number of breaches is distributed according to a binomial distribution. Standard statistical tests were used to confirm that our models agreed with out of sample data.