1 Market Data

2 Risk

2.1 Metrics

Two of the main metrics to quantify the portfolio risk are *Value at Risk* **(VaR)** and *Expected Shortfall*, or *Conditional Value at Risk* **(CVar)**. Both are defined as functions depending on a parameter p representing a probability.

Let Q be the daily portfolio pnl and $F(Q)$ the its pdf, then

$$p = \int_{-\inf}^{VaR(p)} F(Q)dQ, \tag{1}$$

$$CVaR(p) = \frac{1}{p}\int_{-\inf}^{VaR(p)} QF(Q)dQ, \tag{2}$$

this gives us $CVaR(p) < VaR(p) < 0$.

One important feature is that CVaR is convex in the sence that given two portfolios X and Y, then $CVaR(X+Y) \leq CVaR(X) + CVaR(Y)$, wheras VaR is not.

Computing the VaR and the CVaR requieres a hard to measure distribution of portfolio returns.