Value Added Risk Management

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Outline

• Exposure and loss quantification
• Hedging of portfolio tail risk
• Risk based performance evaluation
• Portfolio construction: risk budgeting
• Risk based liquidity analysis
• Cash management
Exposure and Loss Quantification

• Independent group assessing loss potential throughout the organization
  • Portfolio attribute generation including loss and exposures is difficult and time consuming

• Accuracy and integrity
  • Traders often underestimate loss
  • Loss numbers need to be consistent to be credible

• Risk and quantitative research are intertwined

• Communication with investors, counterparties, and prime brokers
Hedging of Portfolio Tail Risk

• Analysis of all portfolios with different exposures
• Quantification of aggregate tail risk
  • Determining tail of portfolio
  • Hedging of tails of individual desks is expensive
• Cheap versus effective hedges
  • Hedging across asset classes
  • Liquidity
• Allocation of hedge p&l to various businesses
Risk Based Performance Evaluation

• *Returns should be evaluated in context of risk*

• **Sharpe Ratio**- standard deviation
  • Misleading conclusions for investments with Non-Normal return distributions
  • Carry or selling of options has a high Sharpe

• **Sortino Ratio**- distinguish between upside and downside volatility
  • Using different volatilities attempt at addressing non-Normality

• **VaR**
  • Many of the same problems as Sharpe Ratio but better metric
Risk Based Performance Evaluation (cont. 2)

• **Expected Shortfall**
  • Incorporate tail of return distributions
  • Penalizes option selling strategies

• **Modified Sharpe Ratio**
  • Intended for evaluating backtest results
  • Skew and kurtosis incorporated
Portfolio Construction: Risk Budgeting

• *Risk based portfolio construction*
  • Notional versus risk based portfolio construction
  • Choice of risk metric

• **Aggregate portfolio level:**
  • Limit on aggregate portfolio risk
  • Giving “credit” to portfolio hedges
  • Liquidity needs to be incorporated determining time horizon
  • Limit minus risk allocated is “available capital” which is different than cash
  • Aggregate risk limit serves as trailing stop
Risk Budgeting (cont. 2)

• **Position level:**
  • Risk versus notional weights

\[ MCR_i = \frac{\frac{\partial \sigma_P}{\partial \omega_i}}{\frac{\sigma_P}{\omega_i}} = \frac{\frac{\partial \sigma_P}{\sigma_P}}{\frac{\partial \omega_i}{\omega_i}} \]

• Risk weights are the correct measure of conviction in investment
• Risk weight concentration limit

• **Risk Factors:**
  • Risk factor limits protect against correlation assumptions in aggregate risk measure
Risk Based Liquidity Analysis

• 2 considerations for liquidity:
  • Raising cash- redemptions at hedge fund etc.
  • Risk reduction- future loss potential reduction

• Risk can be reduced by selling investments or hedging
  • Generally systematic risk is hedged
  • Stressed vs. orderly market correlations

• Residual risk
  • Quantification of effectiveness of hedging strategies
Cash Management

• Cash management considerations:
  • Reducing loss potential
  • Implications for variation margin
  • Expected redemptions if buy side

• Cash management should be based on a stress and not orderly market analysis
  • VaR based cash management is not conservative
  • Expected Shortfall or stress scenarios