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# Risk Attribution in POINT

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## Agenda

- Motivation for Risk Attribution (RA)
  - Alternative (flexible) partitions of the total risk of the portfolio
  - Towards a holistic view of the risk / return trade-off
- Model and Implementation
  - Decision hierarchy
  - Factor and sector partition
  - Asset allocation and security selection
- Extension: Beta Attribution
- Future developments



## **Motivation**

- Objective: Evaluate investment decisions return and risk analysis
  - Portfolio: 50 credit bonds + overlay strategy with five long/short IR swaps
  - Benchmark: Barclays US Credit Corp index.

### • Currently POINT produces:

	Performance Attribution	Isolated TEV	Correlated TEV
Total	47.09	15.15	15.15
Rates factors	45.17	12.6	10.54
Spread factors	2.00	10.3	4.61
Asset Allocation	-1.20	N/A	N/A
Security Selection	3.20	N/A	N/A

- Research questions:
  - How to allocate the correlated risk to the factors? Isolated? Correlated contribution?
  - How to reflect the decision hierarchy of the overlay strategy?
  - How to evaluate the risk on asset allocation and security selection decisions?



# Our Proposal I

### A. POINT allows for a decision hierarchy (proprietary algorithm)

- Example: Rates manager can be responsible for:
  - Isolated risk from Rates (Isolated TEV)

Rates	Correlation
Correlation	Credit

Isolated risk from Rates + half correlated risk (Correlated TEV)

Rates	Correlation
Correlation	Credit

Isolated risk from Rates + all correlated risk (our example)

Rates	Correlation
Correlation	Credit

- Hierarchy is defined by POINT partitions
  - Use factor partition (e.g., to isolate YC risk)
  - Use security partition (e.g., to isolate EMG portfolio or an FX overlay)



## Our Proposal II

### B. Risk on asset allocation and security selection

- Use security partition to define asset classes
- Traditional Brinson style AA+SS

### C. POINT provides a clear link with HPA

- Algorithm allows a link between risk attribution and existing HPA models
- Factors are aligned between the two models
- Partitions and data are completely shared between the applications



## Result

- Performance Attribution in POINT
  - Portfolio: 50 credit bonds + overlay strategy with five long/short IR swaps
  - Benchmark: Barclays US Credit Corp index.

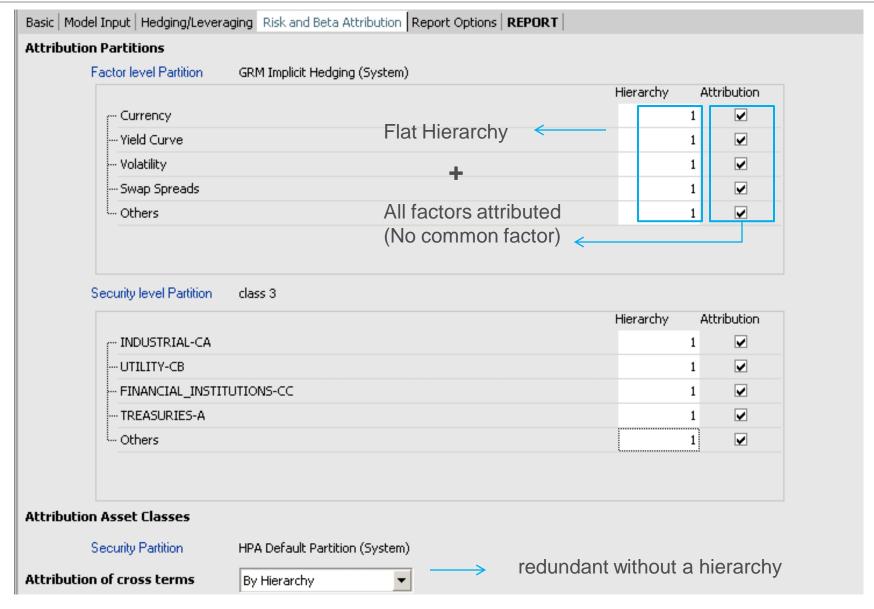
### Risk Attribution in POINT

	Performance Attribution	Risk Attribution (no hierarchy)	Risk Attribution (overlay hierarchy)
Total	47.09	15.15	15.15
Rates factors	45.17	10.54	8.18
Spread factors	2.00	4.61	6.97
Asset Allocation	n -1.20	1.28	1.83
Security Selection	n 3.20	3.33	5.14

- Risk attributions are all in TEV contribution terms
- Flexibility to define the hierarchy to let overlay responsible for the correlated risk
- Attributed risk are split into asset allocations and security selection
- Able to drill down to factor and sector level asset allocation and security selection

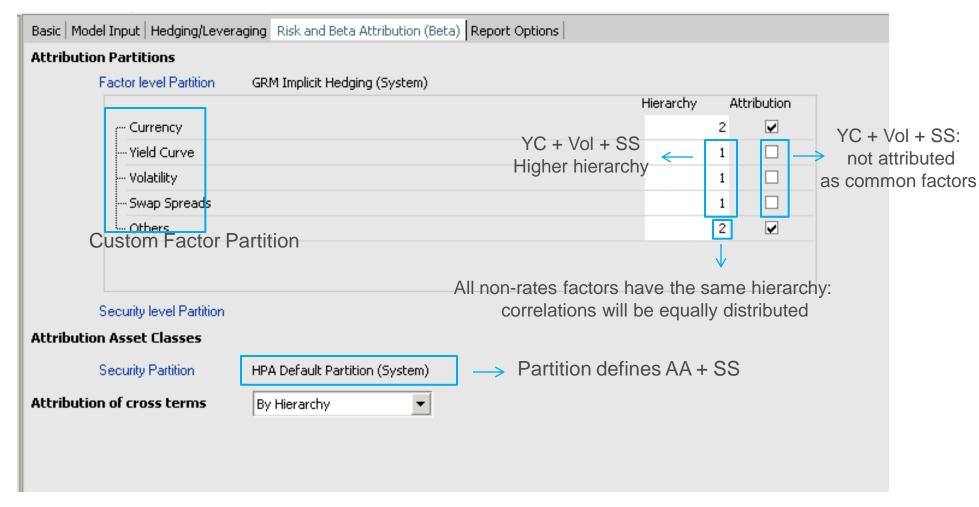


## Implementation in POINT





# Example





## Attribution of Portfolio Beta

- GRM delivers portfolio beta with TEV
- The Risk Attribution framework extends easily to the attribution of beta
  - Understand co-movement of returns, under an excess systematic beta

$$Risk(TEV) = Var(r^P - r^B) = W \times L \times \Omega \times L' \times W'$$

$$Excess\beta = \frac{Cov(r^{P}, r^{B})}{Var(r^{B})} - 1 = \frac{W \times L \times \Omega \times L' \times W^{B'}}{Var(r^{B})}$$

- Beta attribution: split the excess return co-movement into
  - Common factors
  - Asset allocation + Security selection
- Example (same example and settings)

Excess Beta Attribution		
Total	0.07	
Rates Factors	0.06	
Asset Allocation	0	
Security Selection	0.01	



## **Future Projects**

- Idiosyncratic and default TEV attribution
- Extend the asset allocation and security selection methodology to use other contributions as bucket weights
- Risk-adjusted performance attribution models to implement
  - Potentially including a proprietary model

Adjusted Performance Attribution Model	Risk Adjusted Return	
Sharpe/Information Ratio	$R^P/\sigma_P$ or $R^{P-B}/\sigma_{P-B}$	
MM2	$R^P imes rac{\sigma_B}{\sigma_P}$	
MM3	$R^{P^*} = wR^P + \omega R^B$	



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