Alpha in tactical asset allocation

Formulas - part 1
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Return of benchmark I in period t
\[ R_I = \sum_{i=1}^{N} x_i \cdot R_{iI} \]  
where
\[ R_I \] return of benchmark I in period t
\[ x_i \] weight of asset class i included in I at beginning of period t
\[ R_{iI} \] return of index of asset class i in period t
\[ N \] number of asset classes included in I

Return of portfolio P in period t
\[ R_P = \sum_{i=1}^{N} w_i \cdot R_{iI} + \sum_{j=1}^{L} w_j \cdot R_{jI} \]  
where
\[ R_P \] return of portfolio P in period t
\[ w_i \] weight of asset class i in portfolio P at beginning of period t
\[ R_{iI} \] return of component of portfolio P invested in asset class i in period t
\[ w_j \] weight of asset class j in portfolio P at beginning of period t (where j is not included in I)
\[ R_{jI} \] return of component of portfolio P invested in asset class j in period t
\[ L \] number of asset classes included in portfolio P but not included in I
\[ \sum_{i=1}^{N} w_i + \sum_{j=1}^{L} w_j = 1 \]

Return of replication portfolio R in period t
\[ R_R = \sum_{i=1}^{N} u_i \cdot R_{iI} + \sum_{j=1}^{L} u_j \cdot R_{jI} \]  
where
\[ R_R \] return of replication portfolio R in period t
\[ u_i \] strategic weight of asset class i in portfolio P (see text for details)
\[ u_j \] strategic weight of asset class j in portfolio P
\[ R_{iI} \] return of the index of asset class j in period t
\[ \sum_{i=1}^{N} u_i + \sum_{j=1}^{L} u_j = 1 \]

Return of TAA portfolio T in period t
\[ R_T = \sum_{i=1}^{N} w_i \cdot R_{iI} + \sum_{j=1}^{L} w_j \cdot R_{jI} \]  
where
\[ R_T \] return of portfolio T in period t with strategic biases and TAA decisions before all other decisions
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Formulas - part 2

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Value added/subtracted by strategic bias in period $t$

$$\Delta_{\text{strategic bias}} = R_T - R_s = \sum_{i=1}^{N} (u_i - x_i) \cdot R_i + \sum_{j=1}^{L} u_j \cdot R_j$$  \hspace{1cm} (5)

where

$\Delta_{\text{strategic bias}}$ value added/subtracted by strategic bias in period $t$

Value added/subtracted by TAA relative to replication portfolio in period $t$

$$\Delta_{\text{TAA}} = R_T - R_s = \sum_{i=1}^{N} (w_i - u_i) \cdot R_i + \sum_{j=1}^{L} (w_j - u_j) \cdot R_j$$  \hspace{1cm} (6)

where

$\Delta_{\text{TAA}}$ value added/subtracted by TAA relative to replication portfolio in period $t$

Value added/subtracted by strategic bias and TAA in period $t$

$$\Delta_{\text{TOT}} = R_T - R_s = \sum_{i=1}^{N} (w_i - x_i) \cdot R_i + \sum_{j=1}^{L} w_j \cdot R_j$$  \hspace{1cm} (7)

where

$\Delta_{\text{TOT}}$ value added/subtracted in period $t$ by strategic bias and TAA relative to benchmark $I$

"Left over" return in period $t$

$$\Delta_{\text{left over}} = R_T - R_s = \sum_{i=1}^{N} w_i \cdot (R_p - R_i) + \sum_{j=1}^{L} w_j \cdot (R_p - R_j)$$  \hspace{1cm} (8)

where

$\Delta_{\text{left over}}$ value added/subtracted in period $t$ by all other decisions