

**CREDIT  
SUISSE**

# APPLYING THE BRINSON-HOOD- BEEBOWER METHOD TO THE RISK SIDE - DECISION-ORIENTED DECOMPOSITION OF EX-ANTE RISK

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Performance Attribution Roundtable  
Zurich, 28. September 2005

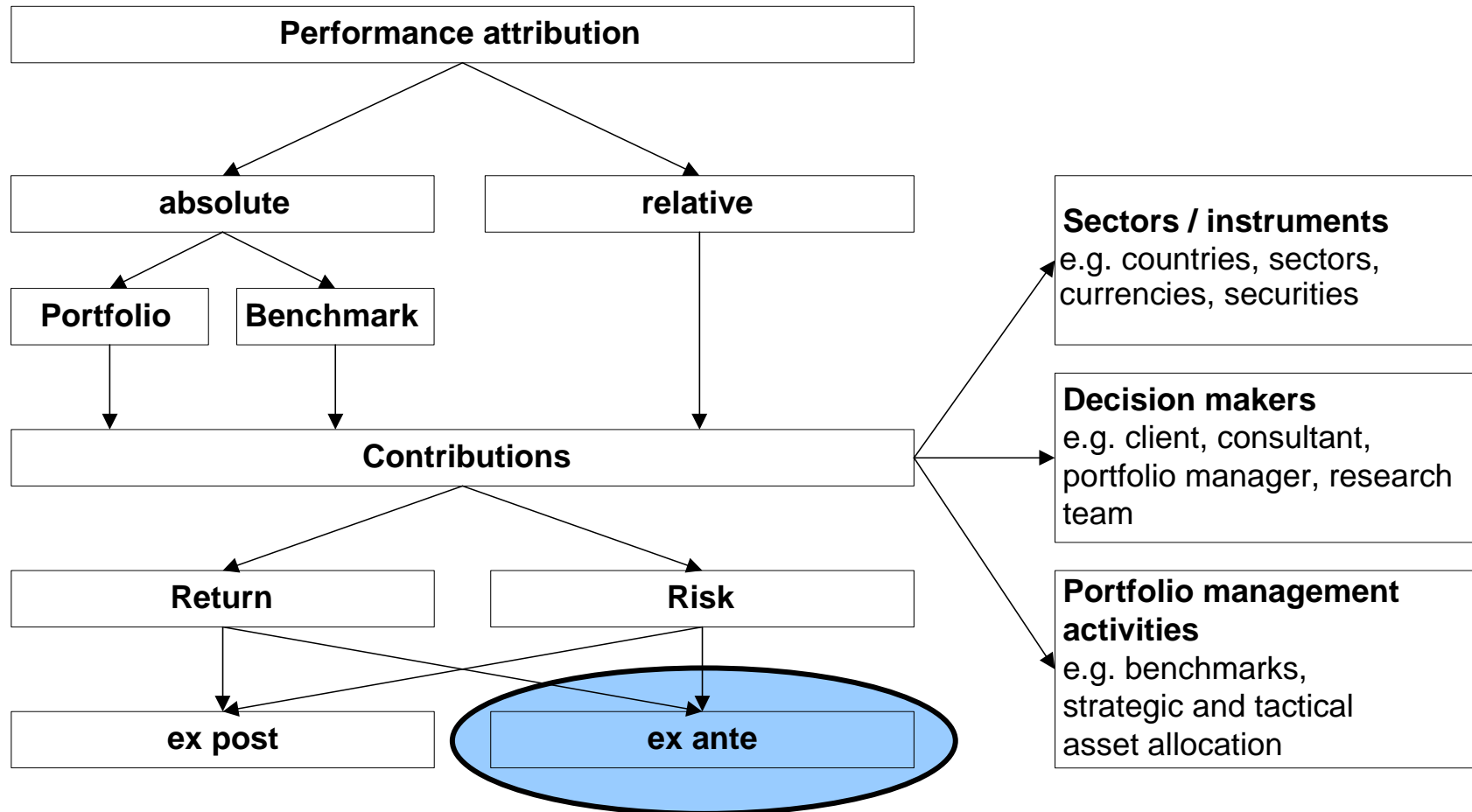
# AGENDA

- Introduction
- Ex-post return attribution
- Ex-ante risk attribution
- Ex-ante absolute risk attribution
- Ex-ante relative risk attribution
- Example for ex-ante risk attribution

# INTRODUCTION

# INTRODUCTION

## PERFORMANCE ATTRIBUTION OVERVIEW



# INTRODUCTION

## QUESTIONS TO THE PORTFOLIO MANAGER

### **General questions**

- What is the level of absolute risk for the portfolio? And in comparison to the benchmark?
- What is the level of relative risk for the portfolio?
- What are the contributions to absolute and relative risk?
- Etc.

### **Specific questions**

- What happens to the absolute and relative risk if the portfolio constituency changes?
- What are the management decisions that contributes to the absolute and relative risk?
- Etc.

# EX-POST RETURN ATTRIBUTION

# EX-POST RETURN ATTRIBUTION

## NECESSARY INPUTS

- Weights of the different asset classes or asset segments for the portfolio for **each** period
- Weights of the different asset classes or asset segments for the benchmark for **each** period
- Return of the different asset classes or asset segments for the portfolio for **each** period
- Return of the different asset classes or asset segments for the benchmark for **each** period

# EX-POST RETURN ATTRIBUTION USING THE BRINSON-HOOD-BEEBOWER METHOD

- Excess return = return of portfolio - return of benchmark

$$\begin{aligned} Re_E &= Re_P - Re_B \\ &= \sum_{i=1}^n (w_i^P * Re_i^P - w_i^B * Re_i^B) \end{aligned}$$

- Excess return = return contribution due to asset allocation  
+ return contribution due to stock picking  
+ return contribution due to interaction

$$Re_E = Re_P^{AA} + Re_P^{SP} + Re_P^{IA}$$

# EX-POST RETURN ATTRIBUTION USING THE BRINSON-HOOD-BEEBOWER METHOD

- Return contribution due to asset allocation

$$Re_P^{AA} = \sum_{i=1}^n (w_i^P - w_i^B) * Re_i^B$$

- Return contribution due to stock picking

$$Re_P^{SP} = \sum_{i=1}^n (Re_i^P - Re_i^B) * w_i^B$$

- Return contribution due to interaction

$$Re_P^{IA} = \sum_{i=1}^n (w_i^P - w_i^B) * (Re_i^P - Re_i^B)$$

# RISK ATTRIBUTION

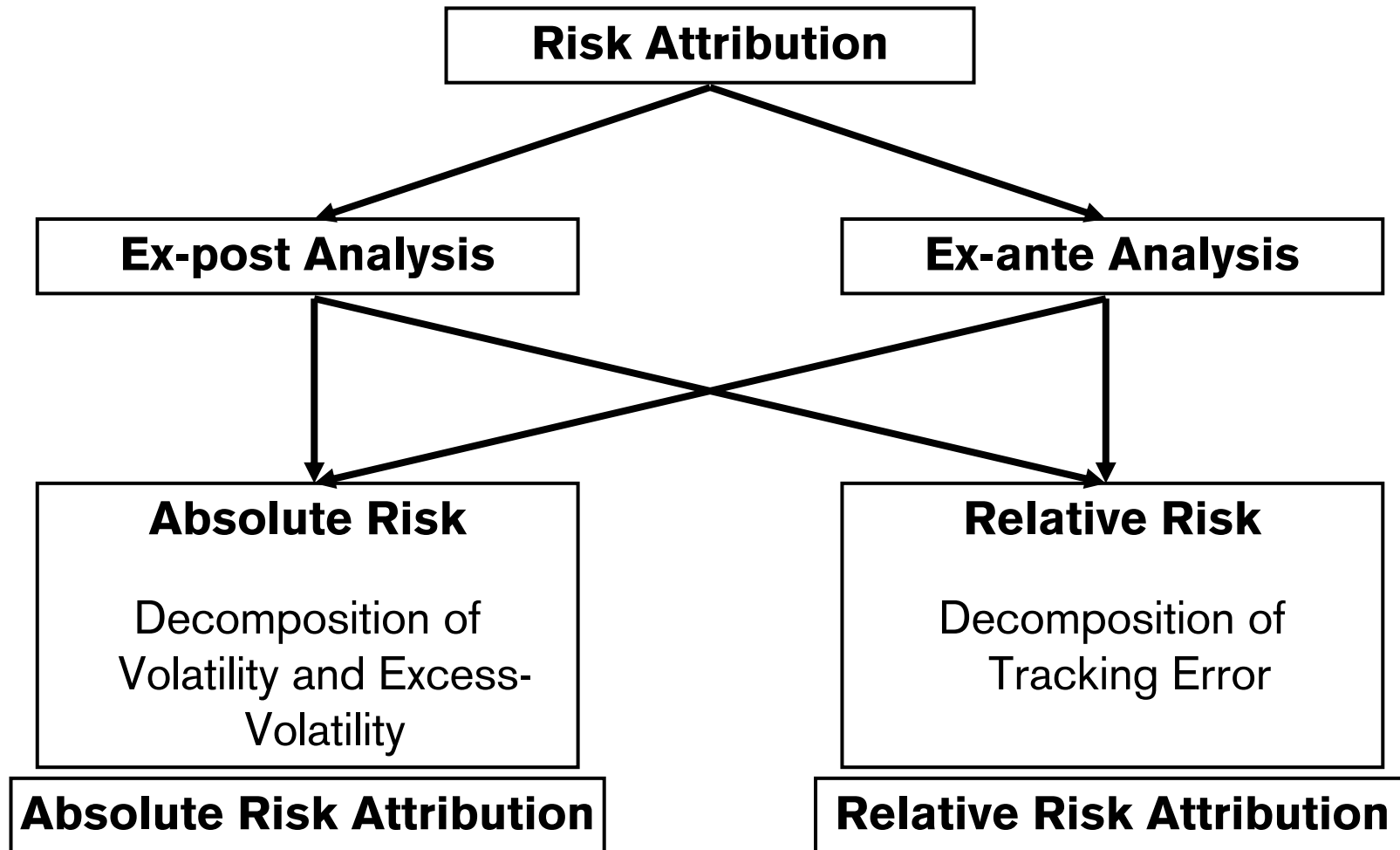
# EX-ANTE RISK ATTRIBUTION

## NECESSARY INPUTS

- Weights of the different asset classes or asset segments for the portfolio for the **relevant** period
- Weights of the different asset classes or asset segments for the benchmark for the **relevant** period
- Estimated covariances between asset classes or asset segments for the portfolio and the benchmark for the **relevant** period

# EX-ANTE RISK ATTRIBUTION

## TYPES OF RISK ATTRIBUTION



# EX-ANTE ABSOLUTE RISK ATTRIBUTION

# EX-ANTE ABSOLUTE RISK ATTRIBUTION

## GENERAL IDEA

- **Step 1:** Calculate the absolute risk for the portfolio and for the benchmark and analyse the individual figures and their difference.
- **Step 2:** Furthermore decompose the figures according to management activities or/and asset classes.

$$\begin{bmatrix} w_1^P & \dots & w_n^P \end{bmatrix} \begin{bmatrix} \text{Cov}_E^P \end{bmatrix} \begin{bmatrix} w_1^P \\ \vdots \\ w_n^P \end{bmatrix} - \begin{bmatrix} w_1^B & \dots & w_n^B \end{bmatrix} \begin{bmatrix} \text{Cov}_E^B \end{bmatrix} \begin{bmatrix} w_1^B \\ \vdots \\ w_n^B \end{bmatrix}$$

# EX-ANTE ABSOLUTE RISK ATTRIBUTION USING THE BRINSON-HOOD-BEEBOWER METHOD

- Ex-ante absolute excess risk = ex-ante absolute risk of portfolio  
- ex-ante absolute risk of benchmark

$$Ri_{AE} = Ri_{PAE} - Ri_{BAE}$$
$$= \sum_{i=1}^n \sum_{j=1}^n w_i^P * w_j^P * Cov_E^P(i, j) - \sum_{i=1}^n \sum_{j=1}^n w_i^B * w_j^B * Cov_E^B(i, j)$$

- Ex-ante absolute excess risk = ex-ante risk contribution due to asset allocation  
+ ex-ante risk contribution due to stock picking  
+ ex-ante risk contribution due to interaction

$$Ri_{AE} = Ri_{PAE}^{AA} + Ri_{PAE}^{SP} + Ri_{PAE}^{IA}$$

# EX-ANTE ABSOLUTE RISK ATTRIBUTION USING THE BRINSON-HOOD-BEEBOWER METHOD

- Ex-ante absolute excess risk contribution due to asset allocation

$$Ri_{PAE}^{AA} = \sum_{i=1}^n \sum_{j=1}^n [(w_i^P * w_j^P) - (w_i^B * w_j^B)] * Cov_E^B(i, j)$$

- Ex-ante absolute excess risk contribution due to stock picking

$$Ri_{PAE}^{SP} = \sum_{i=1}^n \sum_{j=1}^n w_i^B * w_j^B * [Cov_E^P(i, j) - Cov_E^B(i, j)]$$

- Ex-ante absolute excess risk contribution due to interaction

$$Ri_{PAE}^{IA} = \sum_{i=1}^n \sum_{j=1}^n [(w_i^P * w_j^P) - (w_i^B * w_j^B)] * [Cov_E^P(i, j) - Cov_E^B(i, j)]$$

# EX-ANTE ABSOLUTE RISK ATTRIBUTION USING THE BRINSON-HOOD-BEEBOWER METHOD

- Ex-ante absolute excess risk contribution due to asset allocation for asset class i

$$Ri_{PAE}^{AA}(i) = \sum_{j=1}^n [(w_i^P * w_j^P) - (w_i^B * w_j^B)] * Cov_E^B(i, j)$$

- Ex-ante absolute excess risk contribution due to stock picking for asset class i

$$Ri_{PAE}^{SP}(i) = \sum_{j=1}^n w_i^B * w_j^B * [Cov_E^P(i, j) - Cov_E^B(i, j)]$$

- Ex-ante absolute excess risk contribution due to interaction for asset class i

$$Ri_{PAE}^{IA}(i) = \sum_{j=1}^n [(w_i^P * w_j^P) - (w_i^B * w_j^B)] * [Cov_E^P(i, j) - Cov_E^B(i, j)]$$

=> assuming distributed covariances by rows

# EX-ANTE RELATIVE RISK ATTRIBUTION

# EX-ANTE RELATIVE RISK ATTRIBUTION

## GENERAL IDEA

- **Step 1:** Generate a long/short portfolio where the long position consists of the portfolio and the short position is the corresponding benchmark.
- **Step 2:** Calculate and analyse the absolute risk for this long/short portfolio.
- **Step 3:** Furthermore decompose the figures according to management activities or/and asset classes.

$$\begin{bmatrix} w_1^P & \dots & w_n^P & -w_1^B & \dots & -w_n^B \end{bmatrix} \begin{bmatrix} \left[ \begin{array}{c} \text{Cov}_E^P \\ \text{Cov}_E^{P,B} \end{array} \right] \\ \left[ \begin{array}{c} \text{Cov}_E^{P,B} \\ \text{Cov}_E^B \end{array} \right] \end{bmatrix} \begin{bmatrix} w_1^P \\ \vdots \\ w_n^P \\ -w_1^B \\ \vdots \\ -w_n^B \end{bmatrix}$$

# EX-ANTE RELATIVE RISK ATTRIBUTION USING THE BRINSON-HOOD-BEEBOWER METHOD

- Ex-ante relative risk = ex-ante tracking error of the portfolio versus the benchmark
- = ex-ante absolute risk of portfolio
- + ex-ante absolute risk of benchmark
- ex-ante diversification effect between portfolio and benchmark

$$\begin{aligned}
 Ri_{RE} &= TE_E(P;B) \\
 &= Ri_{PAE} + Ri_{BAE} - Di_E(P;B) \\
 &= \sum_{i=1}^n \sum_{j=1}^n w_i^P * w_j^P * Cov_E^P(i,j) + \sum_{i=1}^n \sum_{j=1}^n w_i^B * w_j^B * Cov_E^B(i,j) - 2 * \sum_{i=1}^n \sum_{j=1}^n w_i^P * w_j^B * Cov_E^{P,B}(i,j) \\
 &\text{or in matrix notation} \\
 &= \begin{bmatrix} w_i^P & -w_i^B \end{bmatrix} * \begin{bmatrix} Cov_E^P & Cov_E^{P,B} \\ Cov_E^{P,B} & Cov_E^B \end{bmatrix} * \begin{bmatrix} w_i^P \\ -w_i^B \end{bmatrix} \quad (2n \times 2n \text{ matrix}); \text{ for } i = 1, \dots, n
 \end{aligned}$$

# EX-ANTE RELATIVE RISK ATTRIBUTION USING THE BRINSON-HOOD-BEEBOWER METHOD

- Ex-ante relative risk = ex-ante relative risk contribution due to asset allocation  
+ ex-ante relative risk contribution due to stock picking  
+ ex-ante relative risk contribution due to interaction

$$Ri_{RE} = Ri_{PRE}^{AA} + Ri_{PRE}^{SP} + Ri_{PRE}^{IA}$$

# EX-ANTE RELATIVE RISK ATTRIBUTION USING THE BRINSON-HOOD-BEEBOWER METHOD

- Ex-ante relative risk contribution due to asset allocation

$$\begin{aligned}
 Ri_{PRE}^{AA} &= \sum_{i=1}^n \sum_{j=1}^n 0 * (w_i^P - w_i^B) * (\text{Cov}_E^P(i, j) + \text{Cov}_E^B(i, j) - 2 * \text{Cov}_E^{P,B}(i, j)) \\
 &= \sum_{i=1}^n \sum_{j=1}^n 0 * 0 * \text{Cov}_E^P(i, j) + \sum_{i=1}^n \sum_{j=1}^n (w_i^P - w_i^B) * (w_i^P - w_i^B) * \text{Cov}_E^B(i, j) \\
 &\quad - 2 * \sum_{i=1}^n \sum_{j=1}^n 0 * (w_i^P - w_i^B) * \text{Cov}_E^{P,B}(i, j) \\
 &= \sum_{i=1}^n \sum_{j=1}^n (w_i^P - w_i^B) * (w_j^P - w_j^B) * \text{Cov}_E^B(i, j)
 \end{aligned}$$

or in matrix notation

$$\begin{aligned}
 &= \begin{bmatrix} 0 & w_i^P - w_i^B \end{bmatrix} * \begin{bmatrix} \text{Cov}_E^P & \text{Cov}_E^{P,B} \\ \text{Cov}_E^{P,B} & \text{Cov}_E^B \end{bmatrix} * \begin{bmatrix} 0 \\ w_i^P - w_i^B \end{bmatrix} \quad (2n \times 2n \text{ matrix}); \text{ for } i = 1, \dots, n \\
 &= [w_i^P - w_i^B] * [\text{Cov}_E^B(i, j)] * [w_i^P - w_i^B] \quad (n \times n \text{ matrix}); \text{ for } i = 1, \dots, n
 \end{aligned}$$

# EX-ANTE RELATIVE RISK ATTRIBUTION USING THE BRINSON-HOOD-BEEBOWER METHOD

- Ex-ante relative risk contribution due to stock picking

$$Ri_{PRE}^{SP} = \sum_{i=1}^n \sum_{j=1}^n w_i^B * w_j^B * Cov_E^P(i,j) + \sum_{i=1}^n \sum_{j=1}^n w_i^B * w_j^B * Cov_E^B(i,j) - 2 * \sum_{i=1}^n \sum_{j=1}^n w_i^B * w_j^B * Cov_E^{P,B}(i,j)$$

$$= \sum_{i=1}^n \sum_{j=1}^n w_i^B * w_j^B * (Cov_E^P(i,j) + Cov_E^B(i,j) - 2 * Cov_E^{P,B}(i,j))$$

or in matrix notation

$$= \begin{bmatrix} w_i^B & -w_i^B \end{bmatrix} * \begin{bmatrix} Cov_E^P & Cov_E^{P,B} \\ Cov_E^{P,B} & Cov_E^B \end{bmatrix} * \begin{bmatrix} w_i^B \\ -w_i^B \end{bmatrix} \quad (2n \times 2n \text{ matrix}); \text{ for } i = 1, \dots, n$$

# EX-ANTE RELATIVE RISK ATTRIBUTION USING THE BRINSON-HOOD-BEEBOWER METHOD

- Ex-ante relative risk contribution due to interaction

$$\begin{aligned}
 Ri_{PRE}^{IA} &= Ri_{RE} - Ri_{PRE}^{AA} - Ri_{PRE}^{SP} \\
 &= \begin{bmatrix} w_i^P & -w_i^B \end{bmatrix} * \begin{bmatrix} Cov_E^P & Cov_E^{P,B} \\ Cov_E^{P,B} & Cov_E^B \end{bmatrix} * \begin{bmatrix} w_i^P \\ -w_i^B \end{bmatrix} \\
 &\quad - \begin{bmatrix} 0 & w_i^P - w_i^B \end{bmatrix} * \begin{bmatrix} Cov_E^P & Cov_E^{P,B} \\ Cov_E^{P,B} & Cov_E^B \end{bmatrix} * \begin{bmatrix} 0 \\ w_i^P - w_i^B \end{bmatrix} \\
 &\quad - \begin{bmatrix} w_i^B & -w_i^B \end{bmatrix} * \begin{bmatrix} Cov_E^P & Cov_E^{P,B} \\ Cov_E^{P,B} & Cov_E^B \end{bmatrix} * \begin{bmatrix} w_i^B \\ -w_i^B \end{bmatrix} \quad ; \text{ for } i = 1, \dots, n
 \end{aligned}$$

- Ex-ante relative risk contribution due to management activities for asset class  $i$  by summing up all covariances for the row  $i$

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## ASSUMPTIONS (1/3)

Starting point is a hierarchical decision making process where the asset allocator and the stock picker can invest in nine different asset classes of asset segments: Money market CHF, bonds CHF, foreign bonds hedged, foreign bonds unhedged, mortgages, Swiss equity, foreign equity, Swiss real estate and foreign real estate

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## ASSUMPTIONS (2/3)

	Benchmark weight
▪ Money Market CHF	0%
▪ Bonds CHF	63%
▪ Foreign bonds hedged	0%
▪ Foreign bonds unhedged	5%
▪ Mortgages	0%
▪ Swiss equity	8%
▪ Foreign equity	14%
▪ Swiss real estate	10%
▪ Foreign real estate	0%

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## ASSUMPTIONS (3/3)

- The active portfolio management is simulated by the return of the corresponding sector averages of the mutual funds company for pension funds ("Anlagestiftungen"), respectively individual mutual funds for pension funds if a sector average is not available
- Covariance is calculated based on logarithmic monthly return for the period 1st of February 1995 till 31st of January 2005

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## DEFINITIONS

- **Ex-ante absolute risk**

- is measured using the variance or the volatility and
- is approximated using the historical monthly returns of the relevant indices for the last 10 years

- **Ex-ante excess risk**

- is measured using the variance or the volatility (tracking error) and
- is approximated using the historical monthly returns or monthly excess returns

- **Ex-ante absolute excess risk**

- difference between the absolute risk of two portfolios

- **Ex-ante relative excess risk**

- Variance or volatility (tracking error) of the return differences of two portfolios

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## INPUT - UNDERLYING INDICES

- |                          |  |
|--------------------------|--|
| ▪ Money market CHF       | Citigroup 3 months Euro deposit CHF                      |
| ▪ Bonds CHF              | Swiss Bond Index and before 01.10.1998 Pictet Bond Index |
| ▪ Foreign bonds unhedged | JPM GBI Traded World                                     |
| ▪ Foreign bonds hedged   | JPM GBI Traded World hedged in CHF                       |
| ▪ Mortgages              | Funds Customized Index Mortgages                         |
| ▪ Swiss Equity           | SPI (r)  |
| ▪ Foreign Equity         | MSCI World (r)   |
| ▪ Swiss real estate      | Funds Customized Index Real Estate                       |
| ▪ Foreign real estate    | Funds Foreign Real Estate                                |

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## INPUT - COVARIANZMATRIX INDICES

Annualisierte Kovarianzen	Citigroup CHF 3 Months Eurodeposit	Swiss Bond Index Domestic Government TR	JP Morgan Global GBI Hedged CHF TR	JP Morgan Gl. Traded	Cust Benchm CSA Hypotheiken Schweiz	Swiss Performance Index TR	MSCI World TR	Cust Benchm CSA Immobilien Schweiz	UBS- Immobilien Ausland
Citigroup CHF 3 Months Eurodeposit	0.000009	0.000022	0.000024	0.000005	0.000010	-0.000029	-0.000066	0.000002	-0.000050
Swiss Bond Index Domestic Government TR	0.000022	0.001202	0.000626	0.000061	0.000240	-0.000891	-0.001692	-0.000053	-0.000287
JP Morgan Global GBI Hedged CHF TR	0.000024	0.000626	0.000946	0.000676	0.000181	-0.000982	-0.001169	-0.000122	-0.000181
JP Morgan Gl. Traded	0.000005	0.000061	0.000676	0.004605	0.000052	0.003898	0.007854	0.000227	0.003473
Cust Benchm CSA Hypotheiken Schweiz	0.000010	0.000240	0.000181	0.000052	0.000116	-0.000410	-0.000557	-0.000005	-0.000117
Swiss Performance Index TR	-0.000029	-0.000891	-0.000982	0.003898	-0.000410	0.030362	0.025639	0.000836	0.007943
MSCI World TR	-0.000066	-0.001692	-0.001169	0.007854	-0.000557	0.025639	0.035810	0.000855	0.010735
Cust Benchm CSA Immobilien Schweiz	0.000002	-0.000053	-0.000122	0.000227	-0.000005	0.000836	0.000855	0.004776	0.000691
UBS-Immobilien Ausland	-0.000050	-0.000287	-0.000181	0.003473	-0.000117	0.007943	0.010735	0.000691	0.009046
Annualisierte Varianzen	0.000009	0.001202	0.000946	0.004605	0.000116	0.030362	0.035810	0.004776	0.009046
Annualisierte Volatilitäten	0.30%	3.47%	3.08%	6.79%	1.08%	17.42%	18.92%	6.91%	9.51%

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## INPUT - CORRELATIONMATRIX INDICES

Korrelation	Citigroup CHF 3 Months Eurodeposit	Swiss Bond Index Domestic Government TR	JP Morgan Global GBI Hedged CHF TR	JP Morgan Gl. Traded	Cust Benchm CSA Hypothehen Schweiz	Swiss Performance Index TR	MSCI World TR	Cust Benchm CSA Immobilien Schweiz	UBS- Immobilien Ausland
Citigroup CHF 3 Months Eurodeposit	1.00	0.21	0.27	0.02	0.33	-0.06	-0.12	0.01	-0.18
Swiss Bond Index Domestic Government TR	0.21	1.00	0.59	0.03	0.64	-0.15	-0.26	-0.02	-0.09
JP Morgan Global GBI Hedged CHF TR	0.27	0.59	1.00	0.32	0.55	-0.18	-0.20	-0.06	-0.06
JP Morgan Gl. Traded	0.02	0.03	0.32	1.00	0.07	0.33	0.61	0.05	0.54
Cust Benchm CSA Hypothehen Schweiz	0.33	0.64	0.55	0.07	1.00	-0.22	-0.27	-0.01	-0.11
Swiss Performance Index TR	-0.06	-0.15	-0.18	0.33	-0.22	1.00	0.78	0.07	0.48
MSCI World TR	-0.12	-0.26	-0.20	0.61	-0.27	0.78	1.00	0.07	0.60
Cust Benchm CSA Immobilien Schweiz	0.01	-0.02	-0.06	0.05	-0.01	0.07	0.07	1.00	0.11
UBS-Immobilien Ausland	-0.18	-0.09	-0.06	0.54	-0.11	0.48	0.60	0.11	1.00

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## INPUT - UNDERLYING ACTIVE PORTFOLIOS

- |                          |   |
|--------------------------|---|
| ▪ Money market CHF       | Peer Average Money Market CHF                                     |
| ▪ Bonds CHF              | Peer Average Bonds CHF Domestic                                   |
| ▪ Foreign bonds unhedged | Peer Average Bonds Worldwide                                      |
| ▪ Foreign bonds hedged   | Funds Bonds Hedged CHF and before Peer Average Bonds CHF Domestic |
| ▪ Mortgages              | CSA Mortgages   |
| ▪ Swiss Equity           | Peer Average Stocks Switzerland                                   |
| ▪ Foreign Equity         | Peer Average Stocks Worldwide                                     |
| ▪ Swiss real estate      | Peer Average Real Estate Switzerland                              |
| ▪ Foreign real estate    | Funds Foreign Real Estate   |

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## INPUT - COVARIANZMATRIX ACTIVE PORTFOLIOS

Annualisierte Kovarianzen	Money M. CHF	Bonds CHF Domestic	LOM-Obli-Hedged CHF	Bonds Worldwide	CSA-Hypoth.Schweiz	Stocks Switzerland	Stocks Worldwide	Real E. Switzerland	UBS-Immob.Ausland
Money M. CHF	0.000012	0.000025	0.000032	0.000017	0.000013	-0.000050	-0.000080	-0.000004	-0.000046
Bonds CHF Domestic	0.000025	0.000658	0.000549	0.000202	0.000136	-0.000385	-0.001124	-0.000002	-0.000130
LOM-Obli-Hedged CHF	0.000032	0.000549	0.001033	0.000709	0.000116	-0.000663	-0.001059	0.000000	-0.000080
Bonds Worldwide	0.000017	0.000202	0.000709	0.003599	0.000016	0.003249	0.006429	-0.000063	0.003168
CSA-Hypoth.Schweiz	0.000013	0.000136	0.000116	0.000016	0.000062	-0.000370	-0.000483	-0.000007	-0.000132
Stocks Switzerland	-0.000050	-0.000385	-0.000663	0.003249	-0.000370	0.031551	0.025125	-0.000123	0.007735
Stocks Worldwide	-0.000080	-0.001124	-0.001059	0.006429	-0.000483	0.025125	0.034926	0.000052	0.010481
Real E. Switzerland	-0.000004	-0.000002	0.000000	-0.000063	-0.000007	-0.000123	0.000052	0.000147	-0.000069
UBS-Immob.Ausland	-0.000046	-0.000130	-0.000080	0.003168	-0.000132	0.007735	0.010481	-0.000069	0.009046
Annualisierte Varianzen	0.000012	0.000658	0.001033	0.003599	0.000062	0.031551	0.034926	0.000147	0.009046
Annualisierte Volatilitäten	0.35%	2.57%	3.21%	6.00%	0.78%	17.76%	18.69%	1.21%	9.51%

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## INPUT - CORRELATIONMATRIX ACTIVE PORTFOLIOS

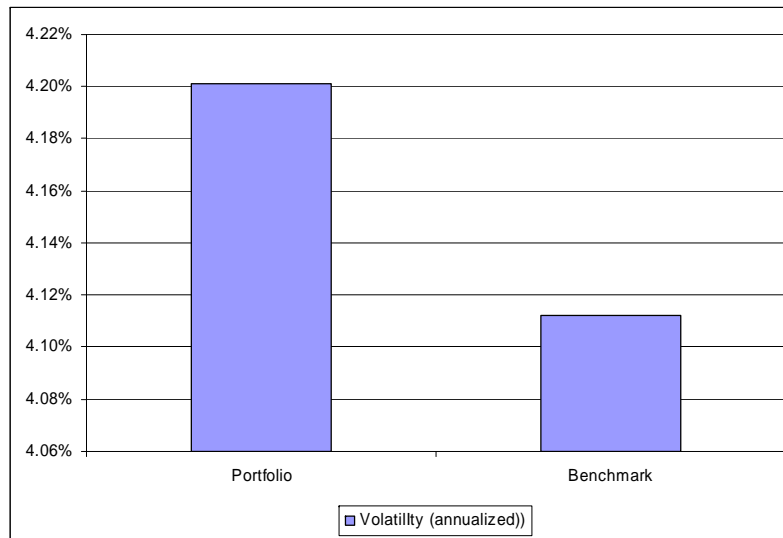
Korrelation	Money M. CHF	Bonds CHF Domestic	LOM-Obli-Hedged CHF	Bonds Worldwide	CSA-Hypoth.Schweiz	Stocks Switzerland	Stocks Worldwide	Real E. Switzerland	UBS-Immob.Ausland
Money M. CHF	1.00	0.29	0.29	0.08	0.47	-0.08	-0.12	-0.10	-0.14
Bonds CHF Domestic	0.29	1.00	0.67	0.13	0.68	-0.08	-0.23	-0.01	-0.05
LOM-Obli-Hedged CHF	0.29	0.67	1.00	0.37	0.46	-0.12	-0.18	0.00	-0.03
Bonds Worldwide	0.08	0.13	0.37	1.00	0.03	0.30	0.57	-0.09	0.56
CSA-Hypoth.Schweiz	0.47	0.68	0.46	0.03	1.00	-0.27	-0.33	-0.08	-0.18
Stocks Switzerland	-0.08	-0.08	-0.12	0.30	-0.27	1.00	0.76	-0.06	0.46
Stocks Worldwide	-0.12	-0.23	-0.18	0.57	-0.33	0.76	1.00	0.02	0.59
Real E. Switzerland	-0.10	-0.01	0.00	-0.09	-0.08	-0.06	0.02	1.00	-0.06
UBS-Immob.Ausland	-0.14	-0.05	-0.03	0.56	-0.18	0.46	0.59	-0.06	1.00

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION INPUT - ASSET ALLOCATION, ETC.

Gewichte per 31.01.2005	Portfolio	Minimum	Maximum	Weights	Benchmark
Money Market CHF	1.79%	0.00%	100.00%	Money Market CHF	0.00%
Bonds CHF	51.06%	53.00%	73.00%	Bonds CHF	52.07%
Foreign Bonds Hedged	8.56%	0.00%	20.00%	Foreign Bonds Hedged	8.45%
Foreign Bonds Unhedged	5.01%	3.00%	8.00%	Foreign Bonds Unhedged	5.00%
Mortgages	5.92%	0.00%	100.00%	Mortgages	7.50%
Swiss Equity	8.63%	6.00%	11.00%	Swiss Equity	8.00%
Foreign Equity	14.73%	10.00%	19.00%	Foreign Equity	14.00%
Swiss Real Estate	4.30%	8.00%	13.00%	Swiss Real Estate	4.98%
Foreign Real Estate	0.00%	0.00%	5.00%	Foreign Real Estate	0.00%
Total	100.00%			Total	100.00%

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## EX-ANTE ABSOLUTE RISK (1/4)



	Volatility (annualized)
Portfolio	4.20%
Portfolio (Cov-Index)	4.30%
Benchmark	4.11%

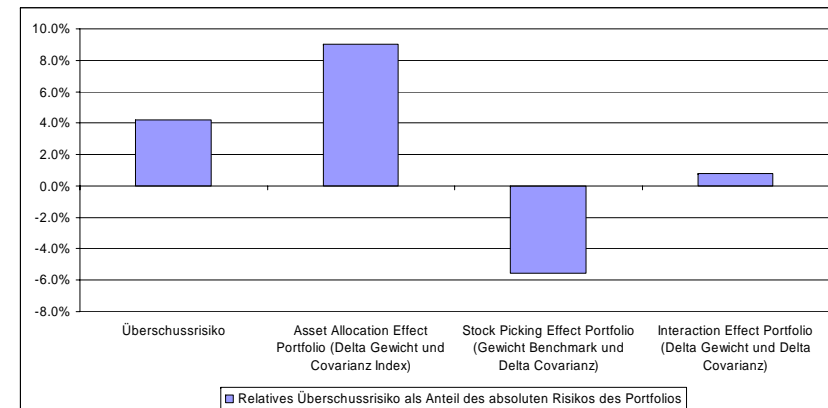
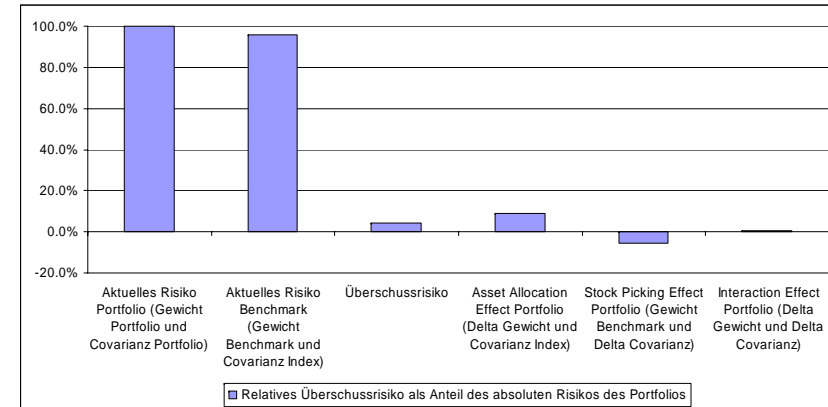
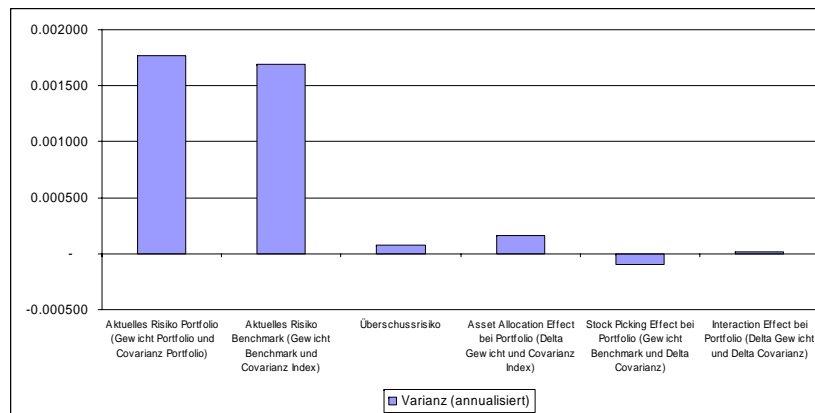
# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## EX-ANTE ABSOLUTE RISK (2/4)

	Absolutes Risk		Absolutes Excess Risk	Management Effects		
	Portfolio	Benchmark	Difference	Asset Allocation	Stock Picking	Interaction
Absolute Risk (Variance)	0.0017647	0.0016911	0.0000737	0.0001588	-0.0000986	0.0000135
Absolute Risk (Volatility)	4.20%	4.11%				
Risk Contribution in % of the Absolute Risk			4.36%	9.39%	-5.83%	0.80%
Risk Contribution in % - Money Market CHF	0.00%	0.00%	0.00%	0.03%	0.00%	-0.13%
Risk Contribution in % - Bonds CHF	5.87%	11.98%	-6.11%	-12.91%	88.68%	65.94%
Risk Contribution in % - Foreign Bonds Hedged	0.96%	1.02%	-0.06%	-1.02%	-0.92%	2.65%
Risk Contribution in % - Foreign Bonds Unhedged	4.46%	5.16%	-0.71%	2.64%	12.32%	-5.09%
Risk Contribution in % - Mortgages	-0.06%	0.18%	-0.24%	-0.79%	3.94%	7.23%
Risk Contribution in % - Swiss Equity	30.83%	26.86%	3.98%	43.57%	-19.18%	13.87%
Risk Contribution in % - Foreign Equity	57.95%	53.63%	4.32%	70.74%	-4.92%	-10.59%
Risk Contribution in % - Swiss Real Estate	0.00%	1.17%	-1.17%	-2.26%	20.08%	26.12%
Risk Contribution in % - Foreign Real Estate	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Risk Contribution in % - Total	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%

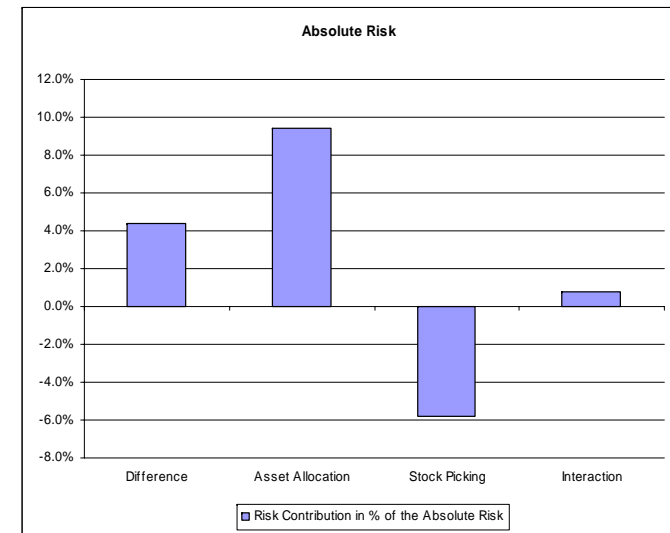
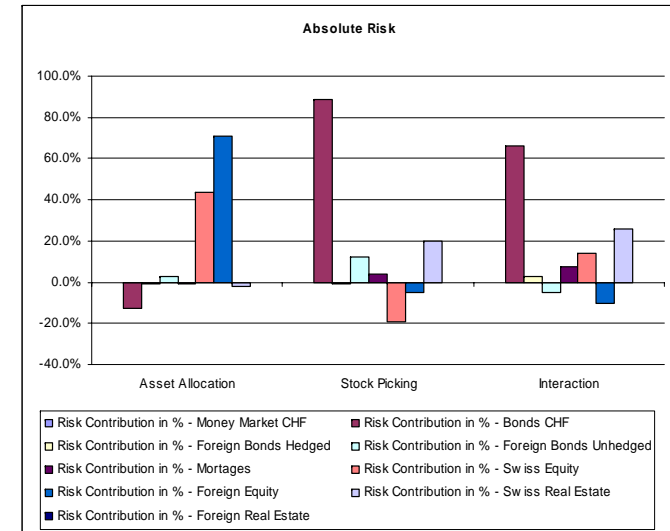
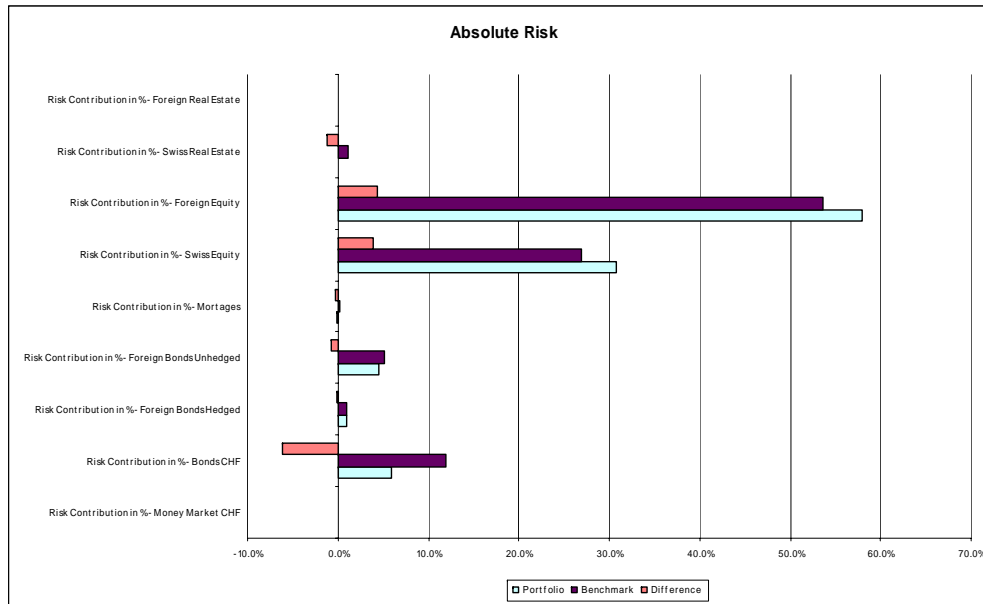
# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## EX-ANTE ABSOLUTE RISK (3/4)



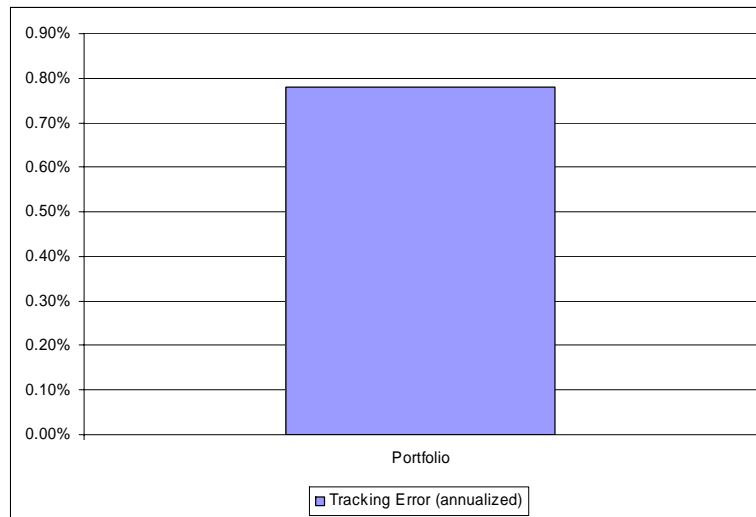
# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## EX-ANTE ABSOLUTE RISK (4/4)



# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## EX-ANTE RELATIVE RISK (1/4)



	Tracking Error (annualized)
Portfolio	0.78%

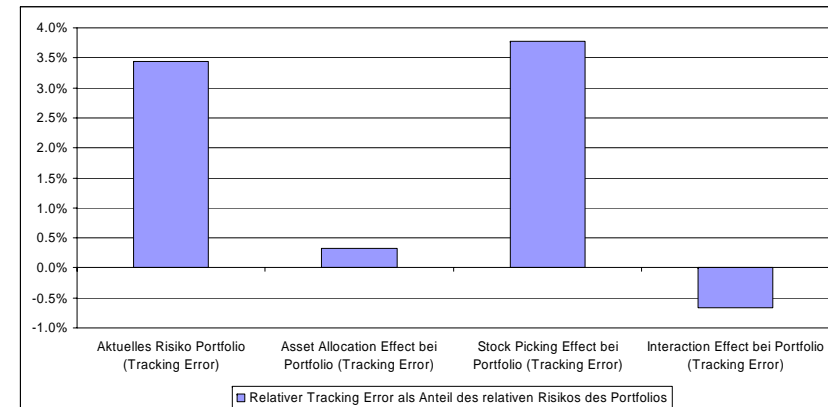
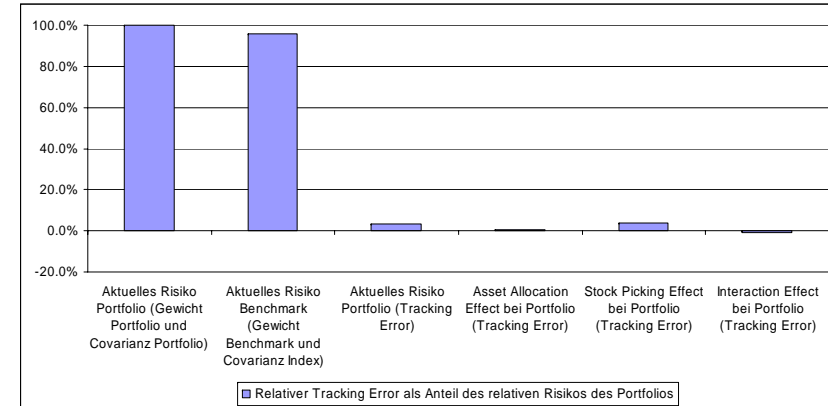
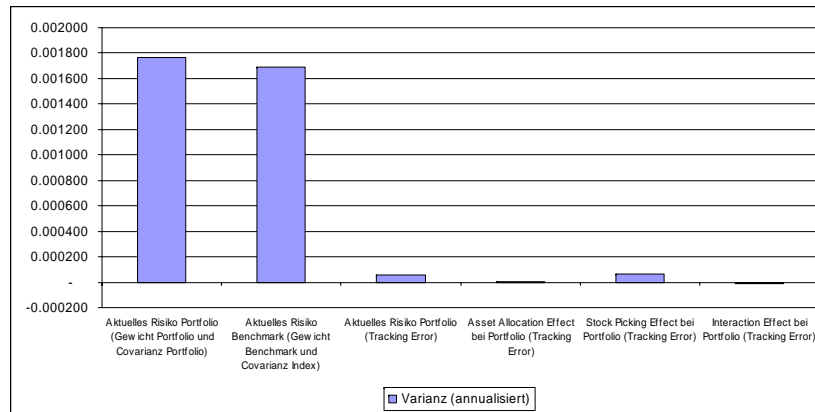
# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## EX-ANTE RELATIVE RISK (2/4)

	Relative Risk		Difference	Management Effects		
	Portfolio	Benchmark		Asset Allocation	Stock Picking	Interaction
Relative Risk (Variance)	0.0000607	0.0000000	0.0000607	0.0000059	0.0000666	-0.0000118
Relative Risk (Volatility)	0.78%					
Risk Contribution in % of the Relative Risk			100.00%	9.70%	109.70%	-19.40%
Risk Contribution in % - Money Market CHF	0.03%			-0.33%	0.00%	-0.33%
Risk Contribution in % - Bonds CHF	47.59%			3.14%	54.36%	63.61%
Risk Contribution in % - Foreign Bonds Hedged	2.27%			-0.33%	2.30%	1.14%
Risk Contribution in % - Foreign Bonds Unhedged	3.41%			0.11%	2.04%	-6.00%
Risk Contribution in % - Mortgages	0.70%			2.09%	1.31%	4.81%
Risk Contribution in % - Swiss Equity	2.52%			41.87%	0.38%	10.12%
Risk Contribution in % - Foreign Equity	27.21%			53.28%	20.98%	5.02%
Risk Contribution in % - Swiss Real Estate	16.27%			0.15%	18.64%	21.63%
Risk Contribution in % - Foreign Real Estate	0.00%			0.00%	0.00%	0.00%
Risk Contribution in % - Total	100.00%			100.00%	100.00%	100.00%

# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## EX-ANTE RELATIVE RISK (3/4)



# EXAMPLE FOR EX-ANTE RISK ATTRIBUTION

## EX-ANTE RELATIVE RISK (4/4)

