Morningstar EnCorr

Asset Allocation: 1st Step to Asset Allocation Modeling

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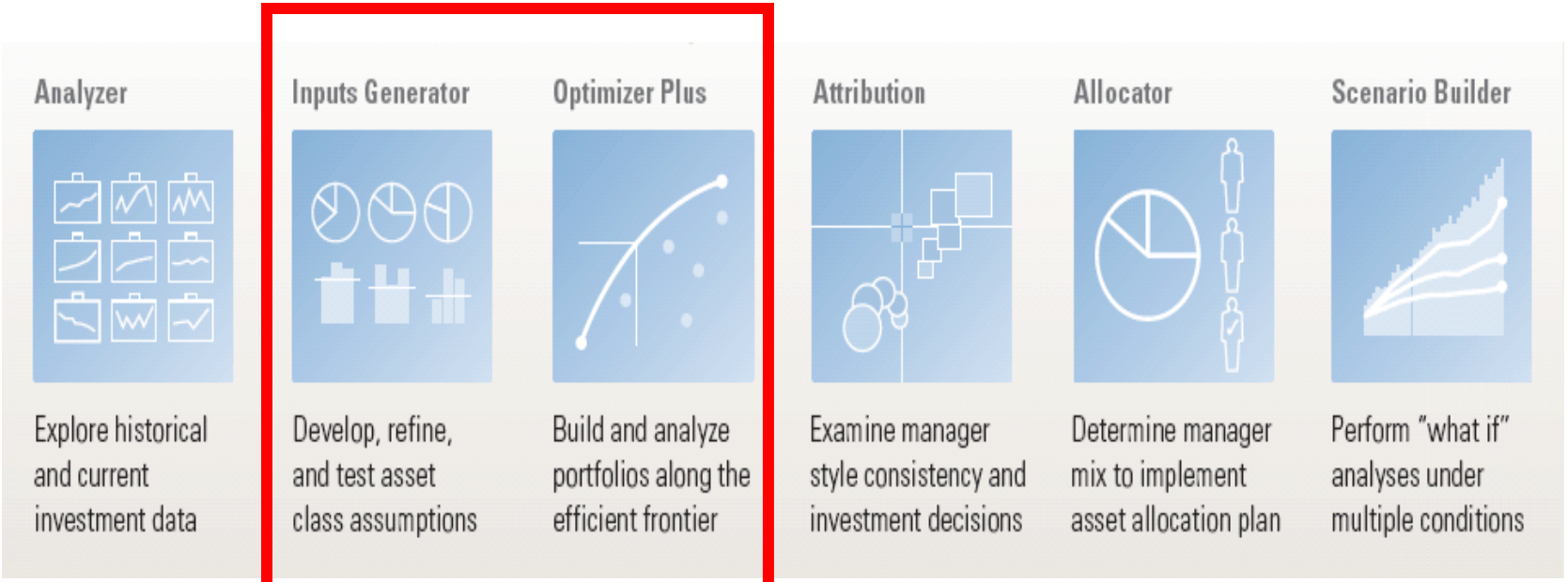
EnCorr Modules



Asset Allocation Plan

- Asset Allocation is the most important part of the investment process.
- Similar References:
  - Strategic Asset Allocation
  - Policy Portfolio
  - Strategic Policy Benchmark

Asset Allocation Plan

- Markowitz's Mean Variance Optimization (MVO) is the most widely used approach.
  - Three inputs are required (expected return, standard deviation, correlation) for each asset class to create the potential portfolio often referred as "opportunity set".
  - These inputs are then fed into optimizer and the output is the efficient frontier.
    - Each point on the efficient frontier represents an efficient or optimal mix of asset classes in the opportunity set.
      - Therefore, each point on the efficient frontier maximizes the expected return per unit of risk or visa versa, minimizes risk per unit of return.

Asset Allocation Plan

- Process
  - Develop asset class inputs in *Inputs Generator*
  - Run the optimization inputs in *Optimizer*
  - Identify Potential Target Portfolios in *Optimizer*

Inputs Generator (Part I)

- Determine the composition of the optimal portfolio.
  - You need to know the nature of the possible returns of each asset class, along with the relationship between the asset returns. Three inputs are required:
    - Expected return of each asset
    - Standard deviation of the returns
    - Correlation between asset returns

Inputs Generator (Part I)

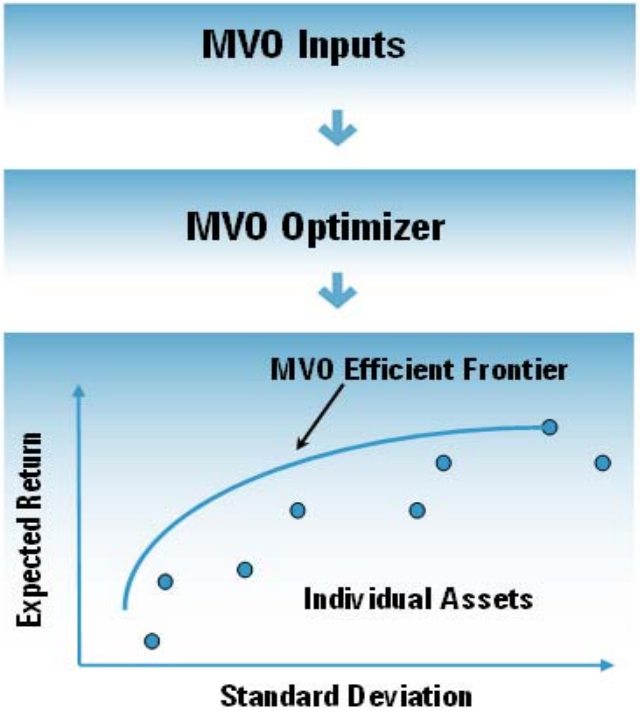
- Develop asset class inputs for optimization.
  - Identify your asset class assumptions
  - Decide which Input Methodology to use to develop forward looking expected returns
  - Analyze the levels of risk and correlation over time
  - Run correlations to test the stability of your inputs
    - Causes for unstable correlation matrix
    - Solutions

Inputs Generator (Part I)

- Once the input process is complete, these expectations are known as optimization inputs where they will drive the probability distribution of future asset class returns and take into account the risk contained in the various asset classes.

Optimizer (Part II)

- To develop, test, and analyze your future asset allocations along the efficient frontier, the Optimizer is the next step.



Optimizer (Part II)

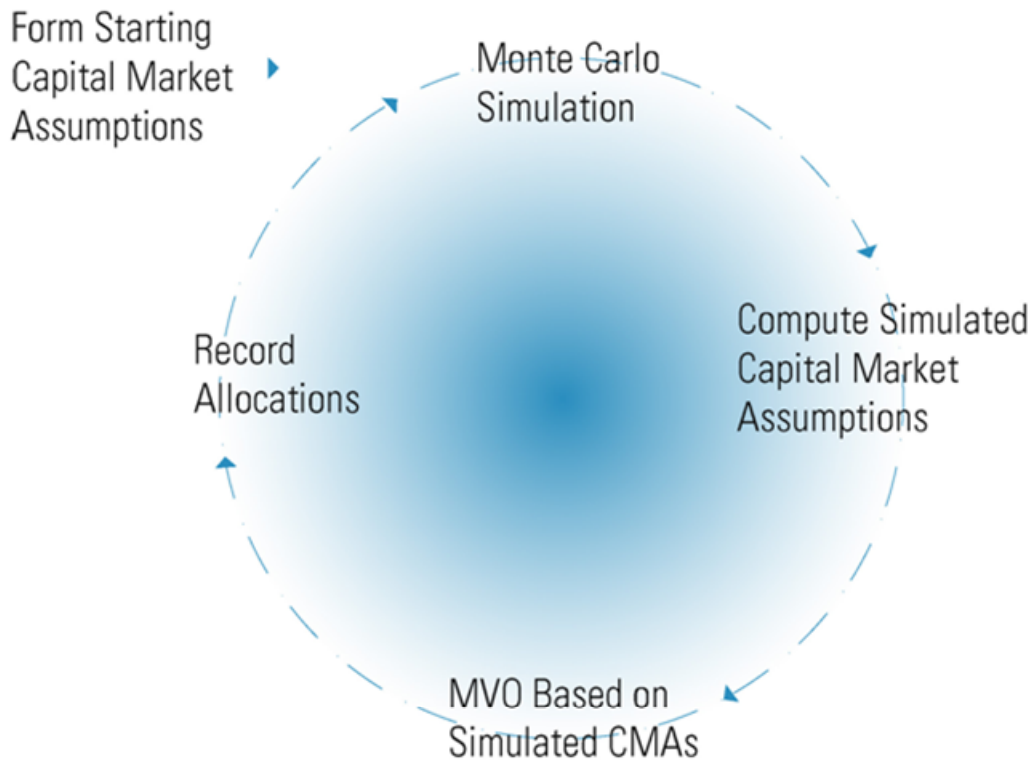
- Mean Variance Optimization (MVO)
  - Base Case
  - Traditional Optimization

Optimizer (Part II)

- Resampled Mean Variance Optimization
  - Combination of the Base case & Monte Carlo simulations
    - By simulating returns, you can compute new set of capital market assumptions.
    - Resampling recognizes that Capital Market Assumptions are forecasts and not a “sure thing”.
    - The end result will produce more diversified and robust portfolios.

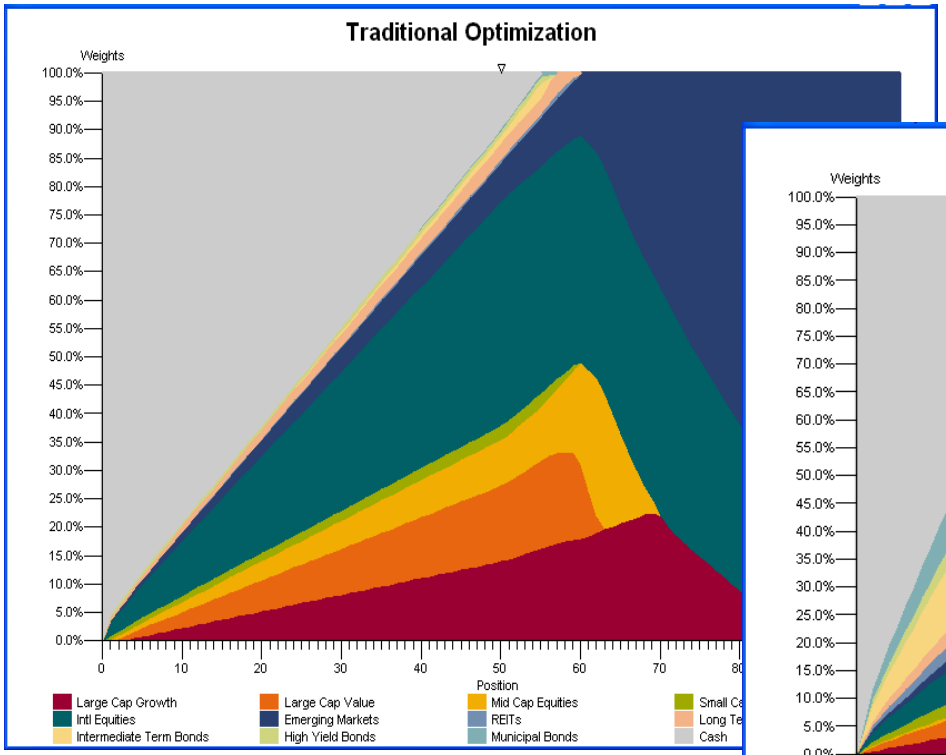
Optimizer (Part II)

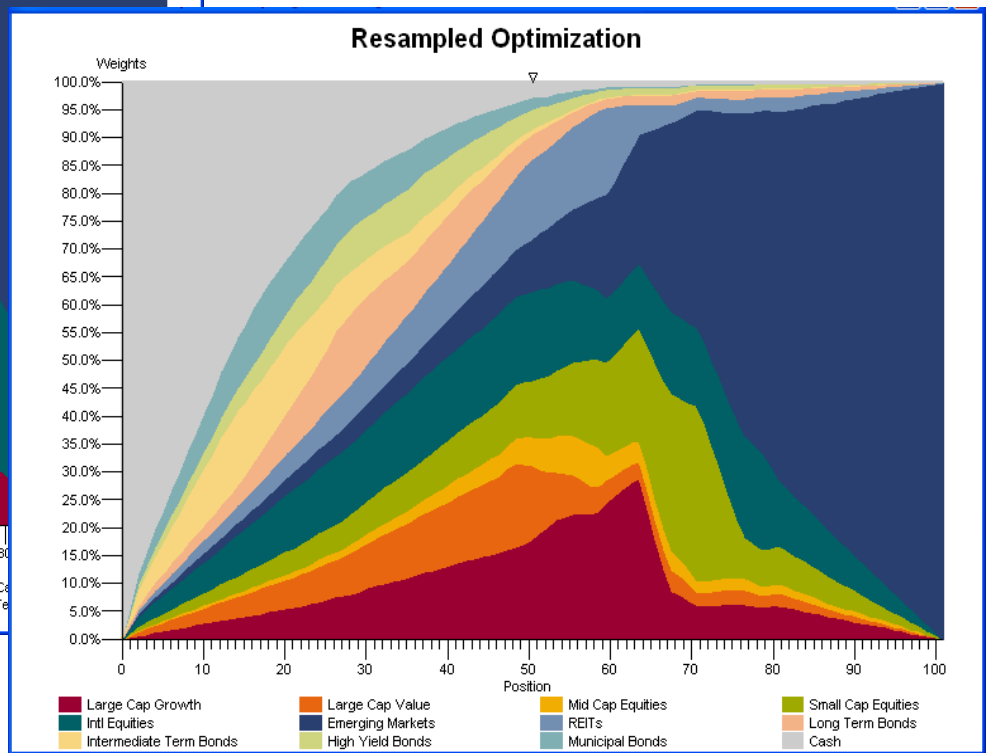
- Resampled Mean-Variance Optimization



Optimizer (Part II)

- Traditional Optimization vs. Resampled Optimization





Optimizer (Part III)

- Identify Target Portfolio(s)
  - Evaluate current portfolio
  - Identify potential portfolios
  - Generate comparative analysis with Forecasts/Simulations
  - Determine the Target Portfolio

Communicate the Results

- Inputs Generator

Standard Deviation Table

	Refined Std.	Historical Std.	Using Historical
S&P 500 TR	NA	4.54	X
IA SBBI US Small Stock TR USD	NA	5.96	X
MSCI EAFE TR	NA	5.23	X
IA SBBI US LT Govt TR USD	NA	2.95	X
ML Global Government Bond Ex US	NA	2.83	X
FTSE NAREIT All REITs TR	NA	5.08	X

Correlation Table

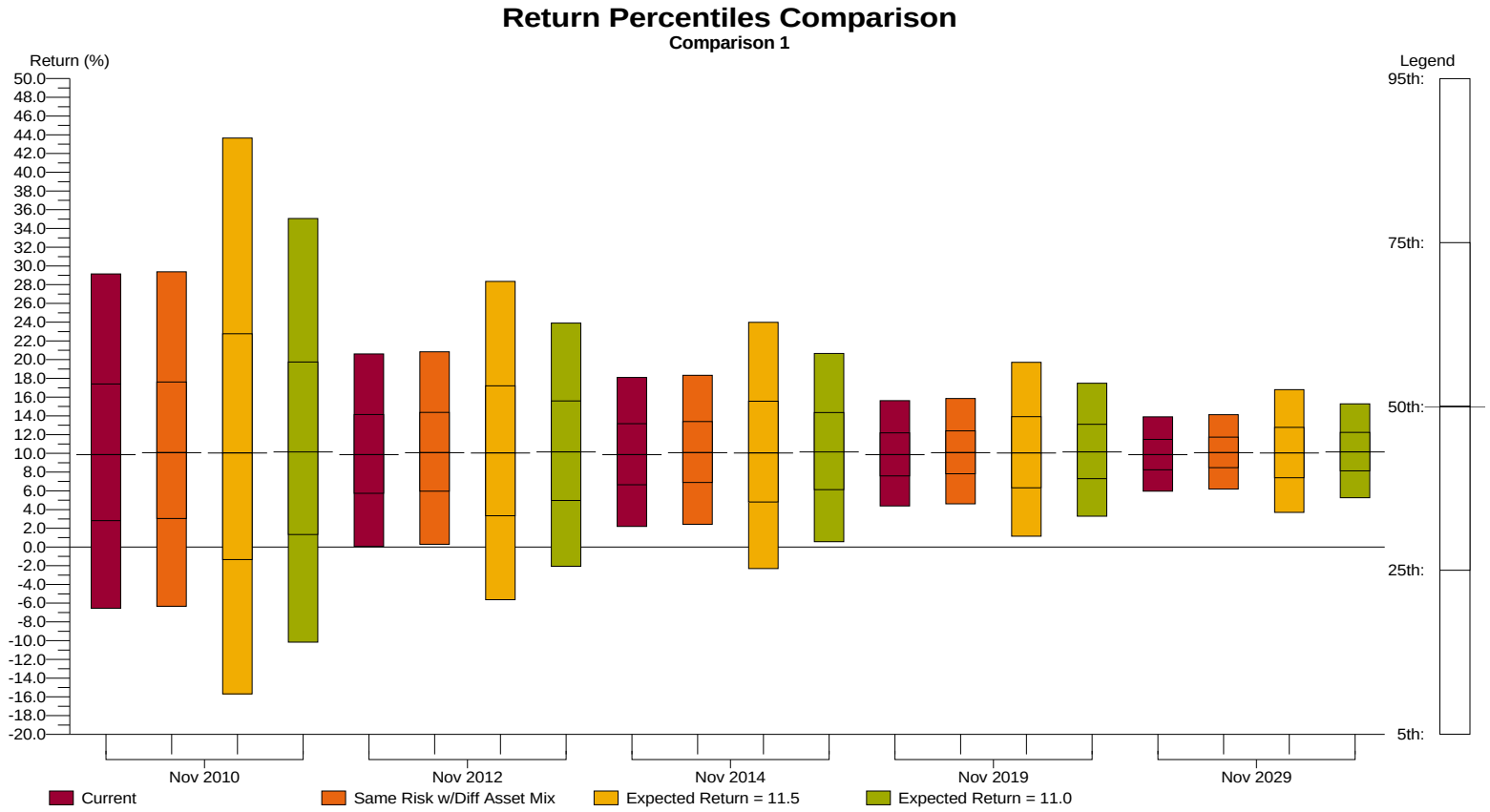
	Correlation with S&P 500 TR	Correlation with IA SBBI US Small Stock TR USD	Correlation with MSCI EAFE TR	Correlation with IA SBBI US LT Govt TR USD	Correlation with ML Global Government Bond Ex US	Correlation with FTSE NAREIT All REITs TR
S&P 500 TR	1.000	0.737	0.662	0.085	0.001	0.531
IA SBBI US Small Stock TR USD	0.737	1.000	0.547	-0.038	-0.085	0.604
MSCI EAFE TR	0.662	0.547	1.000	0.031	0.396	0.434
IA SBBI US LT Govt TR USD	0.085	-0.038	0.031	1.000	0.342	0.081
ML Global Government Bond Ex US	0.001	-0.085	0.396	0.342	1.000	0.052
FTSE NAREIT All REITs TR	0.531	0.604	0.434	0.081	0.052	1.000

Inputs Summary Table

	Expected Return	Standard Deviation	Yield	Correlation with S&P 500 TR	Correlation with IA SBBI US Small Stock TR USD	Correlation with MSCI EAFE TR	Correlation with IA SBBI US LT Govt TR USD	Correlation with ML Global Government Bond Ex US	Correlation with FTSE NAREIT All REITs TR	Total Turnover	Short-Term Turnover**
S&P 500 TR	10.82	17.39	0.00	1.000	0.733	0.659	0.085	0.001	0.528	20.00	0.00
IA SBBI US Small Stock TR USD	12.01	23.11	0.00	0.733	1.000	0.543	-0.037	-0.084	0.600	20.00	0.00
MSCI EAFE TR	10.26	19.95	0.00	0.659	0.543	1.000	0.031	0.393	0.431	20.00	0.00
IA SBBI US LT Govt TR USD	9.65	11.15	0.00	0.085	-0.037	0.031	1.000	0.341	0.081	20.00	0.00
ML Global Government Bond Ex US	9.43	10.68	0.00	0.001	-0.084	0.393	0.341	1.000	0.051	20.00	0.00
FTSE NAREIT All REITs TR	9.45	19.24	0.00	0.528	0.600	0.431	0.081	0.051	1.000	20.00	0.00

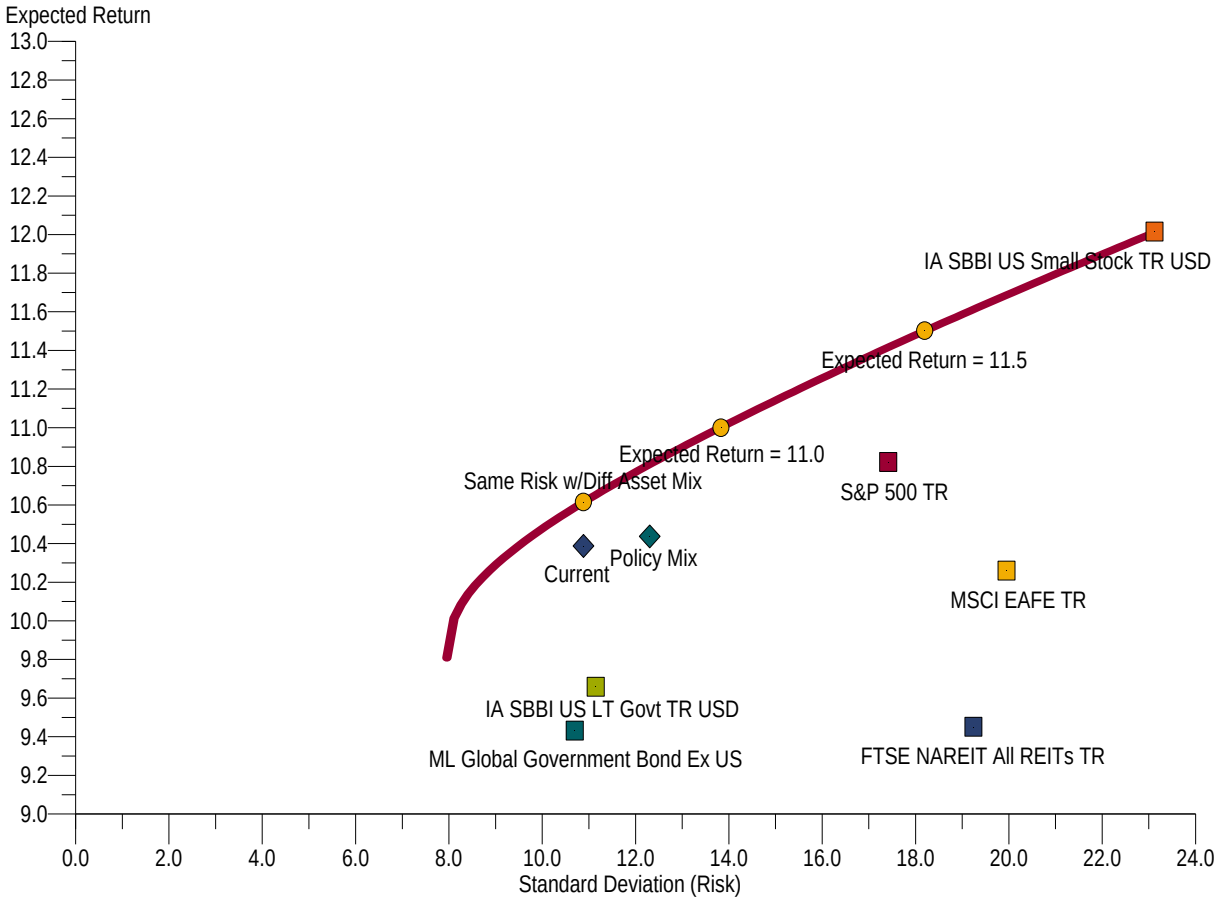
Communicate the Results

- Optimizer



Communicate the Results

- Optimizer

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