Morningstar EnCorr

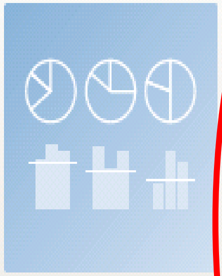
Forecasts and Simulations (Monte Carlo)

EnCorr Modules

Analyzer

Explore historical and current investment data

Inputs Generator

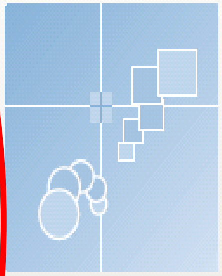


Develop, refine, and test asset class assumptions

Optimizer Plus

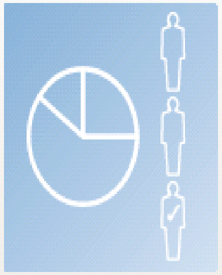
Build and analyze portfolios along the efficient frontier

Attribution



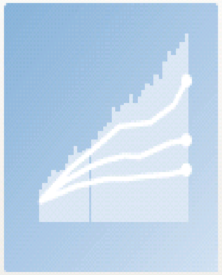
Examine manager style consistency and investment decisions

Allocator



Determine manager mix to implement asset allocation plan

Scenario Builder



Perform "what if" analyses under multiple conditions

Forecasts

- Probability distribution, broken down by percentiles, of possible future annualized returns for selected portfolios and assets.
    - These percentiles represent the range of return or wealth value for a particular year may fall.
    - These percentiles reflect various confidence levels of the statistical model:
        - 95th and 5th percentiles represent the upper and lower projections for a 90% confidence level or
        - 5% chance of the return or wealth value being less than the 5th percentile or greater than the 95th percentiles.
    - *Lognormal distribution or log stable distribution*

Forecasts

▸ Forecasting View

Wealth Percentiles: Position 50

	1 Year	5 Year	10 Year	20 Year
95th Percentile	1350.73	2708.53	5769.70	23702.13
75th Percentile	1212.24	2126.59	4098.19	14611.35
50th Percentile	1124.43	1797.47	3230.89	10438.62
25th Percentile	1042.98	1519.28	2547.13	7457.55
5th Percentile	936.04	1192.86	1809.21	4597.26

Return Percentiles: Position 50

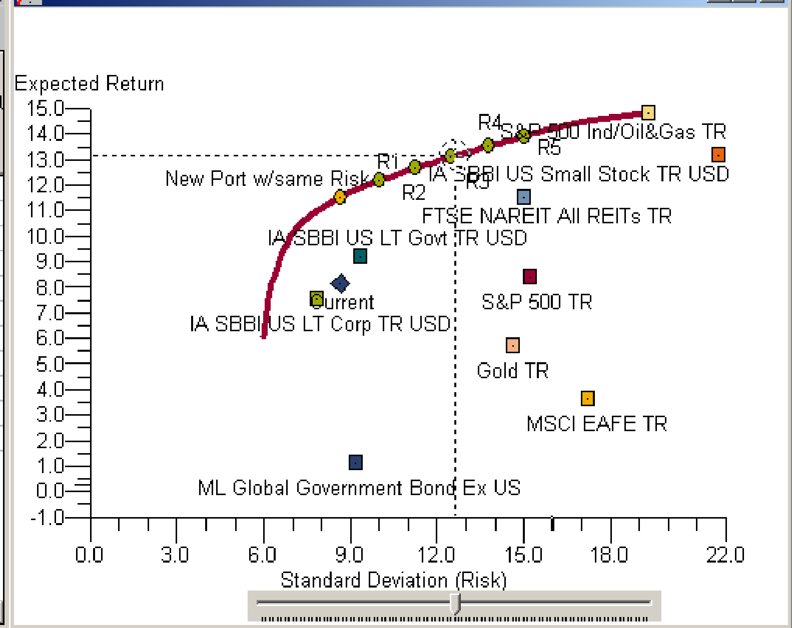
	1 Year	5 Year	10 Year	20 Year
95th Percentile	35.07	22.05	19.16	17.15
75th Percentile	21.22	16.29	15.15	14.35
50th Percentile	12.44	12.44	12.44	12.44
25th Percentile	4.30	8.72	9.80	10.57
5th Percentile	-6.40	3.59	6.11	7.93

Portfolio Statistics

Statistics... "Linked" Mix

	Position 50	Current	S&P 500 TR	IA SB Small TR U
S&P 500 TR	0.00	20.00	100.00	
IA SBBI US Small Stock TR USD	18.96	15.00	0.00	
MSCI EAFE TR	0.00	10.00	0.00	
IA SBBI US LT Corp TR USD	0.00	20.00	0.00	
IA SBBI US LT Govt TR USD	16.40	10.00	0.00	
ML Global Government Bond Ex US	0.00	10.00	0.00	
FTSE NAREIT All REITs TR	12.89	5.00	0.00	
Gold TR	0.00	5.00	0.00	
S&P 500 Ind/Oil&Gas TR	51.76	5.00	0.00	
Expected Return	13.14	8.16	8.37	
Standard Deviation	12.65	8.62	15.23	

Efficient Frontier - Forecast and Simulations.aax



Simulations (Monte Carlo)

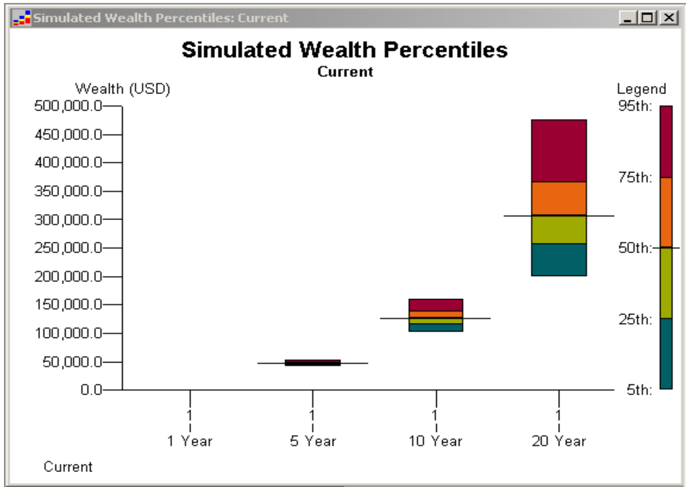
- Probability distribution, broken down by percentiles, of possible future annualized returns for selected portfolio and assets.
- Return and Wealth percentile interpretation is the same as Forecasts but the differences to generate those percentiles are based on:
    - Simulated Runs – 500 to 5000
    - Cash Flows – Inflows and Outflows
    - *Lognormal distribution*

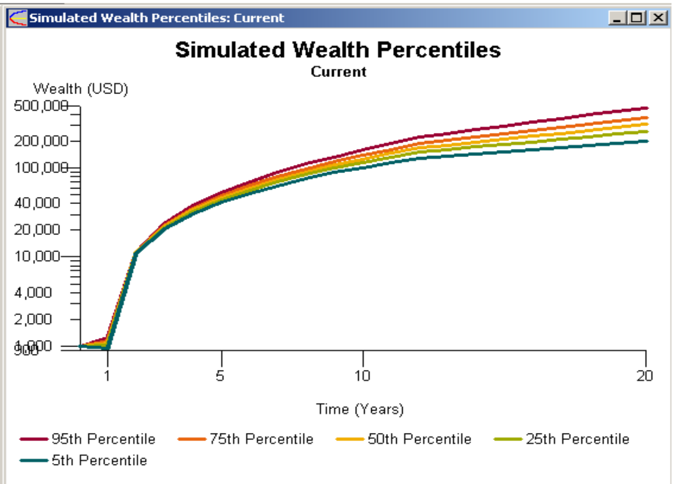
Simulations (Monte Carlo)

- Simulated Runs
  - For each asset per period, simulated returns are sorted from highest to lowest and organized into probability percentile ranges. These simulated returns are then used to calculate Wealth Values.
- Cash Flows
  - For inflows and outflows, you can enter projected cash flows to be included in the simulation by selecting Monetary Amount, Percentage of the Initial Wealth, Percentage of Most Recent Value, and/or Percentage of Moving Average Value.
    - Cash inflows are accounted for at end of period
    - Cash outflows are accounted for at beginning of period

Simulations (Monte Carlo)

- Simulations View





Wealth Percentiles Comparison

	5 Year		10 Year		20 Year	
	Current	New Port w/same Risk	Current	New Port w/same Risk	Current	New Port w/same Risk
95th Percentile	52834.36	55866.77	159326.69	184746.16	476113.69	737021.02
75th Percentile	48960.91	51702.36	138898.66	160927.74	367456.37	567297.23
50th Percentile	46432.90	48992.56	126201.50	146118.56	307167.39	472637.22
25th Percentile	44037.28	46405.09	115301.75	132846.22	256168.09	394489.59
5th Percentile	41074.25	43175.56	101303.01	116684.40	199176.13	303913.49

Case Study

- Scenario
  - Portfolio of US large caps, Non-US large caps, US small caps, US Bonds, US Corporates, Global ex US Bonds, Gold, Energy, Real Estate.

Asset Class Assumptions	Expected Return	Standard Deviation
S&P 500 TR	8.37	15.23
IA SBBI US Small Stock TR USD	13.17	21.76
MSCI EAFE TR	3.62	17.23
IA SBBI US LT Corp TR USD	7.57	7.86
IA SBBI US LT Govt TR USD	9.19	9.32
ML Global Government Bond Ex US	1.10	9.19
FTSE NAREIT All REITs TR	11.49	15.01
Gold TR	5.73	14.62
S&P 500 Ind/Oil&Gas TR	14.80	19.30

Case Study

- Forecasts

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- Simulations

Simulated Return Percentiles: Position 50

	1 Year	5 Year	10 Year	20 Year
95th Percentile	35.45	21.92	19.30	17.13
75th Percentile	21.20	16.26	15.05	14.33
50th Percentile	12.29	12.41	12.41	12.44
25th Percentile	4.13	8.80	9.86	10.63
5th Percentile	-6.19	3.84	5.98	8.01

Simulated Wealth Percentiles: Position 50

	1 Year	5 Year	10 Year	20 Year
95th Percentile	1354.53	60674.12	219700.85	1043986.35
75th Percentile	1212.00	54175.28	178152.35	722633.24
50th Percentile	1122.94	49966.17	154542.66	557442.60
25th Percentile	1041.28	46257.77	134370.71	429247.60
5th Percentile	938.10	41855.15	111278.30	303405.47

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