# Morningstar® EnCorr® User Guide

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# Analyzer

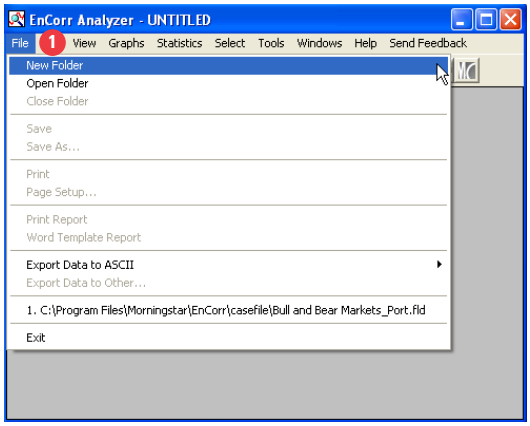
EnCorr Analyzer allows you to perform in-depth historical analysis on various investments, benchmarks, and custom portfolios. Analyzer can be used to analyze historical performance and statistical results, to create blended portfolios and benchmarks, to apply currency conversions and inflation adjusted returns, to construct asset allocation inputs, and to import custom return series.

**Exercises**

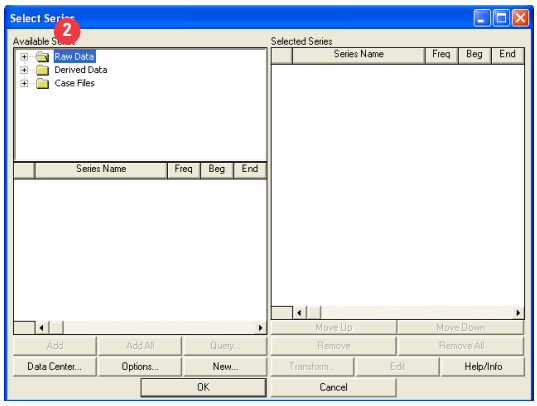
- Selecting Database Series with Standard Query
- Creating Custom Portfolios and Benchmarks
- Customizing Data Settings
- Creating Tables with Supporting Charts
- Creating Graphs and Magnifying Specific Periods
- Summary of Output Options

### Selecting Database Series with Standard Query

**1.** Open EnCorr Analyzer and click on File, *New Folder* to be taken to the Select Series Window.

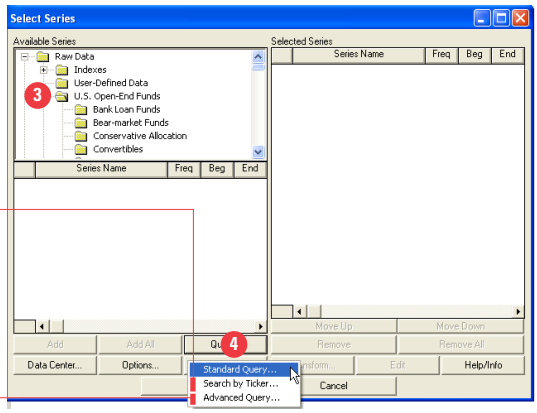


**2.** Go to the Available Series area and click on each of the three folders to view the subfolders.




**3.** Click on *U.S. Open-End Funds* in the Raw Data folder.

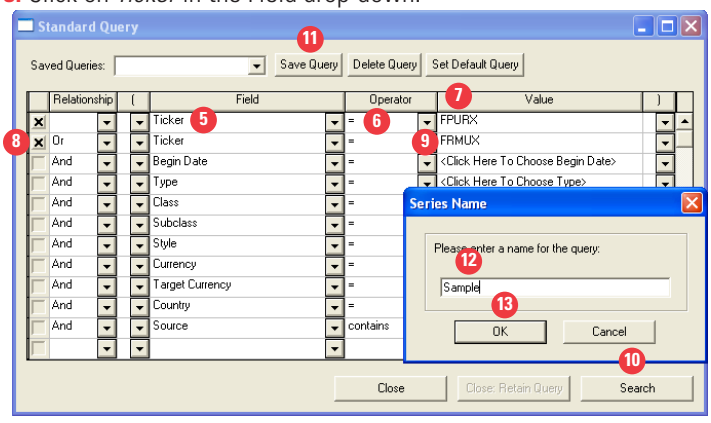
**4.** Click on *Standard Query* to be taken to the Standard Query window.




Search by specific tickers.

Search investments based on specific properities.

**5.** Click on *Ticker* in the Field drop-down.




**6.** Click on "=" in the Operator drop-down.

**7.** Type *FPURX* in the Value drop-down

**8.** On the next line, click on *Or* to make the command not mutually inclusive and follow Steps 5 and 6 to add another Ticker.

**9**. Type *FRMUX* in the Value drop-down.

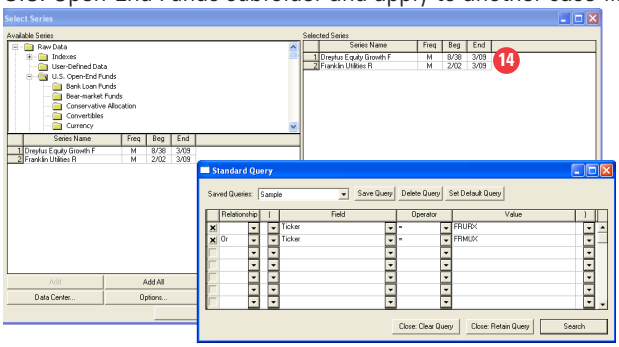
**10.** Click *Search*.

**11.** Click *Save Query* to save and to access this query at future date.

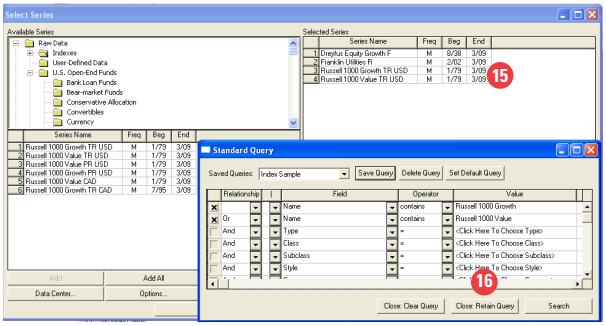
**12.** Type *Sample* in Series Name window.

**13.** Click *OK*.

**14.** *Add* your results to the Selected Series window. You can retrieve this query from the U.S. Open-End Funds subfolder and apply to another case file.



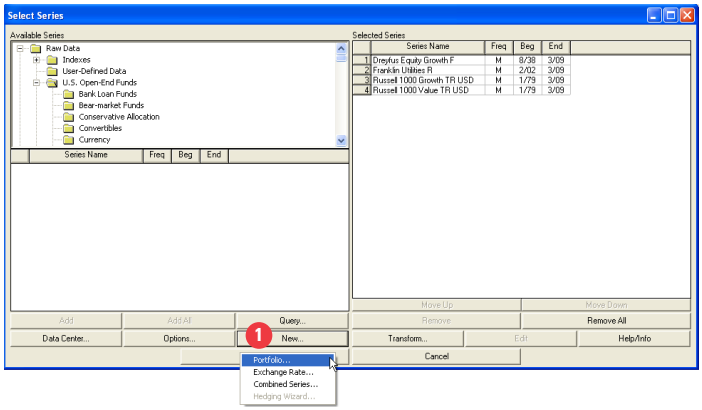

**15.** Go to the Index folder in the Available Series window and follow Steps 5 to 14 to add the *Russell 1000 Growth TR USD* and the *Russell 1000 Value TR USD*.



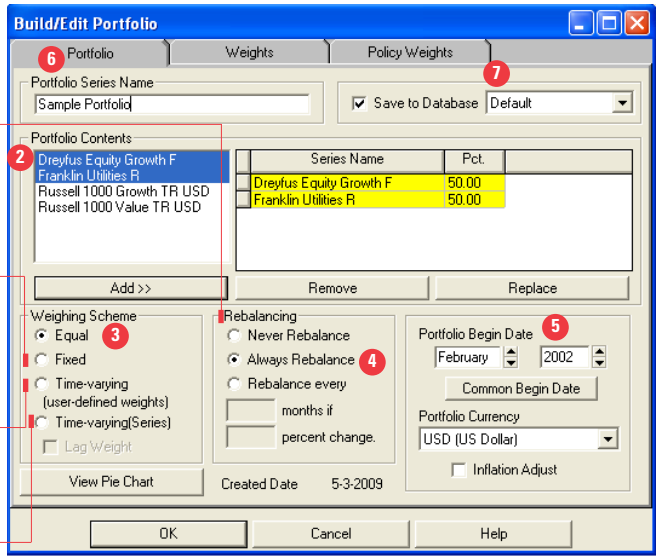

**16.** Click *Close Retain Query* to go back to Select Series window.

## Creating Custom Portfolios and Benchmarks

**1.** Click *Portfolio* from the New drop-down to be taken to the Build/Edit Portfolio window.




**2.** In Portfolio Contents, highlight the two investments and add them to the *Series Name* window.




Specify when, and under what conditions, a portfolio rebalances.

Input specific weights that are constant over the whole time period.

Input specific weights that change over time.

Create a portfolio with weights that vary over time.

**3.** The weighting scheme defaults to *Equal* weighted which is the setting we are going to maintain.

**4.** The default Rebalancing is *Always Rebalance*.

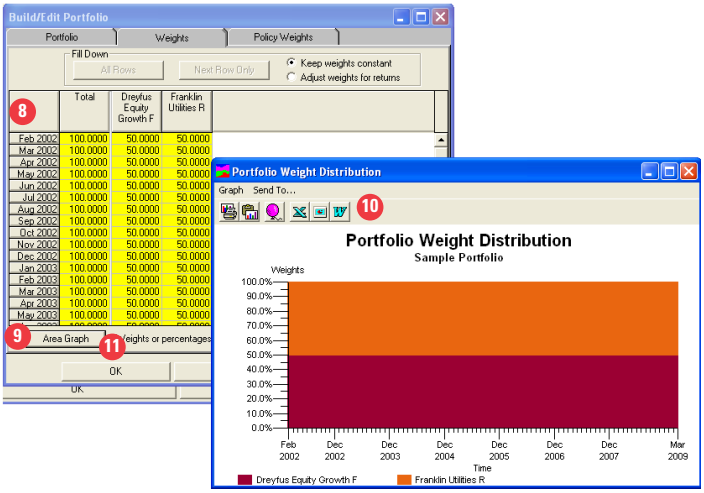
**5.** *Portfolio Begin Date* defaults to the common series begin date. To customize the date, you can select user-defined date.

**6.** Type *Sample Portfolio* in the Portfolio Series Name text field to name this portfolio.

**7.** Check *Save to Database* to save the portfolio in the Default database. If you choose to place this portfolio in another database, select the database from the drop-down.

**8.** Go to the *Weights* tab to view the historical weights.

**9.** Click on the *Area Graph* to view the chart.

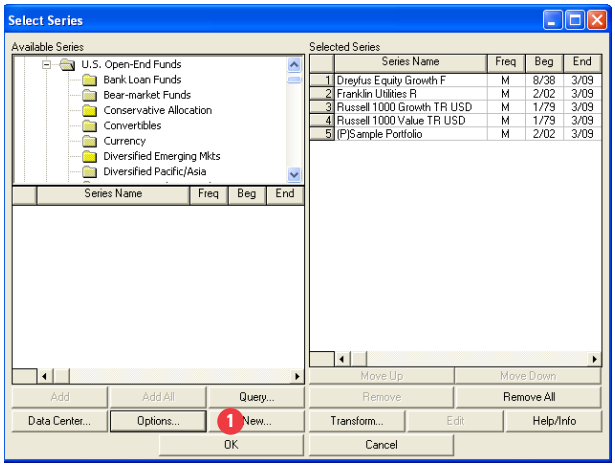



**10.** Click on *Microsoft Excel, PowerPoint,* or *Word* to export the graph. If you select Excel, you will automatically export the numeric values that support the area graph.

**11.** Close the area graph and click *OK* to be taken back to the Select Series window.

### Customizing Date Settings

**1.** Once you've finished selecting your series, click *OK* to be taken to the Date Settings window.

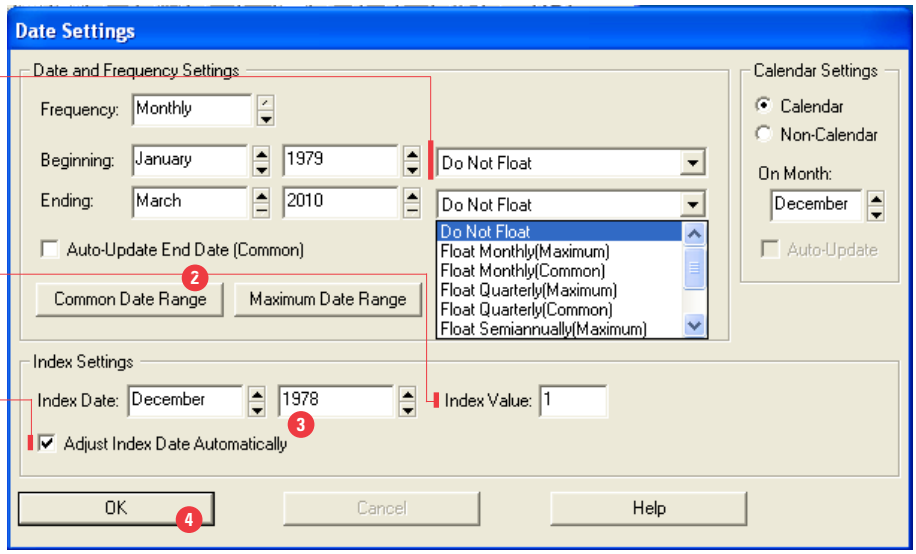


**2.** Click on *Common Date Range* to select the common start date.

Use the Float feature to automatically update start and end dates - monthly, quarterly, semi-annually, or annually.

Input an Index Value to represent start value.

Adjust Index Date Automatically.

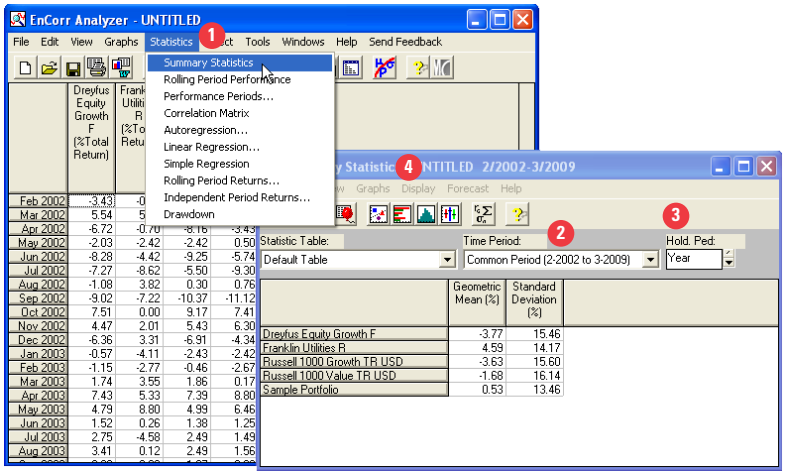



**3.** Click on *Adjust Index Date Automatically* to update your data automatically.

**4.** Click *OK* to complete your Date Settings.

### Creating Tables with Supporting Charts

**1.** In the Data Series window, there are two locations to produce output. The first location is the Statistics drop-down to produce various tables and where applicable, charts to support the data. The second location is the Graph drop-down, discussed in the next section. Select *Summary Statistics*, from the Statistics drop-down.



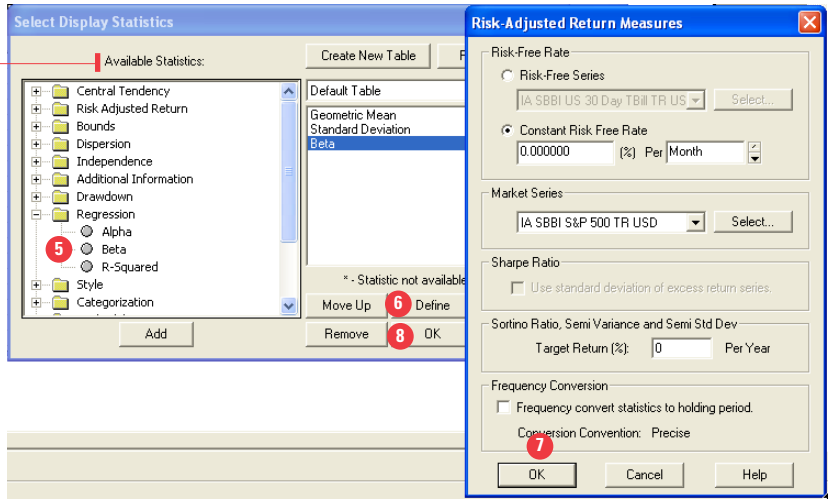

**2.** In the Statistics table, go to the Time Period drop-down to view the default time periods—Entire Range, Common Period, and Year To Date. You also have the option to Edit Time Periods. Click on *Common Period*.

**3.** Holding period default is *Year*, annualizing the data. You also have other holding period options—Monthly, Quarterly, or Half Year.

**4.** Click on *Display* menu to be taken to the Select Display Statistics window where you can create custom tables of specific statistics.

**5.** Go to the *Regression* folder and double click on *Beta* to add to the right table.

Select from various available statistics to display in your table.

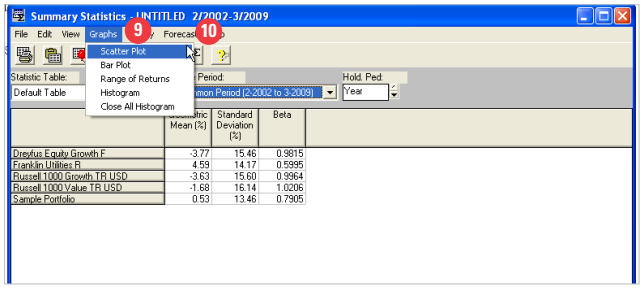



**6.** While highlighting Beta, click on *Define* to set the settings for the risk-adjusted return measures. Here, you can customize your settings to calculate your numeric value. The default Market Series is IA SBBI S&P 500 TR USD which we will keep.

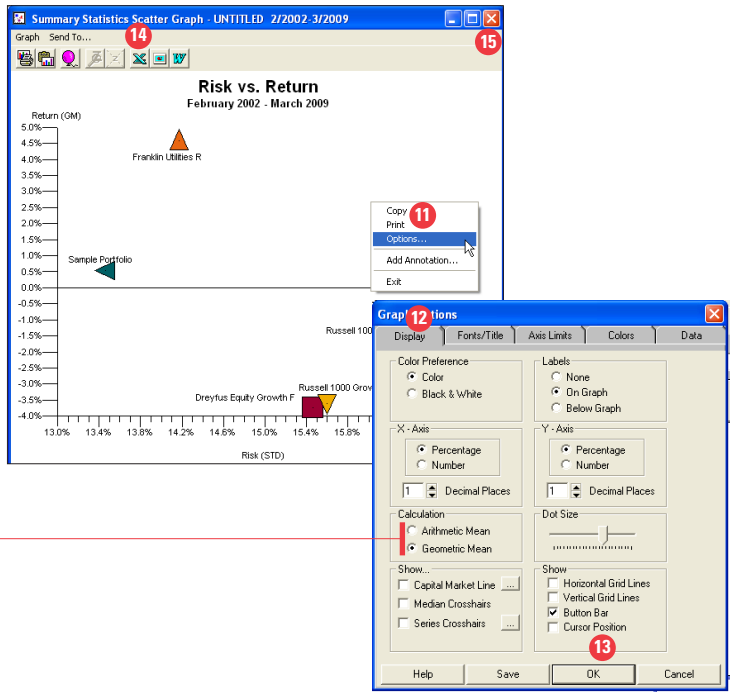
**7.** Click *OK* to be taken back to the Select Display Statistics.

**8.** Click *OK* again to be taken back to the Summary Statistics Table.

**9.** Go to the Graph menu and select *Scatter Plot*.



**10.** You will be asked to select Risk vs. Return or the option to create your own Scatter Plot. Select *Risk vs. Return*.




Set your output using Arithmetic or Geometric calculation.

**11.** Once the graph appears on your screen, right click and select *Options*.

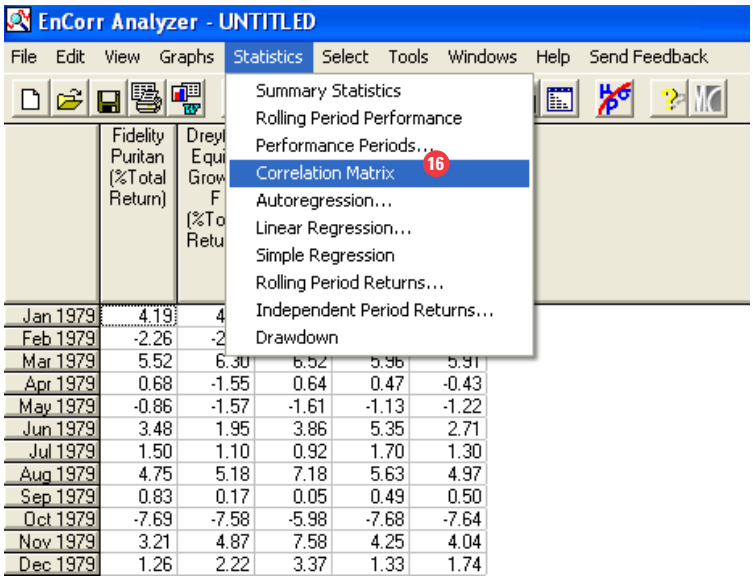
**12.** In the graph options window, you can customize your display settings but also save them for future graphs.

**13.** Click *OK* to be taken back to the Scatter Plot.

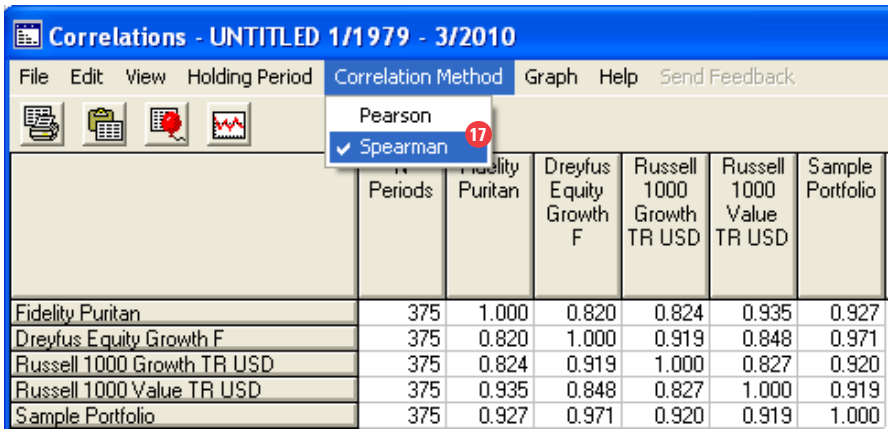
**14.** Click on *Microsoft Excel, PowerPoint,* or *Word* to export the graph. If you select Excel, you will automatically export the numeric values that support the area graph.

**15.** Close the Scatter Plot and continue to exit the Summary Statistics table.

**16.** Next, click on *Correlation Matrix* from the Statistics drop-down.



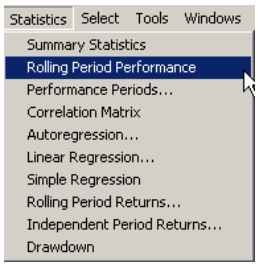

**17.** Go to the Correlation Method and click on *Spearman* which will allow you to view correlations based on ranks driven by returns vs. returns only used with the Pearson method. Both correlation methods are also available in Inputs Generator and Scenario Builder.

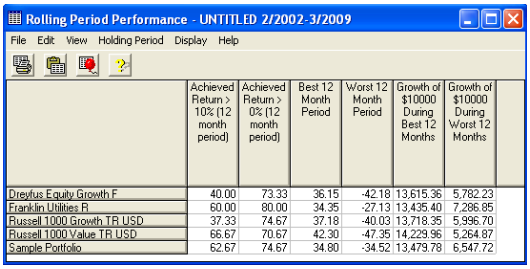


### Statistic Menu Output Options

From the Statistics drop-down menu, select from the remaining choices to display your output. Each output will be driven by your date settings. The examples below represent monthly frequency.

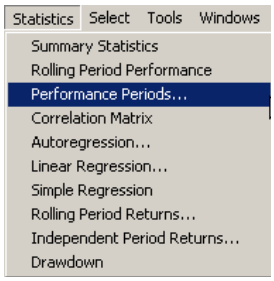
**Select Rolling Period Performance** to view how often a series performed better or worse than a given percentage, based on rolling periods. The default is 12 months.

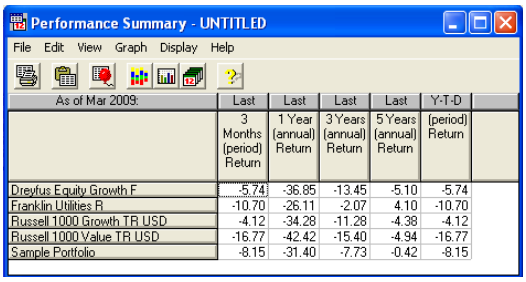



| | Achieved Return > 10% (12 month period) | Achieved Return > 0% (12 month period) | Best 12 Month Period | Worst 12 Month Period | Growth of $10000 During Best 12 Months | Growth of $10000 During Worst 12 Months |
|---|---|---|---|---|---|---|
| Dreyfus Equity Growth F | 40.00 | 73.33 | 36.15 | -42.18 | 13,615.36 | 5,782.23 |
| Franklin Utilities R | 60.00 | 80.00 | 34.35 | -27.13 | 13,435.40 | 7,286.85 |
| Russell 1000 Growth TR USD | 37.33 | 74.67 | 37.18 | -40.03 | 13,718.35 | 5,996.70 |
| Russell 1000 Value TR USD | 66.67 | 70.67 | 42.30 | -47.35 | 14,229.96 | 5,264.87 |
| Sample Portfolio | 62.67 | 74.67 | 34.80 | -34.52 | 13,479.78 | 6,547.72 |

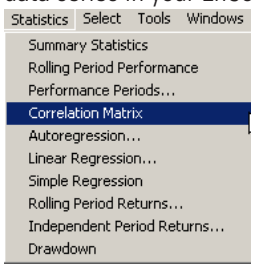
**Select Performance Periods** to view historical returns over multiple time periods and multiple frequencies.

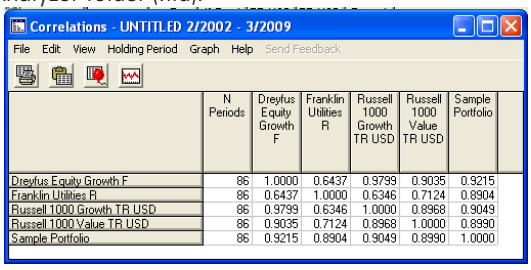



| As of Mar 2009: | Last 3 Months (period) Return | Last 1 Year (annual) Return | Last 3 Years (annual) Return | Last 5 Years (annual) Return | Y-T-D (period) Return |
|---|---|---|---|---|---|
| Dreyfus Equity Growth F | -5.74 | -36.85 | -13.45 | -5.10 | -5.74 |
| Franklin Utilities R | -10.70 | -26.11 | -2.07 | 4.10 | -10.70 |
| Russell 1000 Growth TR USD | -4.12 | -34.28 | -11.28 | -4.38 | -4.12 |
| Russell 1000 Value TR USD | -16.77 | -42.42 | -15.40 | -4.94 | -16.77 |
| Sample Portfolio | -8.15 | -31.40 | -7.73 | -0.42 | -8.15 |

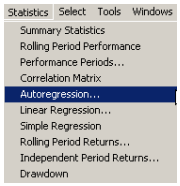
**Select Correlation Matrix** to view the degree of interaction (correlation) between every data series in your EnCorr Analyzer folder (.fld).

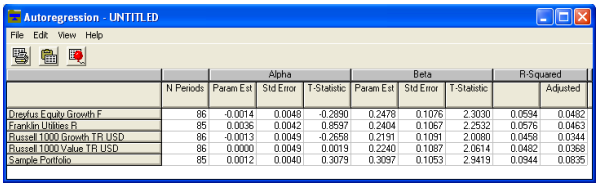


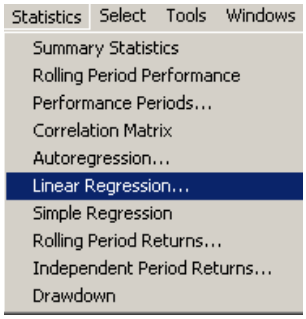

| | N Periods | Dreyfus Equity Growth F | Franklin Utilities R | Russell 1000 Growth TR USD | Russell 1000 Value TR USD | Sample Portfolio |
|---|---|---|---|---|---|---|
| Dreyfus Equity Growth F | 86 | 1.0000 | 0.6437 | 0.9799 | 0.9035 | 0.9215 |
| Franklin Utilities R | 86 | 0.6437 | 1.0000 | 0.6346 | 0.7124 | 0.8904 |
| Russell 1000 Growth TR USD | 86 | 0.9799 | 0.6346 | 1.0000 | 0.8968 | 0.9049 |
| Russell 1000 Value TR USD | 86 | 0.9035 | 0.7124 | 0.8968 | 1.0000 | 0.8990 |
| Sample Portfolio | 86 | 0.9215 | 0.8904 | 0.9049 | 0.8990 | 1.0000 |

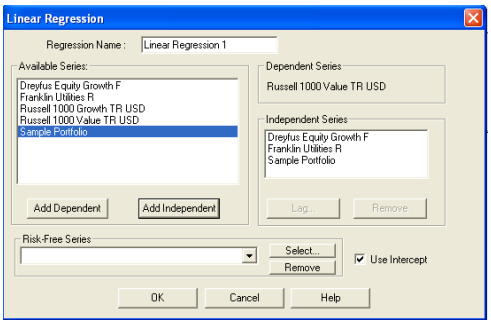
**Select Autoregression** to regress each series in your EnCorr Analyzer case file against its prior period return (one period lag).



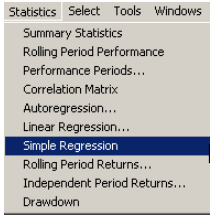



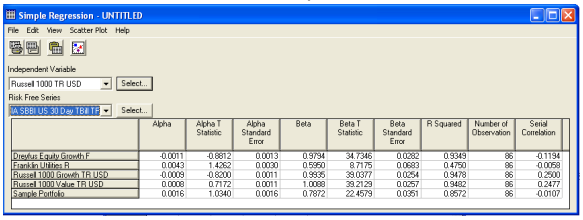

**Select Linear Regression** to perform multivariate regression (multiple independent variables) for one of your selected series.



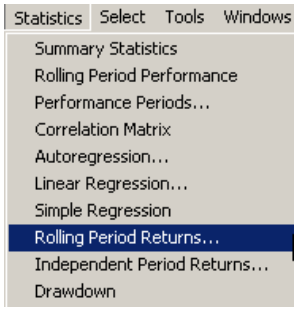



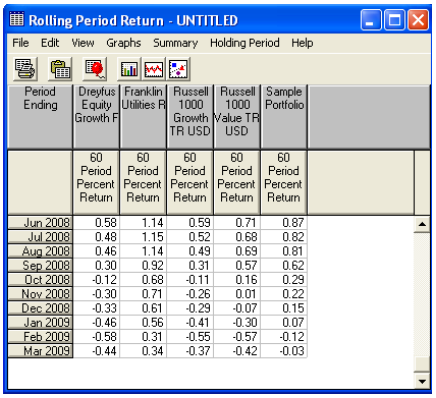

**Select Simple Regression** to measure the relationship between each of a group of series (the dependent variable) and another series (the independent variable).



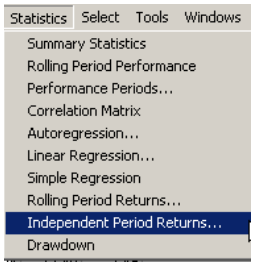



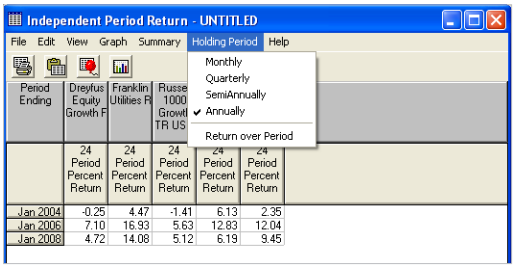

**Select Rolling Period Returns** to view the geometric average for each rolling period return for a given holding period, based on your Date Setting's frequency and time period. The default is 60 months.



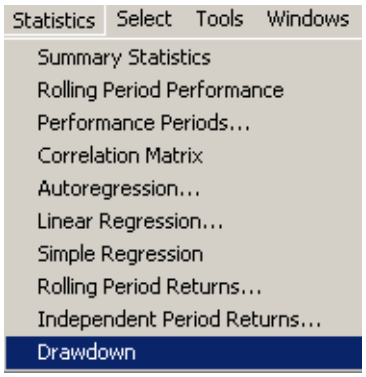



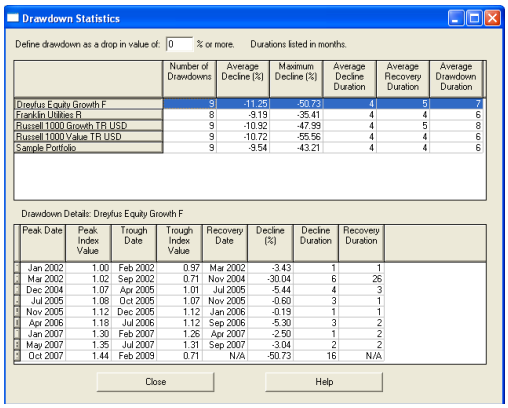
**Select Independent Period Returns** to view mutually exclusive windows of fixed length along each time series (asset). Each Independent Period Return represents the geometric average for a given holding period, based on the frequency and time period of your Date Setting. The default is 60 months. This image is using 24 months with an Annual Holding Period.



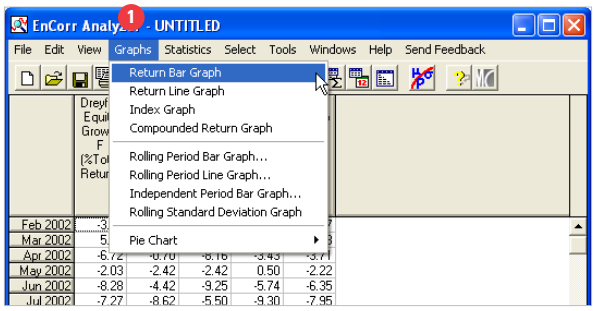

**Select Drawdown** to track the number and magnitude of declines in a series over time.



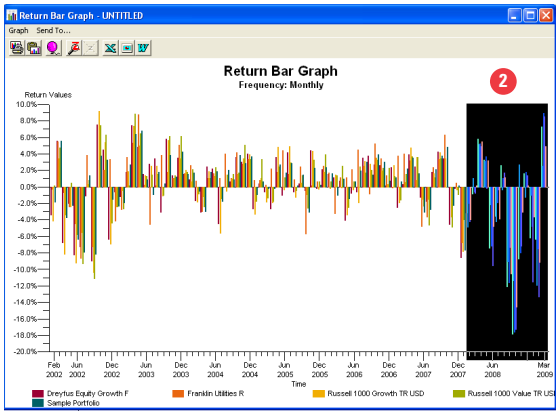




### Creating Graphs and Magnifying Specific Periods

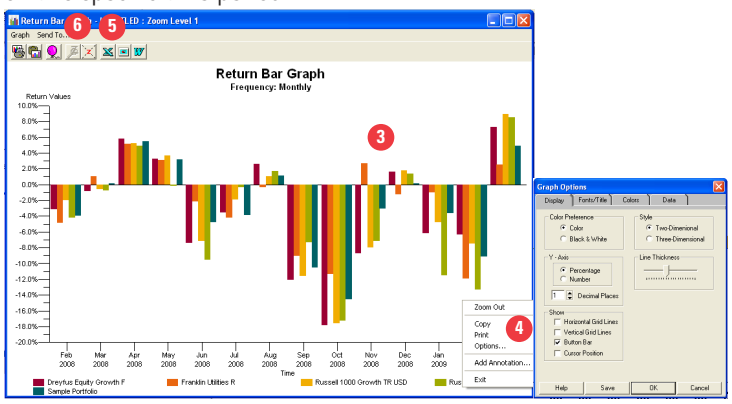
**1.** The second location to produce output is the Graphs drop-down. The display output will be driven by your frequency settings in the Date Settings window. Go to the Graphs drop-down and select *Return Bar Graph* to plot historical returns.



**2.** The default chart display will capture the whole history. To zoom on specific period, click and drag your mouse to the present time period.




**3.** Before letting go, single click again on the left side of the mouse to complete zooming in on this specific time period.




**4.** Right click anywhere on the graph to use the Options command to customize your display.

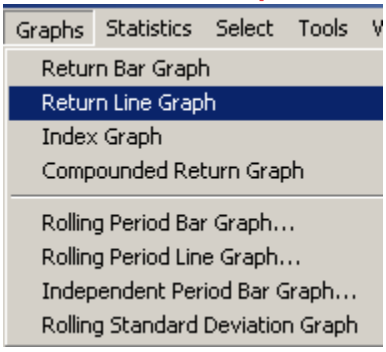
**5.** Click on *Microsoft Excel, PowerPoint, or Word* to export the graph. If you select Excel, you will automatically export the numeric values that support the area graph.

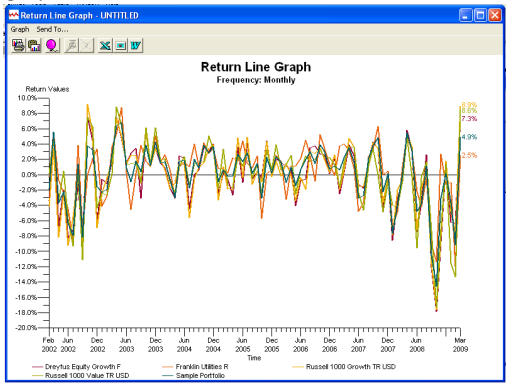
**6.** To return to the previous graph, click on the *red "Z" icon*. This step can also be accomplished by the Options command by clicking on Zoom Out. The zoom feature can be applied to all the chart choices in the Graphs drop-down. Close this window.

### Graph Menu Output Options

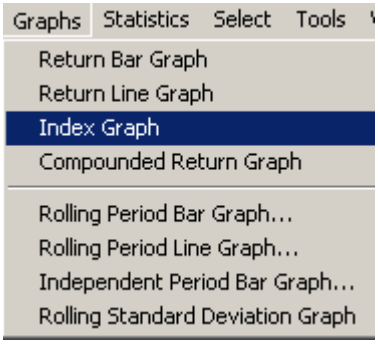
From the Graphs drop-down menu, select from the remaining choices to display your output and apply the zoom feature when necessary. Each output will be driven by your date settings. The examples below represent monthly frequency.

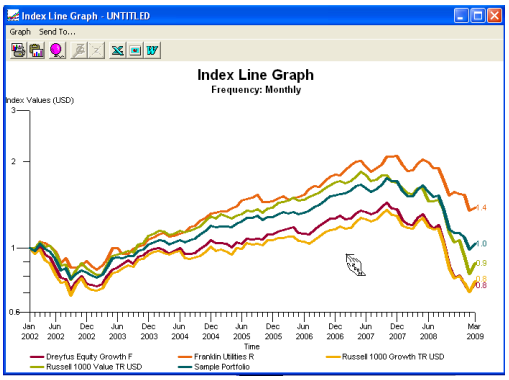
**Select Return Line Graph** to create line graphs for return or index wealth values.



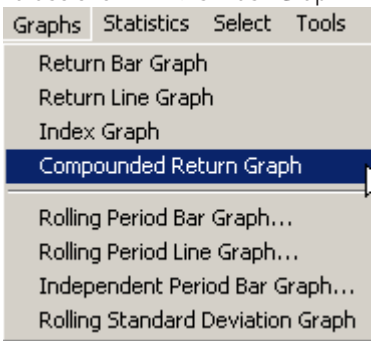



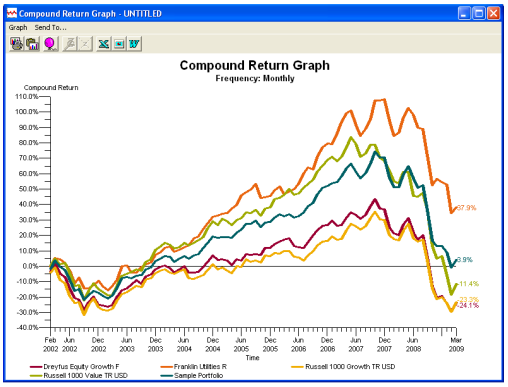

**Select Index Graph** to illustrate how a dollar amount invested in each asset grows over time. The index starting date defaults to one period before the common starting date of the chosen data and the default scale is logarithmic. A non-log scale is also available.



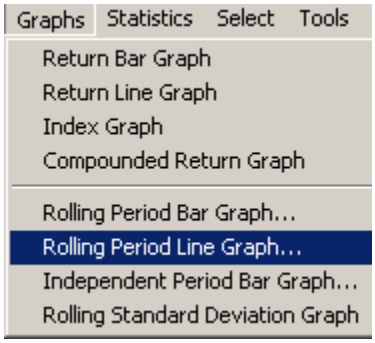



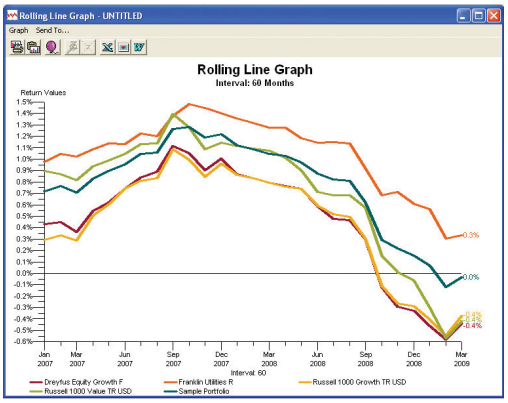

**Select Compound Return Graph** to view the historical compound returns vs. the unit values shown in the Index Graph.



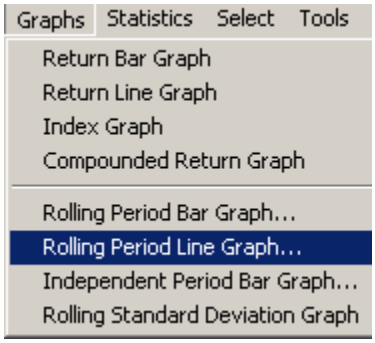



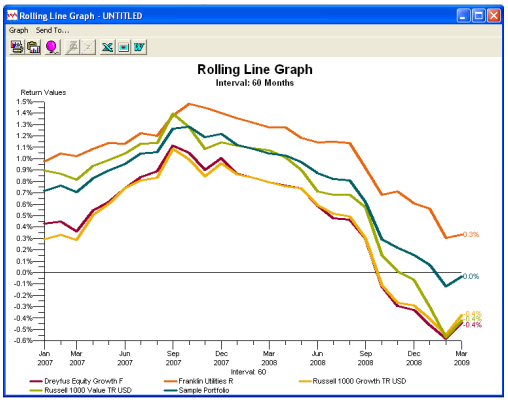
**Select Rolling Period Line Graph** to display average returns over user-defined rolling periods in line graph format. The default is 60 months.



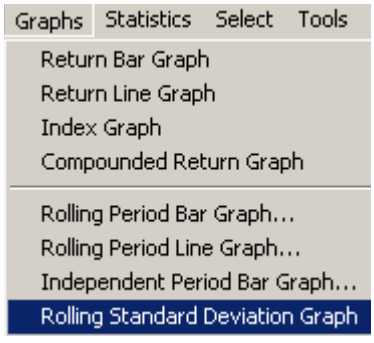



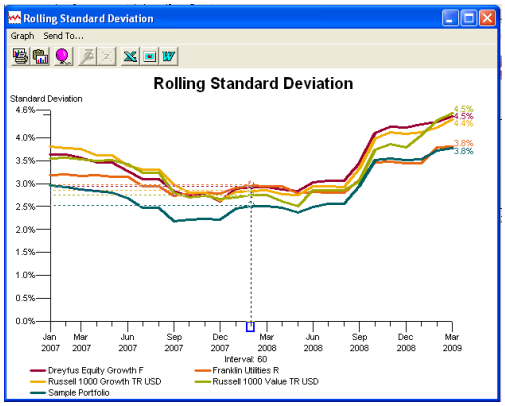

**Independent Period Bar Graph** to display average returns over user-defined independent periods in bar graph format.




**Select Rolling Period Standard** Deviation to display rolling period standard deviation. The default is 60 months.



**Summary of Output Options**

The Graphs drop-down will display the graph views while the Statistics drop-down will display both table views and graph views, where applicable.

### From the Graph Drop-down

Return Bar Graph
Return Line Graph
Index Graph
Compounded Return Graph
Rolling Period Line Graph
Independent Period Bar Graph
Rolling Standard Deviation Graph

### From the Statistics Drop-down

Summary Statistics:
Scatter Plot, Bar Plot
Range of Returns
Histogram
Return Percentile
Wealth Percentile

Performance Periods:
Performance Percentiles
Performance Bar

Rolling Period Returns:
Rolling Period Bar Graph
Rolling Period Line Graph
Risk Return Scatter Plot

Independent Period Returns:
Independent Period Bar

# Inputs Generator

EnCorr Inputs Generator allow you to create, refine, and test asset class assumptions for use in the EnCorr Optimizer. Create optimization inputs by selecting asset classes from various EnCorr databases or by entering your own inputs. Use various input methodologies to develop forward-looking expected returns. Analyze the levels of risk and correlation over time by calculating rolling period standard deviations and correlations. Run correlation tests to quickly evaluate the stability of your input files before optimization.

The table below outlines the necessary settings to create an inputs file. These settings, with the exception of Expected Returns, are applicable to all input methodologies.

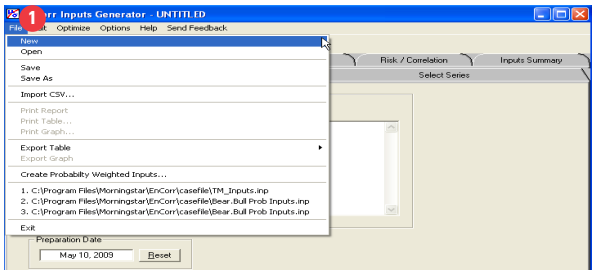
| Asset Class Assumption | Building Block | CAPM | Black-Litterman | Historical |
|---|---|---|---|---|
| Selecting Series (Proxies) | x | x | x | x |
| | | | | |
| **Input Options** | **Building Block** | **CAPM** | **Black-Litterman** | **Historical** |
| Holding Period | x | x | x | x |
| Frequency | x | x | x | x |
| Calculate Historical Data | x | x | x | x |
| | | | | |
| **Default Settings** | **Building Block** | **CAPM** | **Black-Litterman** | **Historical** |
| Current Risk Free Rate | x | x | x | x |
| | | | | |
| **Expected Return** | **Building Block** | **CAPM** | **Black-Litterman** | **Historical** |
| Current Risk Free Rate | x | | | |
| Historical Risk-Free Rate | x | | | |
| Premia Baseline Series | x | | | |
| | | | | |
| Current Risk Free Rate | | x | | |
| Premia Baseline Series | | x | | |
| Domestic Equity | | x | | |
| Market Portfolio | | x | | |
| | | | | |
| Current Risk Free Rate | | | x | |
| Premia Baseline Series | | | x | |
| Market Portfolio | | | x | |
| | | | | |
| Current Risk Free Rate | | | | x |
| | | | | |
| **Risk / Correlation** | **Building Block** | **CAPM** | **Black-Litterman** | **Historical** |
| Standard Deviation | x | x | x | x |

**Exercises**

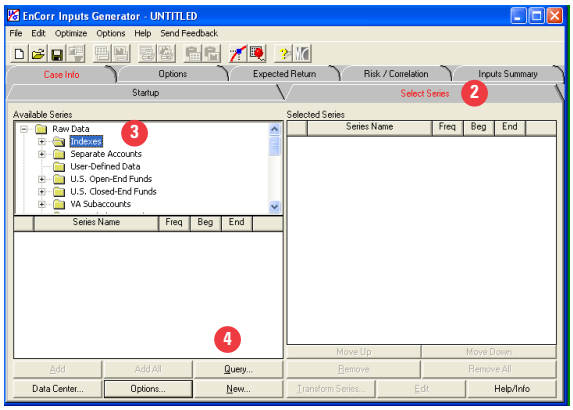
- Creating Asset Class Assumptions
- Setting up Input Options
- Defining Current Risk Free Rate
- Creating Building Blocks Expected Returns
- Creating CAPM Expected Returns
- Creating Black Litterman Expected Returns
- Creating Historical Expected Returns
- Analyzing Risk and Correlation
- Testing Inputs for Optimization
- Viewing your Results

## Creating Asset Class Assumptions

**1.** Our goal is to devise a new long-term strategic asset allocation policy where the characteristics are the following: investment horizon is 20 years and the five investable asset class series are large company stocks, small company stocks, long-term corporate bonds, long-term government bonds, and cash. Open EnCorr Inputs Generator and click *New* to be taken to the Case Info tab.



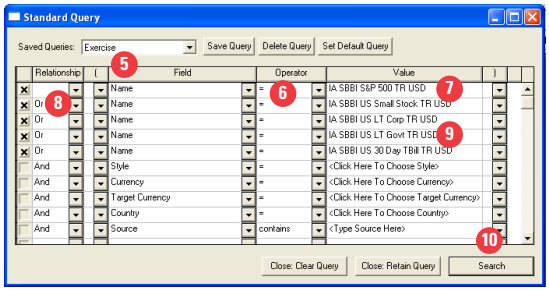

**2.** Go to the *Select Series* subtab to identify the asset class assumptions.




**3.** Highlight *Indexes* in the Available Series window.

**4.** Click on *Query* to be taken to the Standard Query window.

**5.** Go to the first line and locate *Name* in the Field drop-down.




**6.** Click on "=" sign in the Operator drop-down.

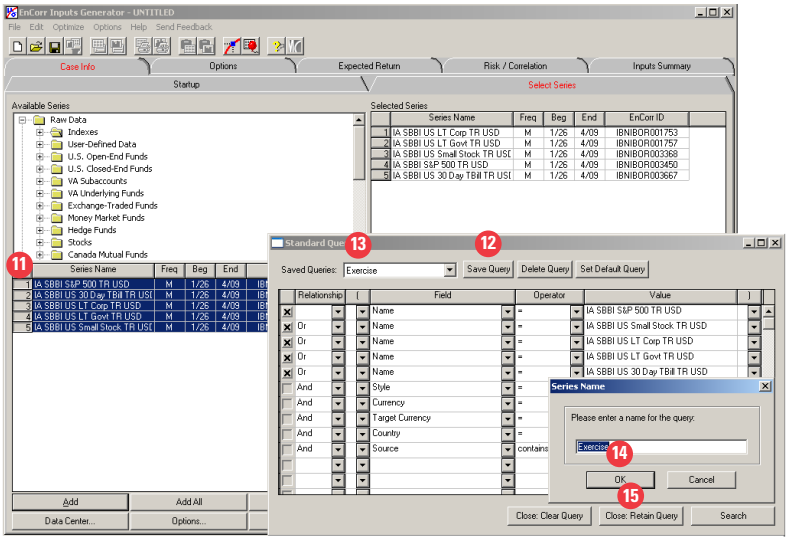
**7.** Type *IA SBBI IA S&P 500 TR USD* in the Value column.

**8.** On the next line, click *Or* from the Relationship drop-down.

**9.** Follow Steps 5 to 8 to add the remaining asset classes:
*IA SBBI US Small Stock TR USD, IA SBBI US LT Corp TR USD, IA SBBI US LT Govt TR USD,* and *IA SBBI US 30 Day Tbill TR USD.*

**10.** Click *Search* to retrieve all five series.

**11.** Highlight all five series and double click to add them to the Series Name window.




**12.** Click *Save Query*.

**13.** Type *Exercise* as the query name.

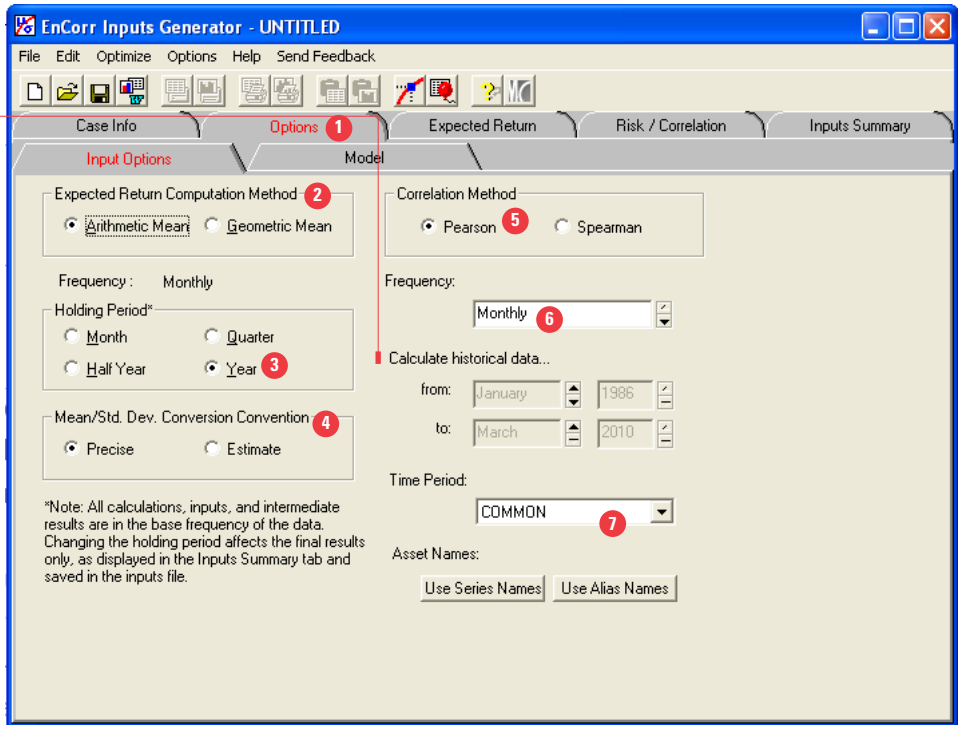
**14.** Click *OK*.

**15.** Click *Close Retain Query*.

### Setting up Input Options

**1.** The following steps will be required for all input methodologies. Go to the *Options* tab to be taken to the Input Options.

Select a time period by activating the Calculate Historical Data to specify the beginning and ending date.




**2.** The *Expected Return Computation* method determines whether the historical expected return for an asset is calculated with the arithmetic mean or the geometric mean. Arithmetic Mean is forward-looking and better represents a typical performance over single periods, acknowledging the fact that market returns vary over time. Geometric Mean is backward-looking and measures the change in wealth over more than one period, assuming that the return will be the same for each and every future time period. The default setting is the Arithmetic Mean.

**3.** Select *Year* Holdings Period to annualize your output in the Inputs Summary Tab.

**4.** Precise is the default of *Mean/Std Dev Conversion Convention*. Precise assumes compounded returns are the product of the individual returns and Estimate assumes compounded returns are the sum of the individual returns.

**5.** Select from the *Spearman Correlation Method* to view correlations based on ranks driven by returns or the *Pearson Correlation Method* to view correlations based on returns only.

**6.** Select *Monthly* from the Frequency drop-down to produce the monthly output in the Expected Return tab (except for Black Litterman which annualizes the results) and the Risk/ Correlation tab. You can also select Quarterly, Semi-Annually, or Base Frequencies.

**7.** Select *Common* from the Time Period drop-down to capture the common start period for all the asset class assumptions.

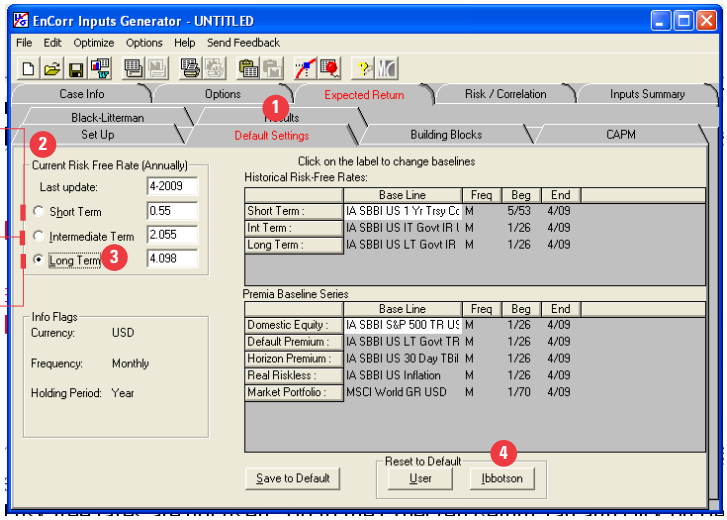
### Defining Current Risk Free Rate

**1.** Go to the Expected Return tab and click on *Default Settings*.

U.S. 1 Yr Treasury Const Mat Yld

U.S. IT Gvt Yld

U.S. LT Gvt Yld




**2.** Go to *Current Risk Free Rate (Annually).* The current risk free rate is determined by your investment horizon which is the expected length of time you will hold your portfolio. Decide between short term, intermediate term and long term investment horizons. When you choose a specific horizon, it determines the current risk free rate and the Historical Risk Free Rate series used to build expected returns (Building Blocks and CAPM models). Intermediate Term investment horizon is the default.

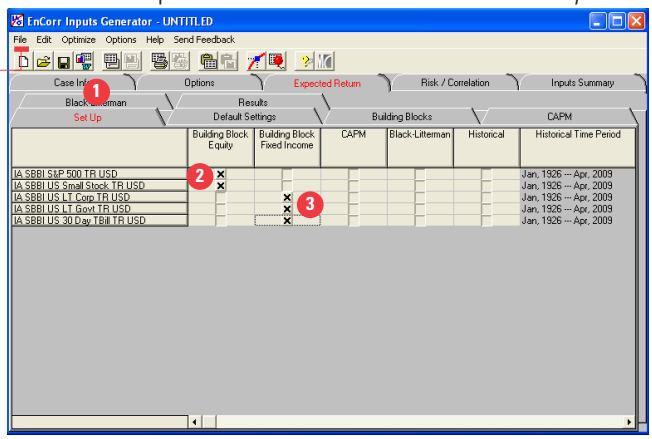
**3.** Select *Long Term* to represent our 20 Year Investment horizon.

**4.** You either have the option of inputting your own Risk Free Rate or use Ibbotson's default which represents the most recent month end update. Click on *Ibbotson*.

## Creating Building Blocks Expected Returns

Developed by Ibbotson Associates, the Building Blocks model assumes that the expected return on an asset class represents the sum of the current risk free rate and one or more historical risk premia, or building blocks. By combining current expectations with historical risk premia, you take into account current market conditions (investors' economic expectations) and historical market returns. The use of risk premia versus a pure historical return increases the predictive power of the model, since historical risk premia are more stable over time than the pure historical return of an asset class.

**1.** Go to the Expected Return tab and click on the *Set Up* tab.

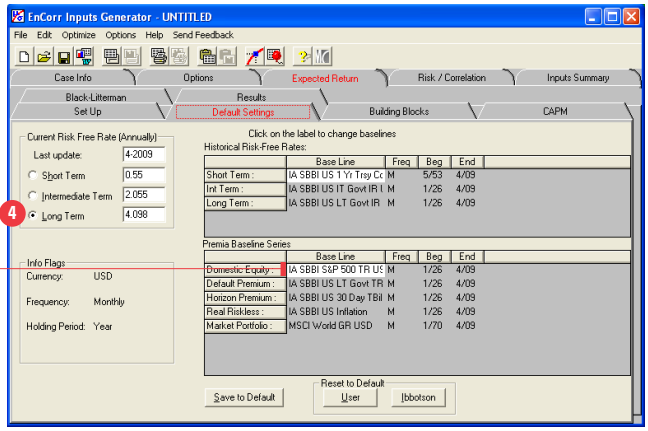



Ibbotson Associates supplies the One (Oneyear.inp), Five (Fiveyear.inp), and Twenty (twentyyr.inp) year inputs files for use in the Optimizer.

**2.** Check *IA SBBI S&P 500 TR USD* and *IA SBBI US Small Stock TR USD* in the Building Blocks Equity column.

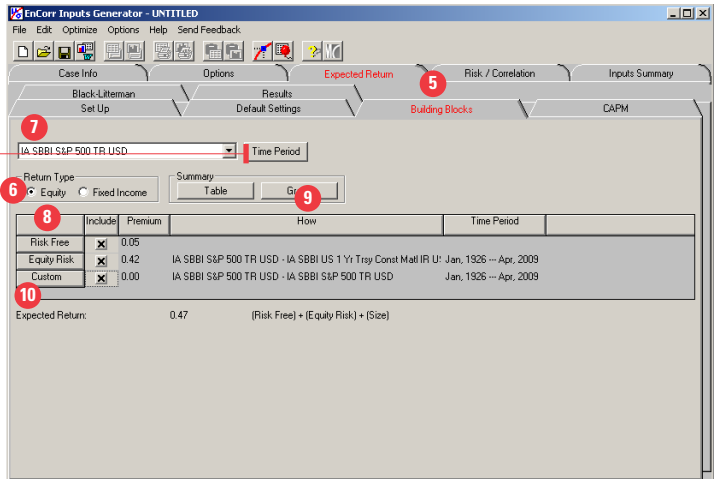
**3.** Follow Step 2 to define the fixed income asset classes—*IA SBBI US LT Corp TR USD, IA SBBI US LT Govt TR USD, IA SBBI US 30 Day TBill TR USD*—for the Building Block Fixed Income column.

**4.** Go to the Default Settings sub tab and click on the *Long Term* radio to represent the long-term investment horizon.




Select another choice for the series, if the cell is marked white.

**5.** Go to the *Building Blocks* subtab where we will build our expected returns for each asset class.




Adjust beginning and end dates.

**6.** Click on *Equity Return Type*.

**7.** Select *IA SBBI S&P 500 TR USD* from the drop-down.

**8.** Check the *Risk Rate, Equity Risk,* and *Custom* to start building the model.

**9.** The calculations are shown in the *How* column.

**10.** The Expected Return for the specific Asset Class is shown at the bottom of the screen.

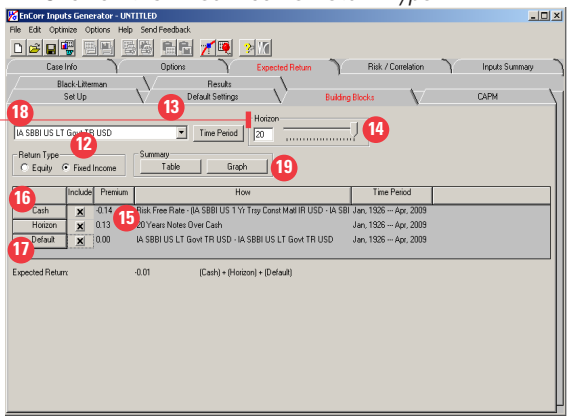
## Equity Building Blocks Calculations View

| **Equity Expected Return = Current Risk Free Rate + Equity Risk Premium + Small Stock Premium** | |
|---|---|
| | |
| Risk Free | = Current risk free rate expectation for your investment horizon |
| | = Current Risk Free Rate |
| Equity Risk | = Historical premium for investing in risky equities |
| | = Domestic Equity PBS – Historical Risk Free Rate series |
| Custom | = Historical premium for investing in risky small company stocks |
| | = Asset class to refine – Domestic Equity PBS |

**11.** Follow steps 7 to 10 to build *IA SBBI US Small Stock TR USD* Building Blocks.

**12.** Click on the *Fixed Income Return Type*.

Represents the maturity of the fixed income asset class.




**13.** Select *IA SBBI U.S. LT Gvt TR* from the drop-down to forecast the expected return for long-term government bonds.

**14.** Keep the default *20* Year Horizon.

**15.** Check *Horizon* first to lock the bond maturity.

**16.** Check *Cash* and *Default*.

**17.** The Expected Return for the specific Asset Class is shown at the bottom of the screen.

## Fixed Income Building Blocks Calculations View

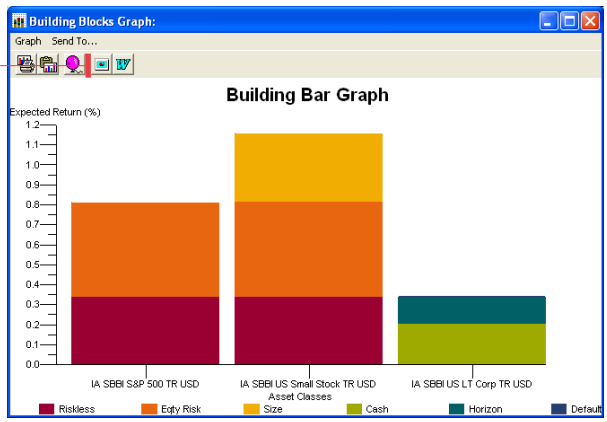
| **Fixed Income Expected Return = Cash + Horizon + Default** | |
|---|---|
| | |
| Cash | = Current risk free rate for your investment horizon with the maturity component removed |
| | = Current Risk Free Rate – Horizon Premium where Horizon Premium = Historical Risk Free Rate – Horizon PBS |
| Horizon | = Historical premium for investing in longer maturity bonds. Match the maturity of the asset with the Horizon slider bar. |
| Default | = Historical premium for investing in risky corporate bonds in order to compensates for the possibility of default. |
| | = (Asset class to refine) – (Default Premium PBS) |

**18.** Follow Steps 13 to 17 to continue to produce the expected returns for *U.S. LT Corp Bond TR (using 15 year Horizon)* and the *U.S. 30 Day TBill (0 year Horizon)* selected from Asset Class drop-down.

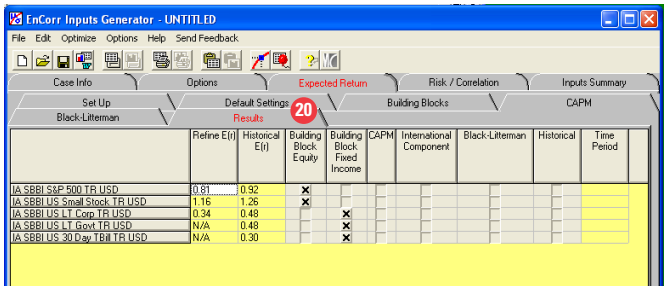
**19.** Click *Graph* to display your Equity and Fixed Income Building Blocks for both equity and fixed income.

## Sample View

Export the graph to word or powerpoint.



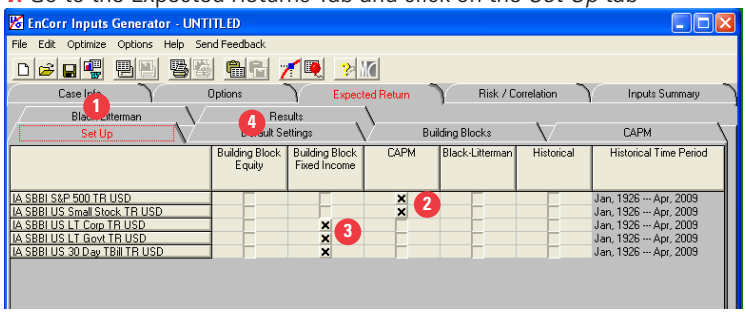

**20.** Click on the *Results* tab to compare your Refined Expected Returns with the Historical Expected Returns.




### Creating CAPM Expected Returns

The CAPM in EnCorr refines the expected return of assets based on the Capital Asset Pricing Model methodology. The major difference between Building Blocks and CAPM is in the risk premium calculation. Building Blocks calculates risk premium(s) by taking the arithmetic difference between two historical data series, while the CAPM uses a regression approach.

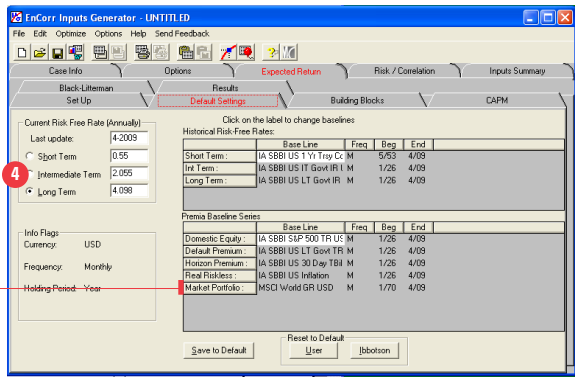
**1.** Go to the Expected Returns Tab and click on the *Set Up* tab



**2.** Go to the CAPM column and check the equity asset classes, *IA SBBI S&P 500 TR USD* and the *IA SBBI U.S. Small Stk TR.* We will use the Building Blocks methodology to refine the fixed income assets.

**3.** Go to the Building Blocks column and check the fixed asset classes, *IA SBBI US LT Corp TR USD, IA SBBI US LT Govt TR USD,* and *IA SBBI US 30 DAY TBill TR USD.* Follow Steps 12 to 18 from Building Blocks section to complete the process for the fixed income assets.

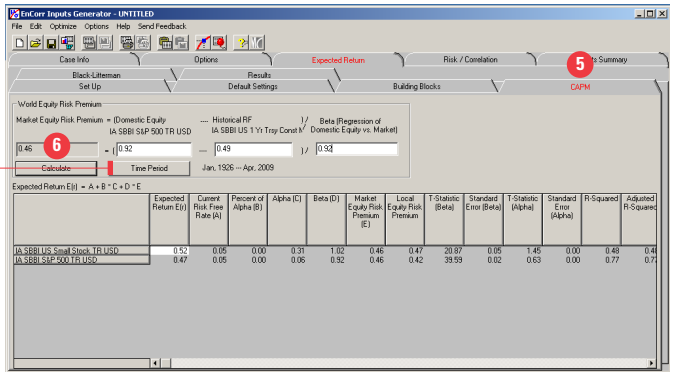
**4.** Go to the Default Settings sub tab and click on the *Long Term* radio to represent the long-term investment horizon.




MSCI World GR USD is the default to calculate the World Equity Risk Premium.

**5.** Go to the *CAPM* tab.

**6.** Click *Calculate* to create your expected returns results.




Alter the time period.

CAPM Expected Return = A + B*C + D*E

**A = Rf:** The Risk Free Rate is defined as the Current Risk Free Rate for a given investment horizon.

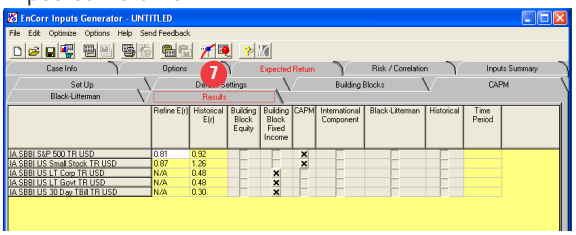
**B = %Alpha:** The %Alpha defines how much of the alpha is added to the expected return of an asset.

**C = Alpha:** The alpha is computed by user defined value or from the regression. By default, the alpha is calculated with the Beta (Asset/Market).

**D = Beta (Asset/Market):** The Beta is calculated from the regression with the refined asset defined as the dependent variable and the Market Portfolio Premia Baseline Series defined as the independent variable.

**E = Market Equity Risk Premium:** The Market Equity Risk Premium is calculated in the Market Equity Risk Premium Table.

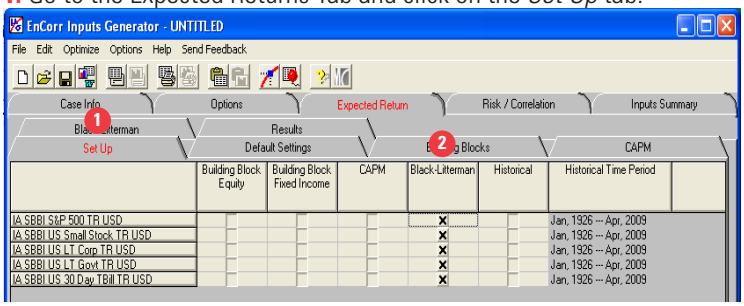
**7.** Go to the *Results* tab to compare your Refined Expected Returns with Historical Expected Returns.




### Creating Black Litterman Expected Returns

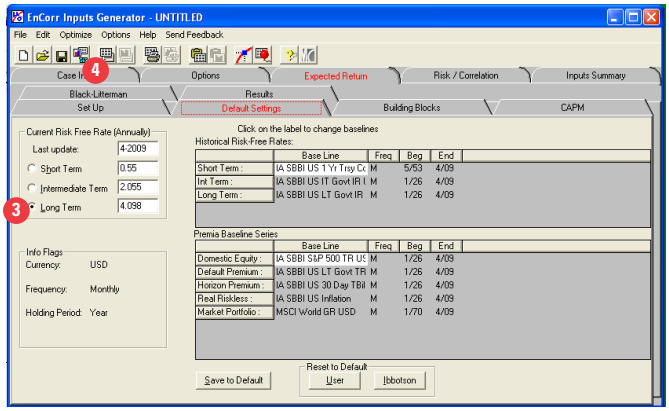
The Black-Litterman asset allocation model is an approach for creating and refining mean-variance optimization expected returns that result in better-diversified asset allocations. This model starts with CAPM-based, market equilibrium expected returns derived by using the reverse optimization approach proposed by Sharpe (1970). The required inputs are the risk-free rate, an estimate of the market premium, estimates of each asset classes' market capitalization, standard deviations, and correlations. These starting expected returns can then be refined by incorporating your particular views.

**1.** Go to the Expected Returns Tab and click on the *Set Up* tab.



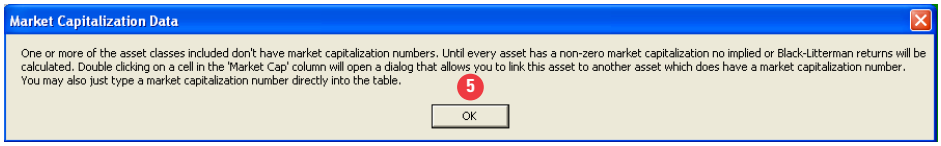
**2.** Check the *first row* in the Black-Litterman column. You will notice that the rest of the asset classes will get checked automatically since Black-Litterman does not allow you to combine input methodologies.

**3.** Go to the *Default Settings* sub tab and click on the Long Term radio to represent the long-term investment horizon.



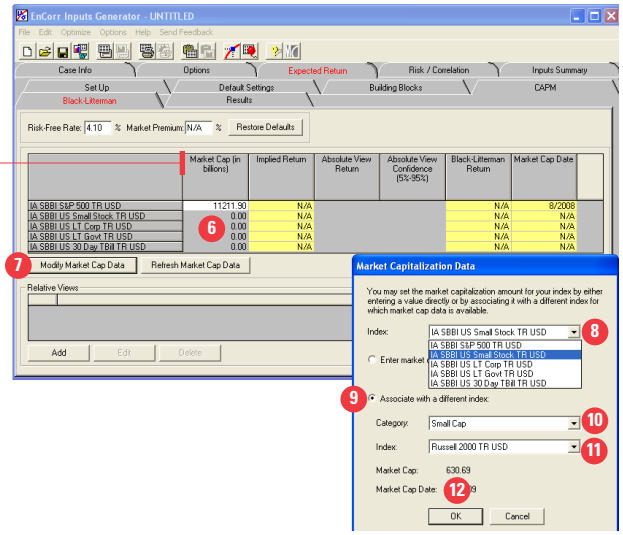

**4.** Go to the *Black-Litterman* sub tab and a pop-up will appear in the window indicating that one or more asset classes do not have market capitalization numbers.

**5.** Click *OK* to be taken to the Black Litterman subtab.



**6.** Zeros will populate if there are no Market Caps. You can either input our own market caps or you can use proxies to fill in the remaining Market Cap information.

12,000 + equity market capitalization values available.




**7.** Click *Modify Market Cap Data*.

**8.** Click *IA SBBI US Small Stock TR USD* from the Index drop-down to identify the proxy for small caps.

**9.** Click *Associate with a different index*.

**10.** Locate *Small Cap* in the Category drop-down.

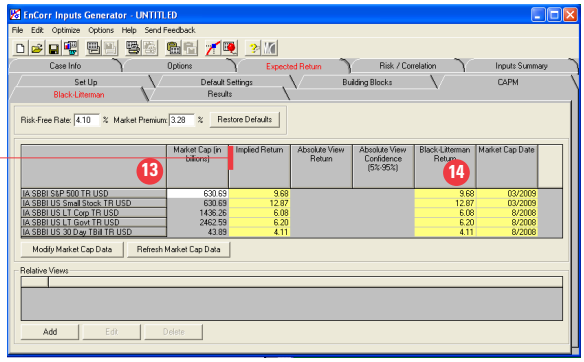
**11.** Select *Russell 2000 TR* from the Index drop-down.

**12.** Click *OK*.

**13.** Repeat steps 7 through 12 to modify the remaining asset classes using the table.

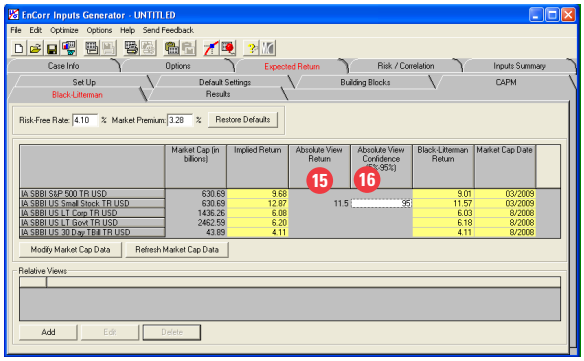
| Market Caps | Category | Index |
|---|---|---|
| U.S. LT Gvt TR | LT Bond | ML 10+ Yr Govt/Corp TR |
| U.S. LT Corp TR | Bond | ML Corp TR |
| U.S. 30 Day TBill TR | Cash | ML U.S. 3 Mo Tbill TR |

**14.** Once the market cap information is complete, the implied returns equal the Black- Litterman returns since we have not applied any views.



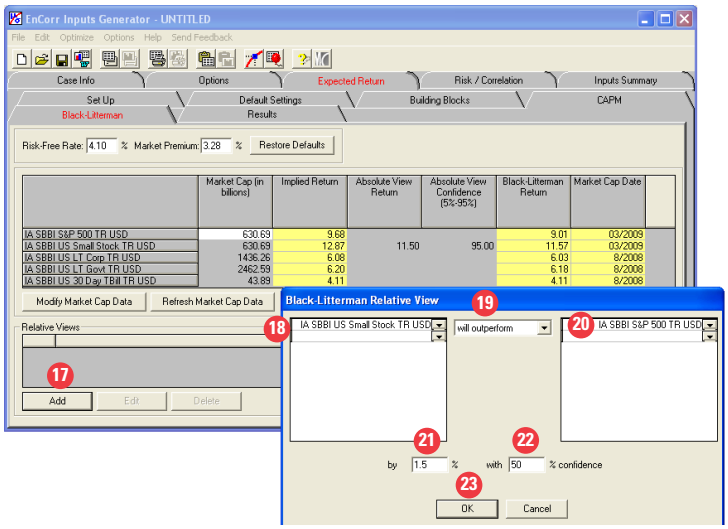

Implied return is the starting expected return calculated by the Black-Litterman model without incorporating any user views. The value is automatically recalculated when other values are modified.

**15.** Go to the Absolute View column and input *11.50*%, for example, to reflect your own view.




**16.** Go to the Absolute View Confidence column and input *95%*, for example, to apply your confidence level. You will now see that your Black-Litterman returns vary from your implied returns.

**17.** Go to Relative views and click *Add* to apply relative views between single and multiple markets.



**18.** Click *IA SBBI US Small Stock TR USD* from the left-hand drop-down.

**19.** Maintain "*will outperform*" in the middle drop-down.

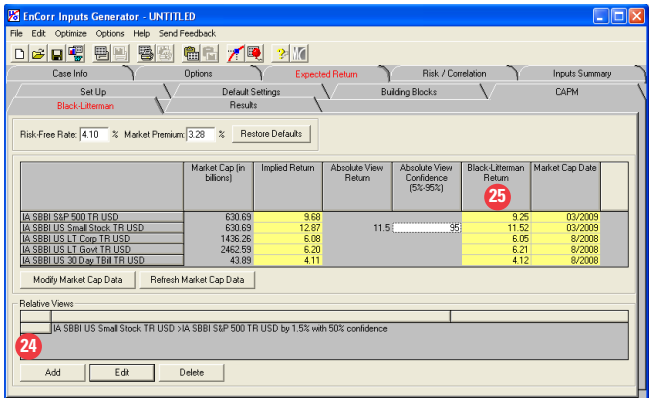
**20.** Select *IA SBBI S&P500 TR USD* from the right-hand drop-down.

**21.** If you believe that the small cap market will outperform the large cap market by 1.5%, for example, input *1.5%*.

**22.** Type *50* in the Confidence window.

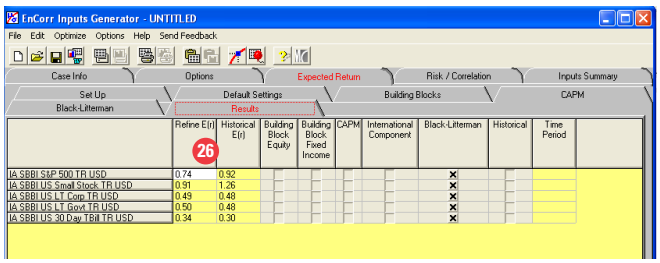
**23.** Click *OK*.

**24.** The Relative View Formula will now be displayed.




**25.** When applying Absolute and/or Relative views, the Black Litterman returns will be modified from the implied returns.

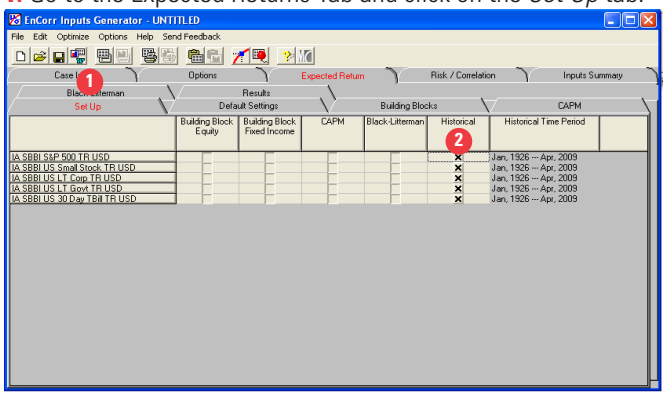
**26.** Go to the *Result* tab to view your refined and historical results.



## Creating Historical Expected Returns

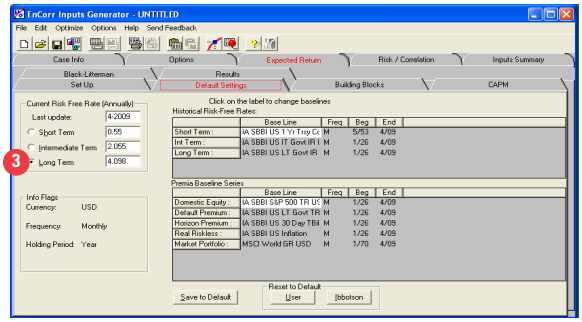
Historical expected returns are based on the historical time period and frequency where pure historical returns are used to forecast the expected returns, without any methodologies in place.

**1.** Go to the Expected Returns Tab and click on the *Set Up* tab.

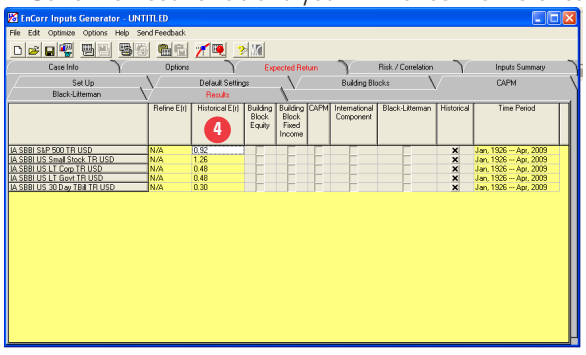



**2.** Go to the *Historical* column and check all asset classes.

**3.** Go to the Default Settings sub tab and click on the *Long Term* radio to represent the long-term investment horizon.




**4.** Go to the *Results* Tab and you will notice the historical results are only displayed.



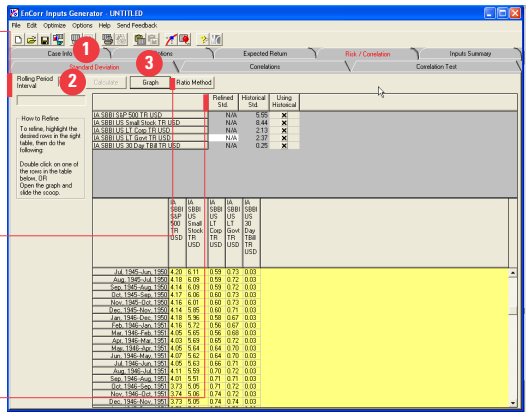
## Analyzing Risk and Correlation

**1.** In the previous sections, our concentration was to develop forward-looking expected returns for all asset classes. We also need to build forward-looking expectations of standard deviations and correlations for each asset class. To calculate expectations of standard deviation and correlation for both equity and fixed income, go to the Risk/Correlation Tab and click on *Standard Deviation* first.

The default interval is 5 years, driven by the frequency setting in the Input Options Tab.

Extend the standard deviation of an input (asset) that has a short back history.

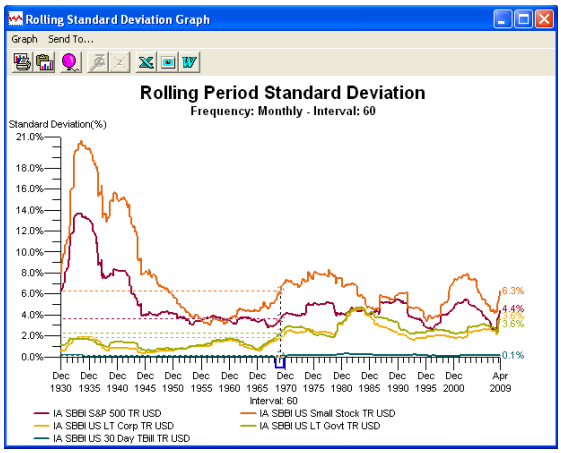
Refine your Standard Deviation before inputting your Absolute View with Black Litterman.



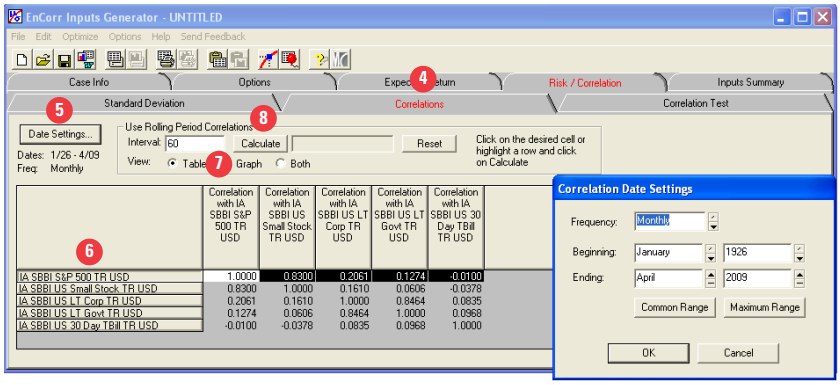

**2.** Click *Calculate* to view the historical rolling 60 month standard deviations back to 1926.

**3.** Click *Graph* to view the display.

### Sample View



**4.** Next, go to the *Correlations* sub tab to view the correlations. These correlations are based on your frequency settings in the input options tab.




**5.** Click *Date Settings* if you want alter your Beginning and End Dates.

**6.** Click *IA SBBI S&P 500 TR USD* to set up the correlation to the rest of the asset classes.

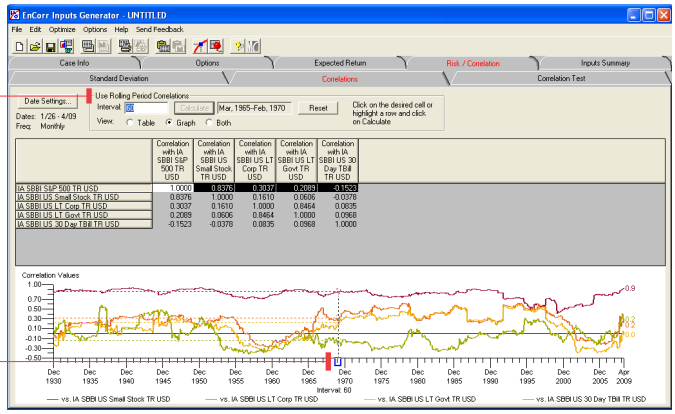
**7.** Click *Graph*.

**8.** Click *Calculate* to view how IA SBBI S&P 500 correlates with the other asset classes.

## Sample View

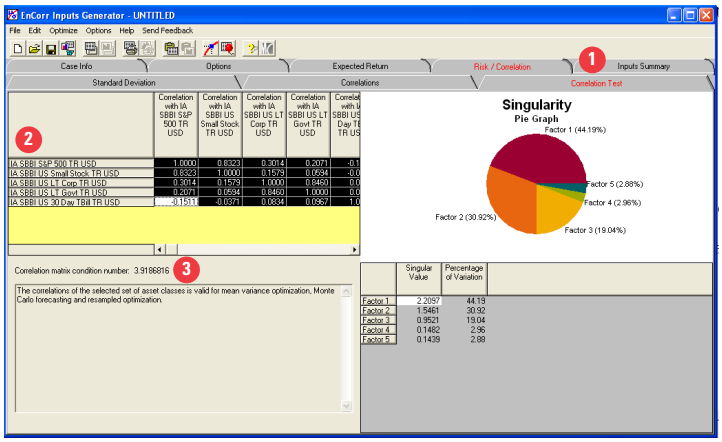
60 months is the default.

Toggle the periscope to view the correlations for the various rolling time periods.



## Testing Inputs for Optimization

**1.** In order to use mean-variance optimization to produce the efficient portfolio frontiers, it is critical that the estimated correlation matrix of the asset classes be positive semi-definite - method to test if the correlation matrix for the selected assets is valid. Go to the *Correlation Test* sub tab to test the integrity of the correlation matrix. The output will be driven by the same time periods used in your Correlation sub tab.




## Correlation Matrix Condition Number

**0-20 =Correlation Matrix** is valid for mean-variance optimization, Monte Carlo simulations, and resampling optimization.

**>20 =Correlation Matrix** is nearly singular. The set of asset classes may produce unstable results along the efficient frontier but you can still run resampling and Monte Carlo simulations in EnCorr Optimizer.

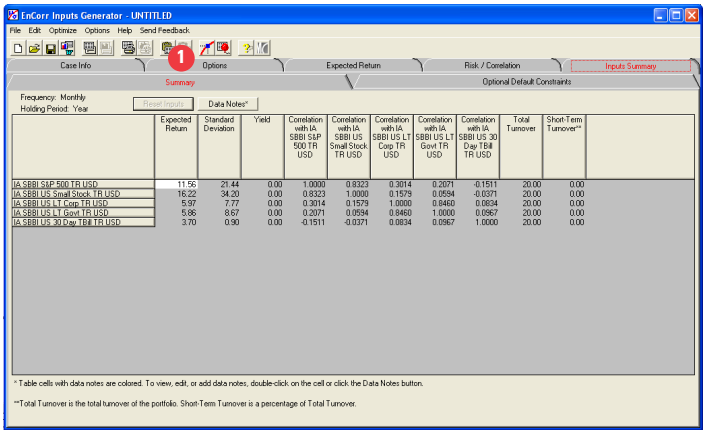
**N/A =Correlation Matrix** is not positive semi-definite. You can still use the asset classes to run your mean-variance optimization, but the results will be unstable along the efficient frontier. Resampling or Monte Carlo simulations are not possible.

**2.** Click on each asset class.

**3.** For each asset class, the correlation matrix condition number changes at the bottom left which is supported by the text in the box.

## Viewing your Results

**1.** Go to the *Inputs Summary* tab to view your expected returns, standard deviations, and correlations all three components necessary to run a mean variance optimization. You can now continue to run asset allocation, create an efficient frontier, and determine the new asset allocation policy.



# Optimizer

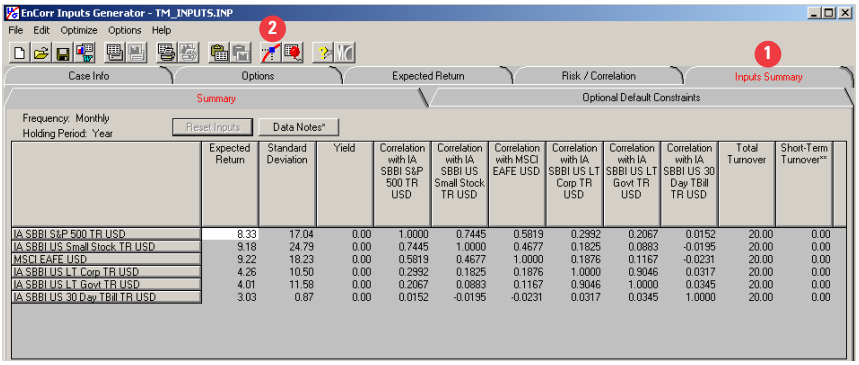
EnCorr Optimizer allows you to develop, test, and analyze possible asset allocations along the efficient frontier, based on mean-variance optimization (MVO). Mean-variance optimization, originally developed by Nobel Prize winner Harry Markowitz, is the process of identifying portfolios that have the highest possible return for a given level of risk, or the lowest possible risk for a given return. Traditional mean-variance optimization (base-case), resampled mean-variance optimization, and surplus mean-variance optimization are the three types of optimization methods.

### Exercises

- Setting up Traditional Optimization
- Setting up Resampled Optimization
- Setting up Surplus Optimization
- Identifying Potential Portfolios
- Creating Forecasted and Return Percentiles
- Creating Simulated Return and Wealth Percentiles
- Understanding Risk Decomposition

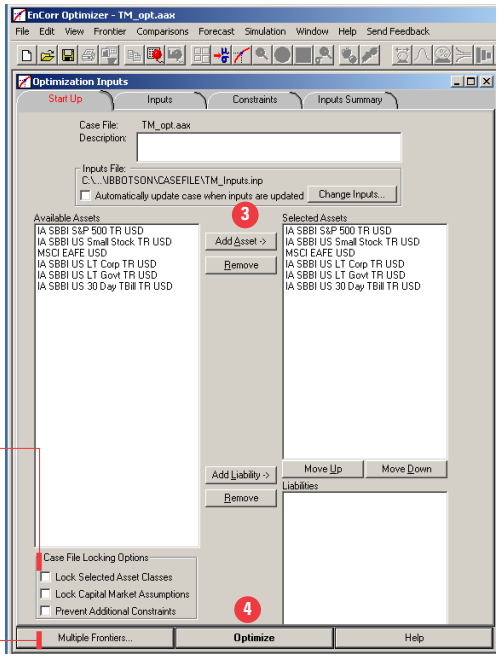
### Setting up Traditional Optimization

**1.** Traditional Optimization is Asset Only Optimization. To start the process, open an inputs file in the Inputs Generator and click on the *Inputs Summary* tab to view the results. The expected returns, standard deviations, and correlations are the necessary components to run an optimization. You can also start the process from Optimizer's Input section by retrieving an existing inputs file.



**2.** Click on the *Efficient Frontier* icon to be taken to the optimizer's Start Up tab.

**3.** Highlight all six asset classes and click *Add Asset* to add them to the selected Assets window.

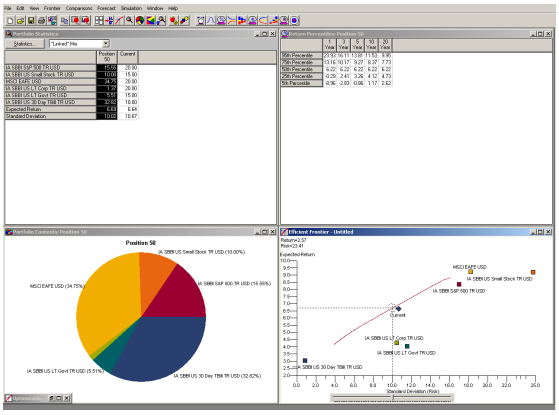



Prevent modifications to the original case file.

Analyze multiple efficient frontiers in the same case file.

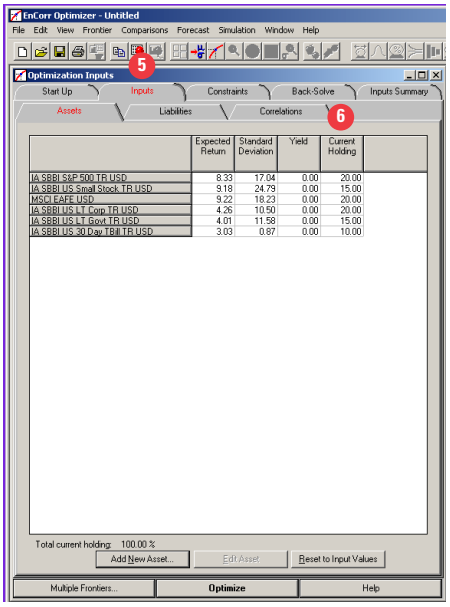
**4.** Click on *Optimize* to run the Traditional Optimization.

## Traditional MVO View



Steps 5 to 10 are optional to customize settings, established prior to running Traditional MVO.

**5.** Click on the *Inputs* tab to be taken to the Assets sub tab.



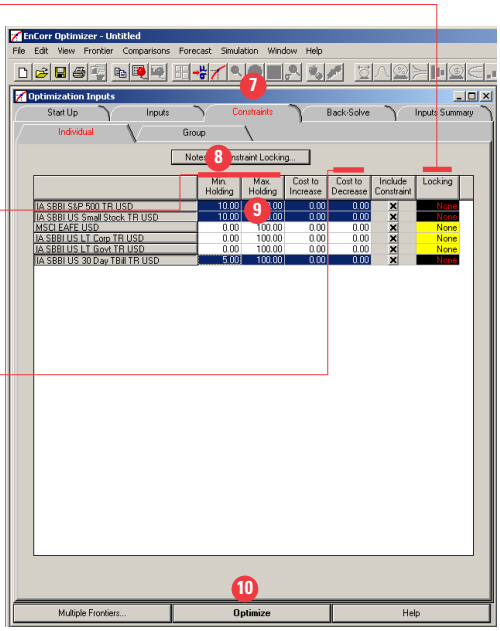

**6.** Enter the current holdings for the six asset classes *IA SBBI S&P 500 TR USD = 20, IA SBBI U.S. Small Stock TR USD = 15, MSCI EAFE TR USD= 20, IA SBBI U.S. LT Govt TR USD = 20, IA SBBI U.S. LT Corp TR USD = 15, and IA SBBI U.S. 30 Day TBill TR USD = 10.*

**7.** Click on the *Constraints* tab and you will be taken to the Individual sub tab to set limits.

Lock the expected returns for specific assets and generate returns for the remaining asset class.

Enter constraints on specific assets or combination of assets while optimizing.

Enter adjustment costs as a percentage of wealth per unit of time.



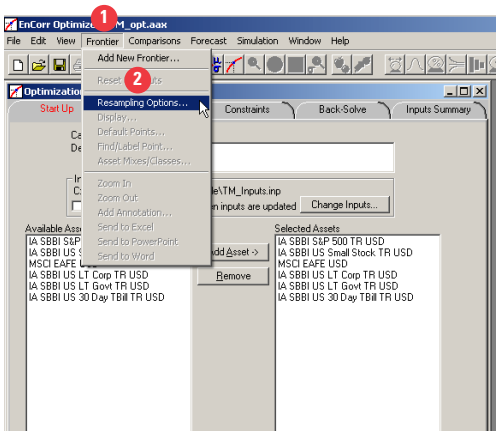

**8.** Click on the *IA SBBI S&P 500 TR USD* row and go to the Minimum Holdings column.

**9.** Type 10 to ensure that no portfolio on the efficient frontier will contain less than 10% holdings in Large Stocks. Proceed to type 10 for the IA SBBI US Small Stock TR USD minimum holdings and 5 for the IA SBBI US 30 Day T-bill TR USD minimum holdings.

**10.** Click on *Optimize* to run the traditional MVO.

### Setting up Resampled Optimization

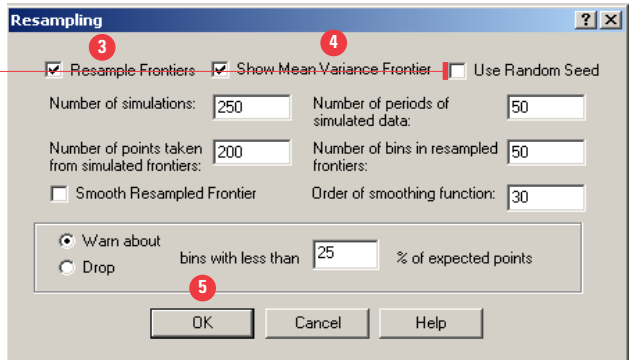
**1.** Resampling is an additional option to Traditional MVO where it is the combination of traditional mean-variance optimization and Monte Carlo simulations. To set up Resampled Optimization, the process is the same as Traditional Optimization, but it is necessary to activate the resampled setting to run resampled optimization. Go to the *Frontier* menu.




**2.** Select *Resampling Options* from the drop-down to be taken to the Resampling window.

**3.** Check on *Resample Frontiers*.

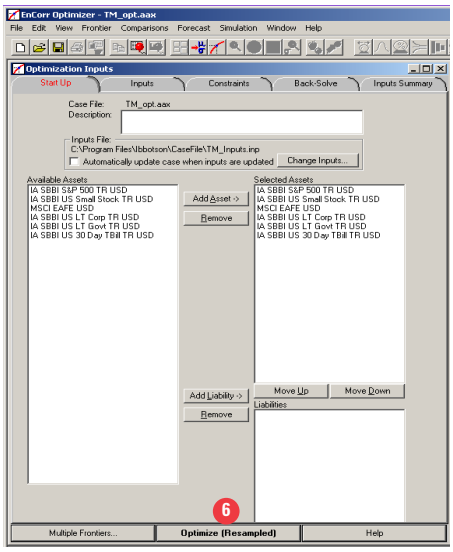
Produce different results each time you run the Resampled Optimization.




**4.** Click on *Show Mean Variance Frontier* to display the Traditional MVO along with the Resampled MVO.

**5.** Click *OK* to be taken back to the Start Up tab where Resampled is now displayed in parenthesis next to Optimize.

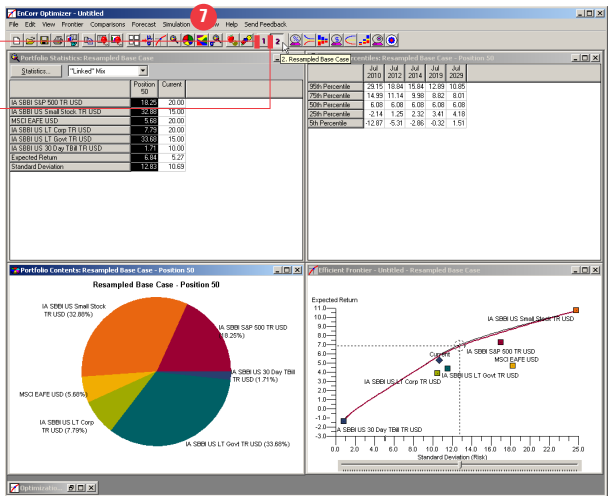
**6.** Click on *Optimize (Resampled)* to run the traditional MVO and resampled MVO. To customize settings such as constraints, prior to running the optimization, see Setting Up Traditional Optimization, Steps 5 to 10.




## Resampled MVO View

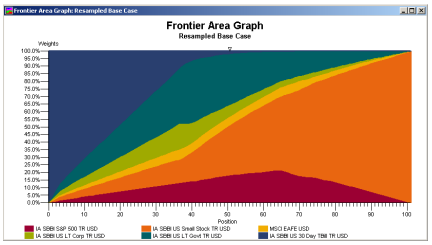
1= Traditional MVO.

2= Resampled MVO.

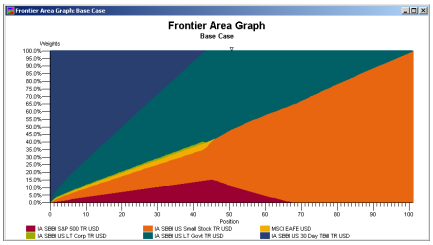



**7.** Click on the *Area Graph* icon.

## Resampled MVO View

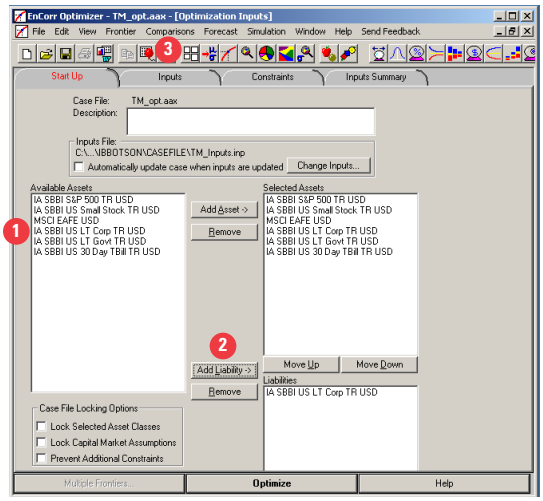



## Traditional MVO View



### Setting up Surplus Optimization

**1.** Surplus Optimization is known as Liability Modeling whereby liabilities are accounted for in addition to Assets. Clients who would benefit from Surplus Optimization are Defined Benefit Pension Plans, Defined Contribution Pension Plans, Foundations and Endowments, Life Insurance Companies, and other Insurance Companies. The set up process is the same as the traditional optimization but the liability functionality is necessary to activate Surplus Optimization. From the start up tab, select the *IA SBBI U.S. LT Corp TR USD* from the available assets window.

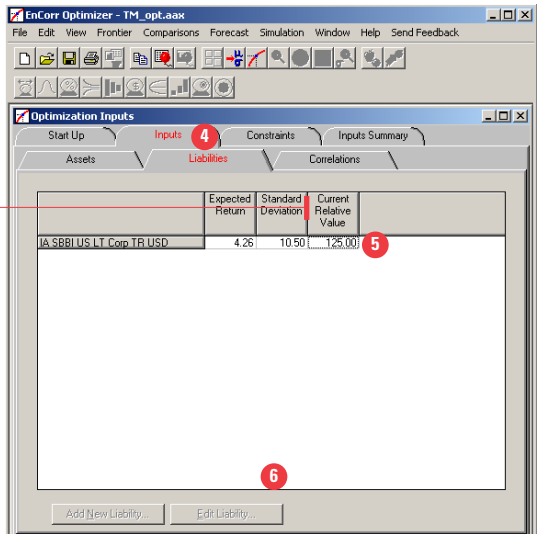



**2.** Click on *Add Liability* to add U.S. LT Corp TR as your liability.

**3.** Click on the *Inputs* tab.

**4.** Click on the *Liabilities* tab.

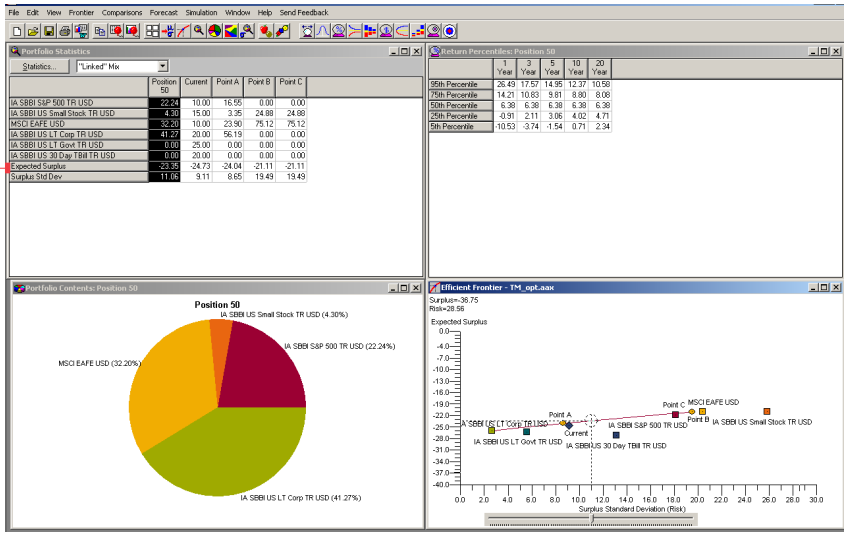
**5.** Go to the *Current Relative Value* column and type 125 which will represent an underfunded pension.




Relative size of a liability to the assets:
> 100 means pension fund is underfunded.
< 100 means pension fund is overfunded.
= 100 means pension fund is fully funded.

**6.** Click on *Optimize* to run the Surplus Optimizaton. To customize settings such as constraints, prior to running the optimization, see Setting Up Traditional Optimization, Steps 5 to 10.

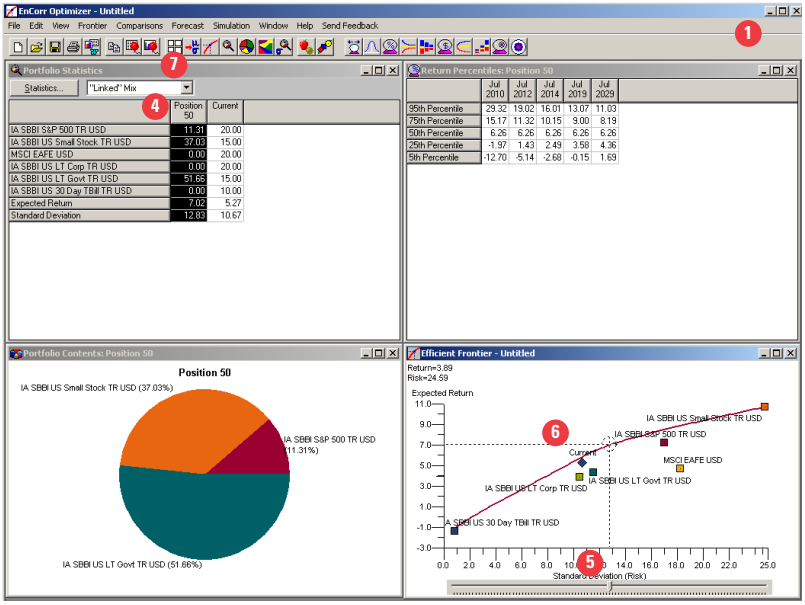
## Surplus Optimization View



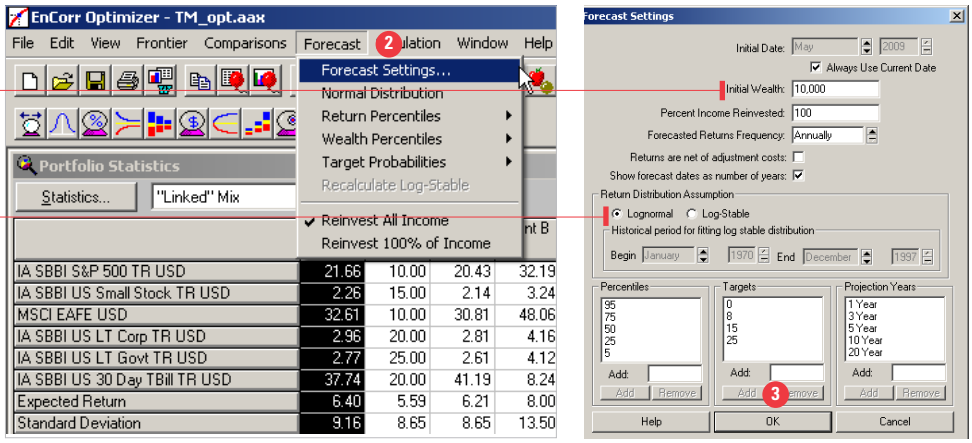
Forecast of future net worth, expressed as a percentage of the initial value of fund's assets: Positive "expected surplus" is increased through plan contributions or investment earnings. Negative "expected surplus" is increased through plan withdrawals and investment losses.

### Identifying Potential Portfolios

**1.** When you run your optimization, a 4-quadrant default view will appear on your screen. Each quadrant is driven by the placement of the periscope (cross-referencing dotted lines) on the Efficient Frontier Graph. We will return to this view in #3.



**2.** Before we begin identifying potential portfolios, go to Forecast and click on *Forecast Settings* to set parameters for the tables and graphs.




Input initial wealth amount to be forecasted.

Represents the methodology used to compute percentile forecasts: Log normal distribution is the default calculation. Log-stable distribution is also available where the assumption is that it will have higher sensitivity to market events.

**3.** Once complete, click *OK* to be taken back to the same 4-Quadrant view in #1.

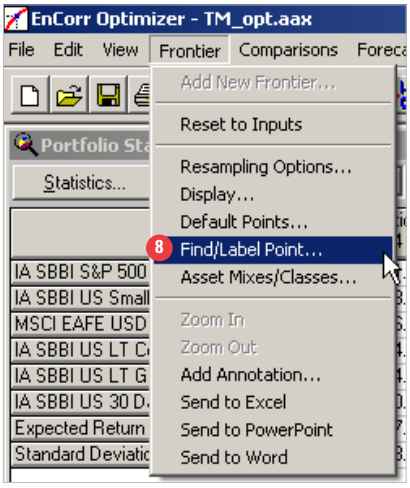
**4.** The default periscope placement is Position 50.

**5.** Move the location of the periscope by clicking and dragging the point on the scroll bar or by using the scroll arrows on your keyboard. The zoom feature is also available on the efficient frontier to narrow in a particular section.

**6.** Locate the *Current* portfolio on your efficient frontier.

**7.** To identify another portfolio with a higher expected return with the same level of risk, go to the top menu and select *Frontier*.

**8.** Click on *Find/Label Point* to be taken to the Frontier Points window. The same access is available by right clicking on the efficient frontier graph.



**9.** Go to the *Find By* sub tab.

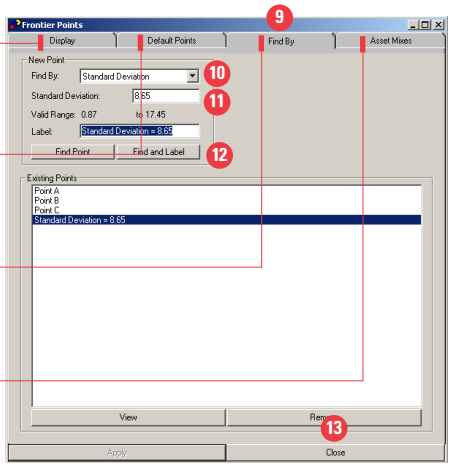
**10.** Click on the *Find By* drop-down and locate Standard Deviation.

Control what is displayed in your view.

Display points based on specific point definitions.

Locate specific points based on criteria.

Create new asset mixes.

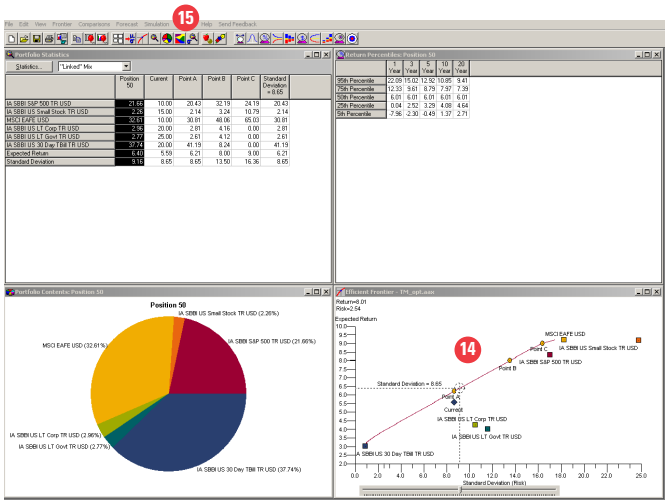



**11.** Type *8.65* for the current portfolio's Standard Deviation.

**12.** You can either provide a custom name or click on *Find and Label* to add to the new point.

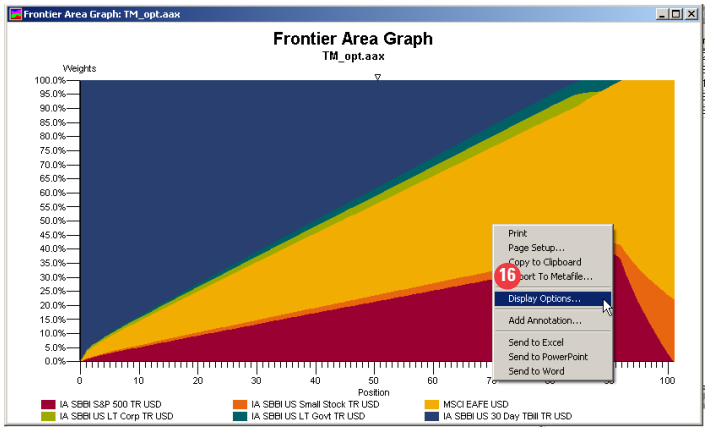
**13.** Click *Close* to be taken back to the Optimizer view.

**14.** Your new point will now be displayed on the efficient frontier.

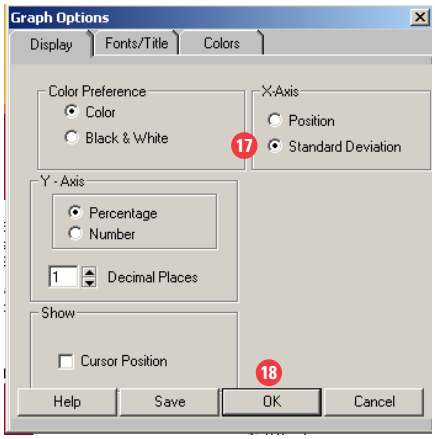



**15.** Another method to view your positions is the Frontier Area graph. Click on the *Area* graph.

**16.** The default view will be all the position numbers on the x-axis. To alter the position numbers to read standard deviation on the x-axis, right click and locate *Display Options*.

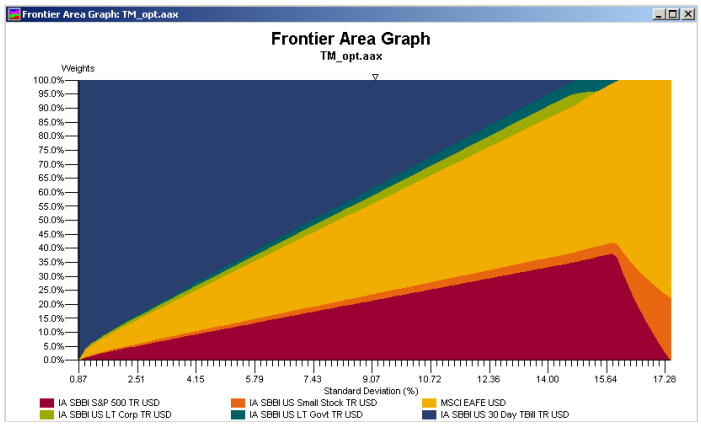



**17.** Click on *Standard Deviation* radio button.




**18.** Click *OK* and you will see the standard deviation positions displayed on the x-axis.

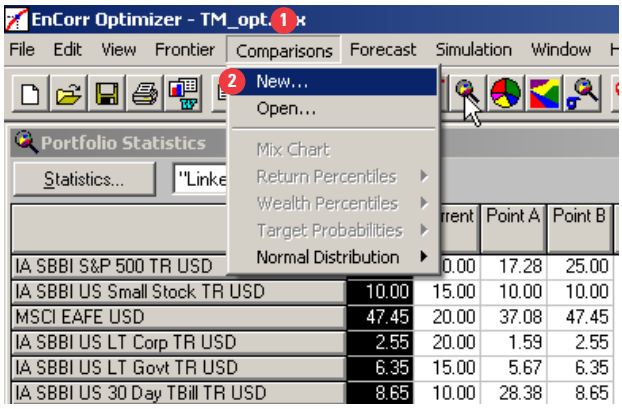
## Standard Deviation Position View



### Creating Forecasted Return and Wealth Percentiles

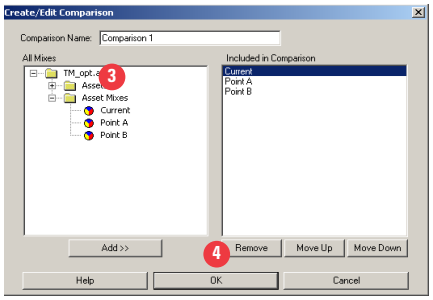
The steps below apply to the Comparison and Forecast menus. In Comparison menu, more than 2 portfolios can be displayed. In Forecast menu, 1-2 portfolios can be displayed in the results.

**1.** For this example, we will begin with the Comparison menu to generate forecasted tables and charts of the Current portfolio vs. the two possible portfolios (Point A and Point B), using the base case (1). Click *Comparisons* on the top menu.



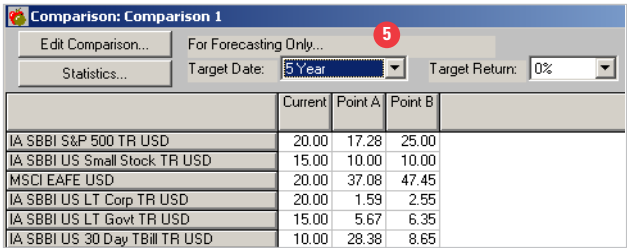

**2.** Select *New* and a Create/Edit Comparison window will be displayed.

**3.** From the Base Case tree, Asset Mixes, click on *Current, Point A, and Point B* individually to add to the Included in Comparison box.

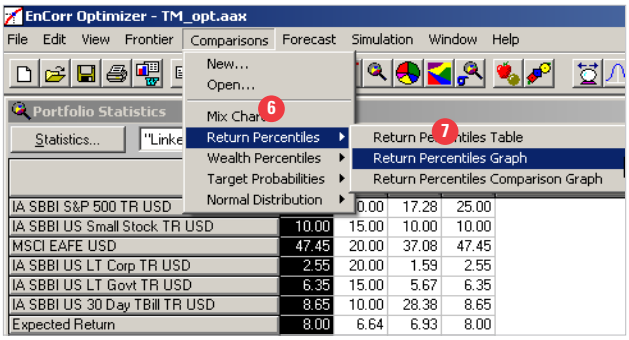



**4.** Click *OK* and you will be taken to the comparison table displaying the weights of each possible portfolios.

**5.** Click on *5 Year* under the Target Date drop-down.

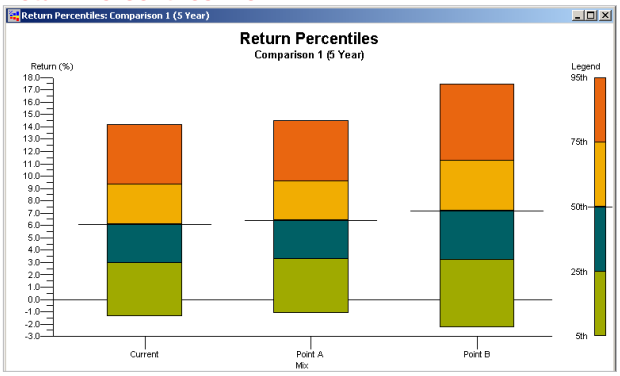



**6.** While still maintaining your comparison table view, click on *Comparisons* to access the Forecasted Return Percentiles, Wealth Percentiles, and Target Probabilities. Go to the *Return Percentiles*.



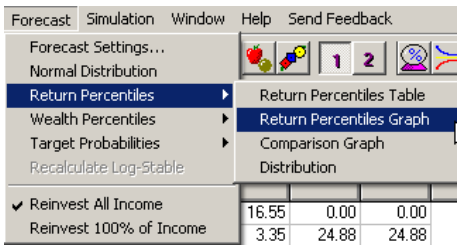

**7.** Click on the *Return Percentiles Graph* to display the 5 year forecasted return percentile result for the current portfolio vs. the possible portfolios.

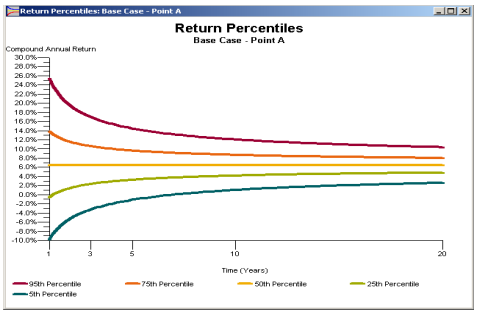
## Return Percentiles View



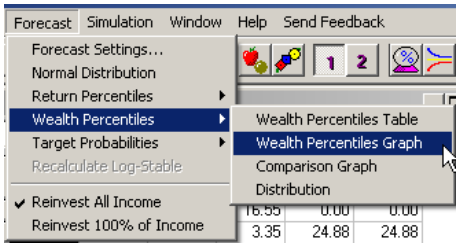
## Additional Forecasted Output Options

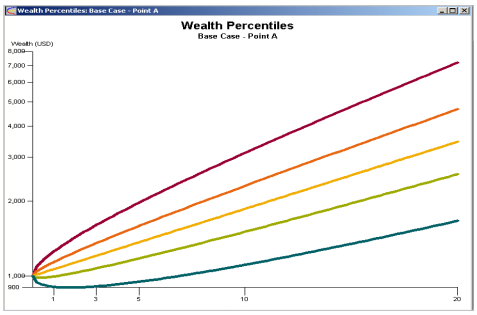
**Return Percentiles** represent the possible return values of the portfolio(s) during the projection period. The percentiles displayed in the forecast reflect various confidence levels of the statistical model.



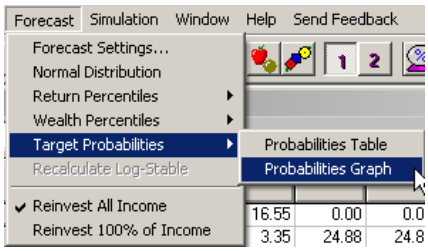



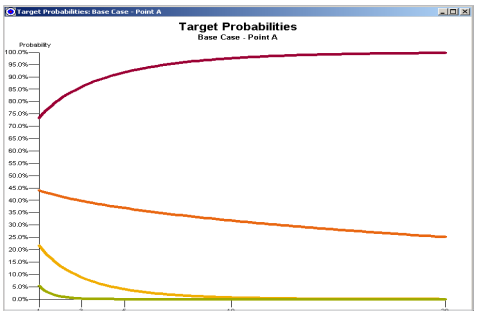

**Wealth Percentiles** illustrate the possible dollar values of the portfolio(s) during the projection period. The percentiles displayed in the forecast are a range of wealth possibilities for the entire investment horizon.



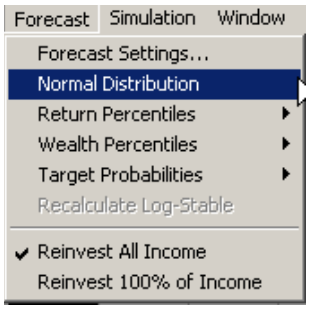



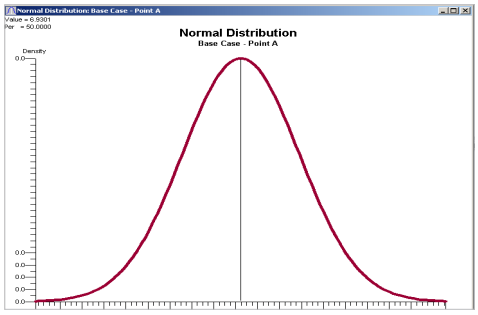

**Target Probabilities** represent the probability of achieving specified levels of target compounded returns over a certain time period.



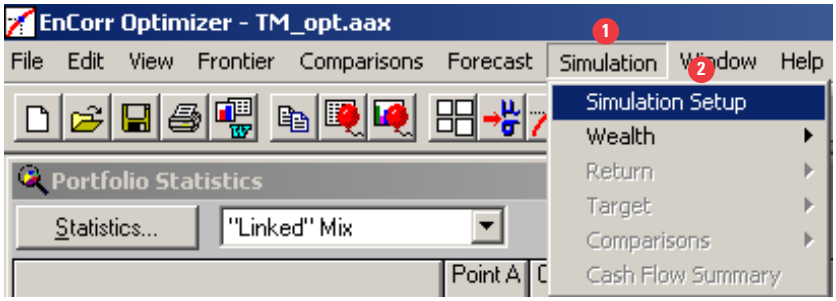
**Normal Distribution Graph** displays the distribution of the active portfolio with the assumption that the returns are normally distributed.



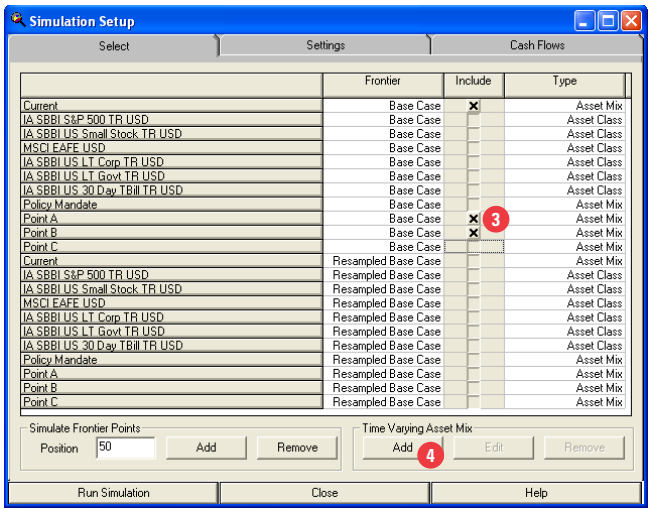

### Creating Simulated Return and Wealth Percentiles

**1.** Monte Carlo Simulation is the method to approximate the probability of certain outcomes by using random variables and by performing multiple trial runs, called simulations. Click on *Simulation*.

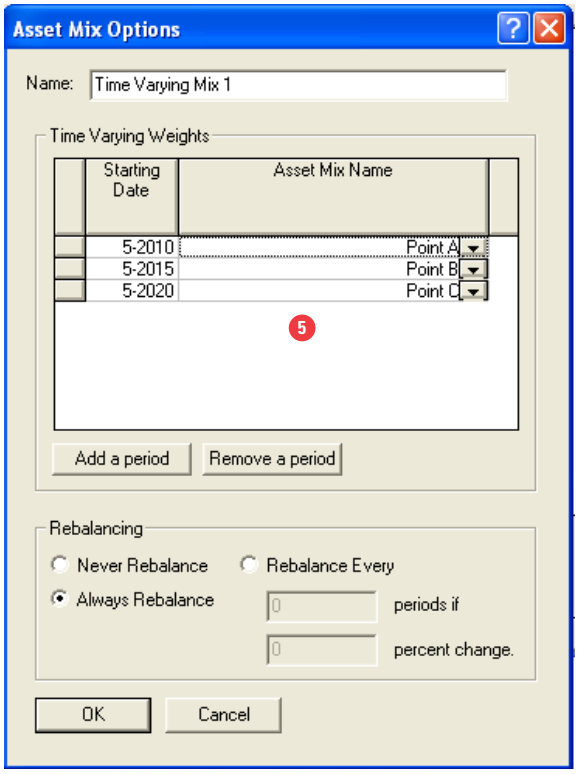



**2.** Next, click on *Simulation Setup*.

**3.** In the Simulation Setup window, the Current portfolio is checked by default provided you inputted the weights in Optimization Inputs. To compare the current portfolio with the possible portfolios, click on *Point A* and *Point B* from the Base Case Frontier. You can also select a target portfolio from an additional frontier(s) such as the resampling frontier. The benefit is that you can identify your potential portfolios from various frontiers vs. from one frontier.



**4.** Go to the Time Varying Asset Mix and click on add.



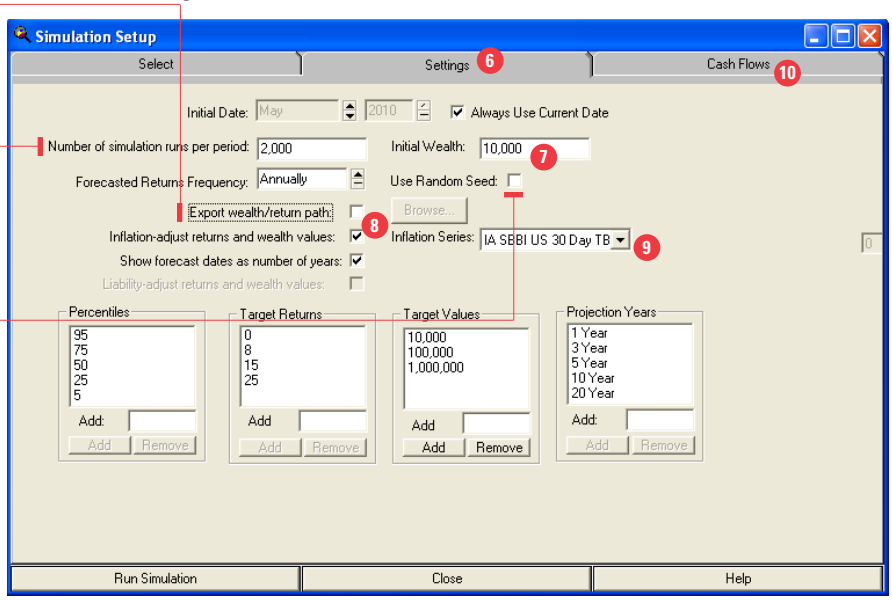

**5.** Here, you can create a Lifecycle portfolio, for example, of various Time Varying Weights where the asset mix will change on the given year. Use the Rebalancing feature to update a portfolio on an ongoing basis vs. never rebalancing where the portfolio is treated as a Buy and Hold at the beginning of each start date. Close this view.

**6.** Click on *Settings* tab.

Write your own macros to create custom statistics.

Dictates how many simulation runs per period for each asset class (2000 to 5000).

Produce different random numbers in each simulation. Export data to create custom statistics.



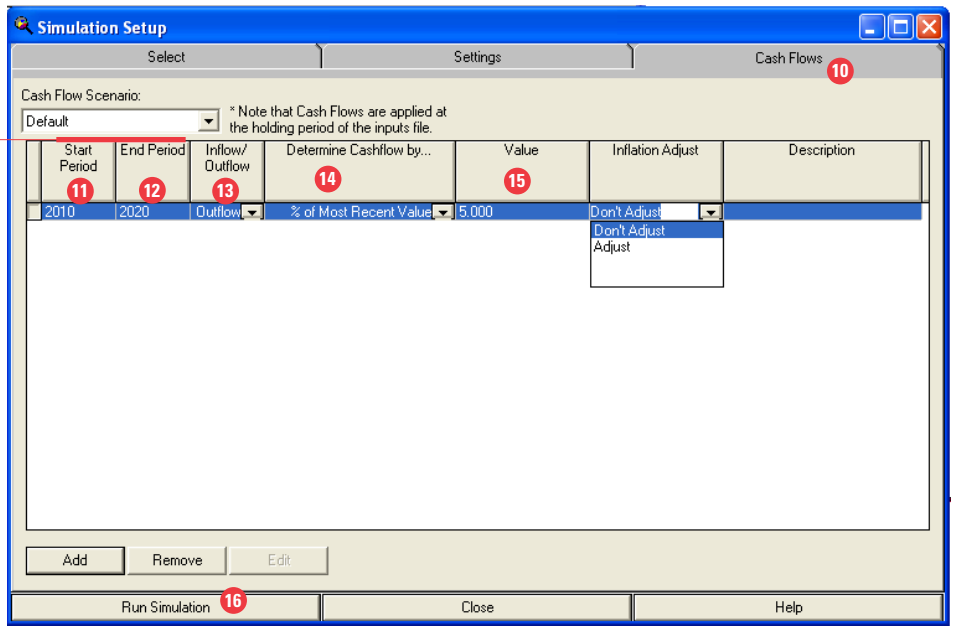
**7.** We will keep the number of simulations runs per period at 2000, the default. Next, change the default initial wealth of 1 to 10,000.

**8.** To inflation adjust your return and wealth values, check *Inflation-adjust returns and wealth values.*

**9.** Select the *Inflation Series* from the drop-down.

**10.** Click on the *Cash Flows* tab to account for Cash Flows. Here, you have the ability to enter projected cash flows to be included in the simulation. Cash Flows can be entered as a Monetary Amount, Percentage of the Initial Wealth, Percentage of Most Recent Value, or Percentage of Moving Average Value.

Cash Inflows accounted for at the end of the period.
Cash outflows withdrawn at the beginning of the period.




**11.** Enter *2010* as the Start Period.

**12.** Then enter *2020* as the End Period.

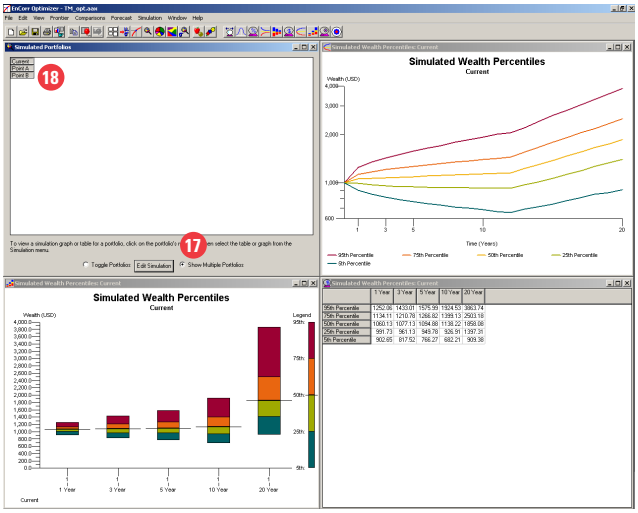
**13.** Select *Outflow* from the Inflow/Outflow drop-down.

**14.** Select *% of Most Recent Value* from the Determine Cashflow By drop-down.

**15.** Input 5 for the Value to reflect 5% spending rate of its current value every year for next ten years. You can also inflation adjust these cash flows separately from return and wealth percentiles.

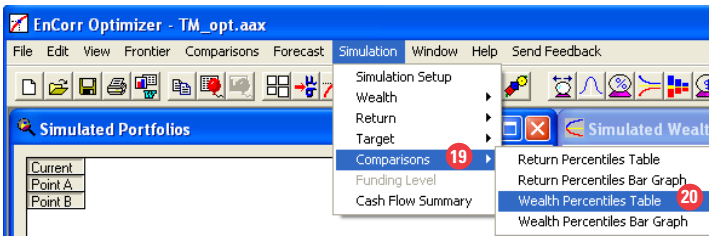
**16.** Run the *Simulation* and you will be taken to the 4-quadrant view displaying the results of the first listed portfolio (Current). These charts and tables are similar to the Forecasted 4-quadrant default view. The difference is that this output represents simulated wealth percentiles results and incorporates cash flows.

**17.** In the top left quadrant, click on the *Show Multiple Portfolio* button.



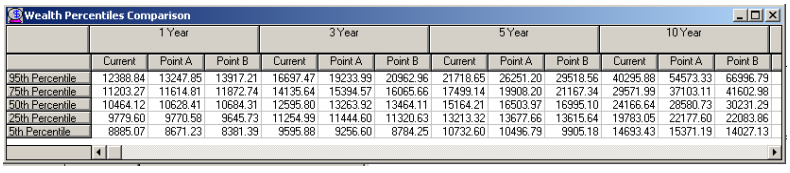

**18.** Next, click on *Point A* and *Point B* to compare the simulated results to the current portfolio.

**19.** Go to the Simulation menu and click on *Comparisons*.




**20.** Go to the *Wealth Percentile Table* to compare the simulated results of all three portfolios at the same time.

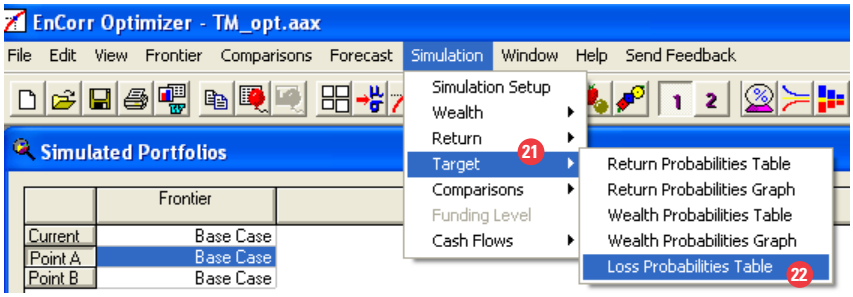
## Wealth Percentiles View



Wealth Percentiles Comparison

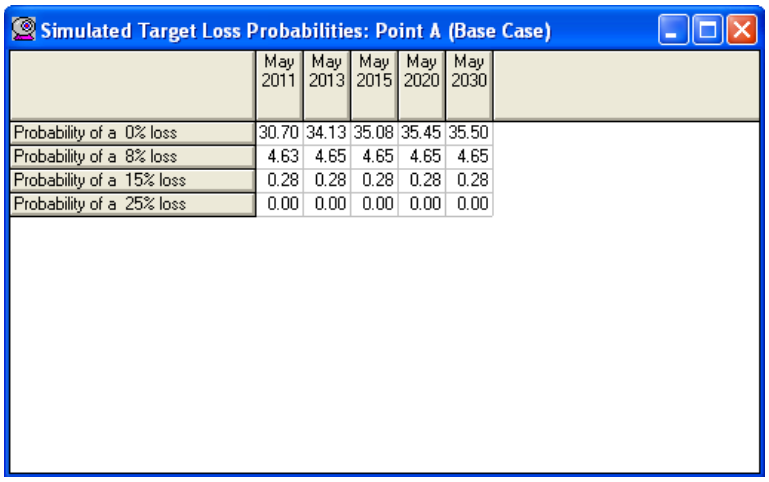
| | 1 Year | | | 3 Year | | | 5 Year | | | 10 Year | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current | Point A | Point B | Current | Point A | Point B | Current | Point A | Point B | Current | Point A | Point B |
| 95th Percentile | 12388.84 | 13247.85 | 13917.21 | 16697.47 | 19233.99 | 20962.96 | 21718.65 | 26251.20 | 29518.56 | 40295.88 | 54573.33 | 66996.79 |
| 75th Percentile | 11203.27 | 11614.81 | 11872.74 | 14135.64 | 15394.57 | 16065.66 | 17499.14 | 19908.20 | 21167.34 | 29571.99 | 37103.11 | 41602.98 |
| 50th Percentile | 10464.12 | 10628.41 | 10684.31 | 12595.80 | 13263.92 | 13464.11 | 15164.21 | 16503.97 | 16995.10 | 24166.64 | 28580.73 | 30231.29 |
| 25th Percentile | 9779.60 | 9770.58 | 9645.73 | 11254.99 | 11444.60 | 11320.63 | 13213.32 | 13677.66 | 13615.64 | 19783.05 | 22177.60 | 22083.86 |
| 5th Percentile | 8885.07 | 8671.23 | 8381.39 | 9595.88 | 9256.60 | 8784.25 | 10732.60 | 10496.79 | 9905.18 | 14693.43 | 15371.19 | 14027.13 |

**21.** Go back to the Simulation menu and click on *Target*.



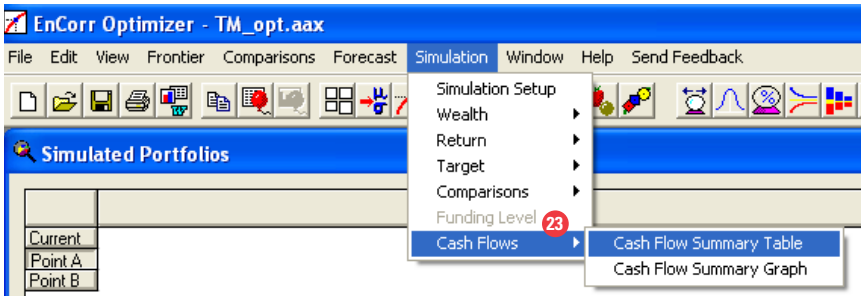

**22.** Click on *Loss Probabilities Table* to identify the probability of a loss.

## Loss Probabilities Table View



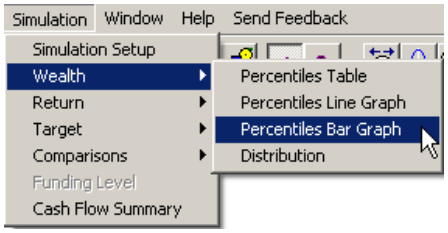

| | May 2011 | May 2013 | May 2015 | May 2020 | May 2030 |
|---|---|---|---|---|---|
| Probability of a 0% loss | 30.70 | 34.13 | 35.08 | 35.45 | 35.50 |
| Probability of a 8% loss | 4.63 | 4.65 | 4.65 | 4.65 | 4.65 |
| Probability of a 15% loss | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 |
| Probability of a 25% loss | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

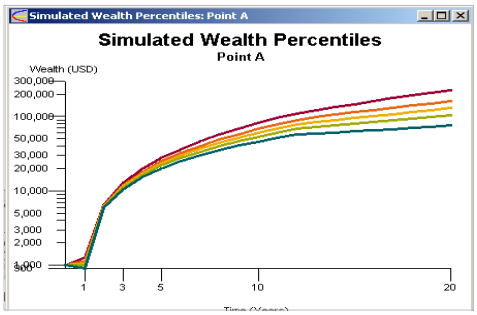
**23.** Go back to the Simulation menu and click on *Cash Flows*. Here, you can select Cash Flow Summary Table and Cash Flow Summary Graph to view the inflows and outflows separately.



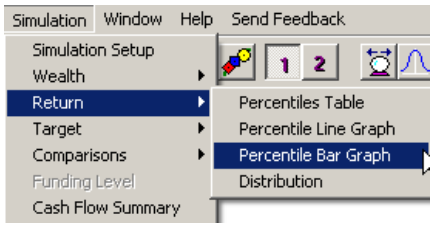
## Additional Simulated Output Options

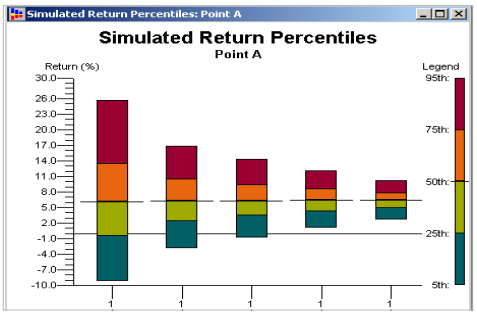
**Simulated Wealth Percentiles** displays the range of wealth possibilities for the selected portfolio, beginning with an initial wealth amount, over varying investment horizons.



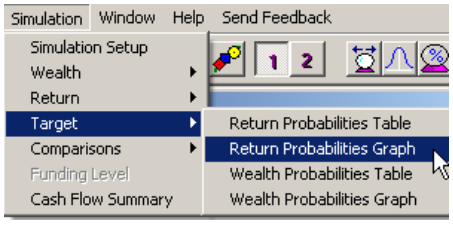



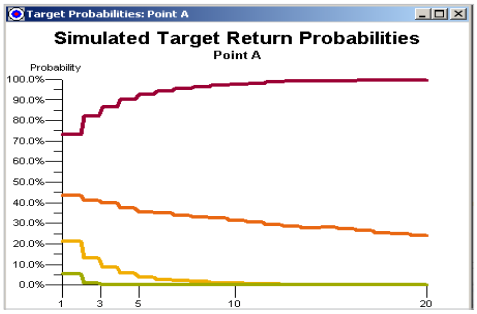

**Simulated Return Percentiles** displays the probability distribution (broken down by percentiles) of possible future compounded annual returns for the selected portfolio using Monte Carlo simulation.



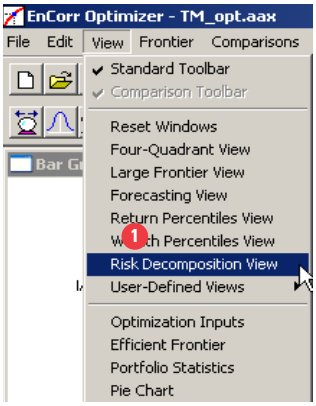

**Target Return Probabilities** displays the probability of achieving specified levels of the target simulated portfolio returns over the investment period.



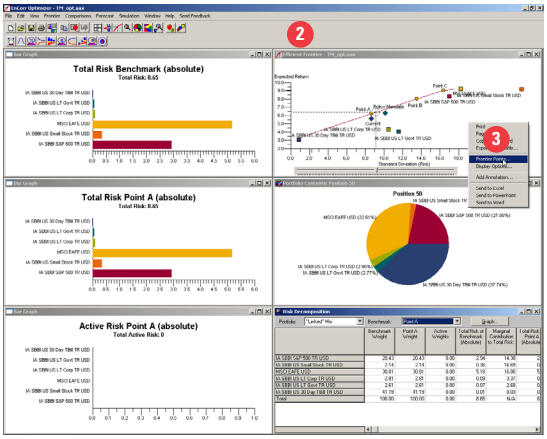
## Understanding Risk Decomposition

**1.** Risk Decomposition, also known as Risk Budgeting, is a quantitative process that brings logic and scientific rigor to the portfolio management process. It helps you to understand the risks you are taking as you attempt to maximize returns. For this example, we will determine how each asset class contributed to the overall risk using Point A as our sample portfolio. Go to View and select the *Risk Decomposition* view.




**2.** You will be taken to the 6-quadrant Risk Decomposition view.

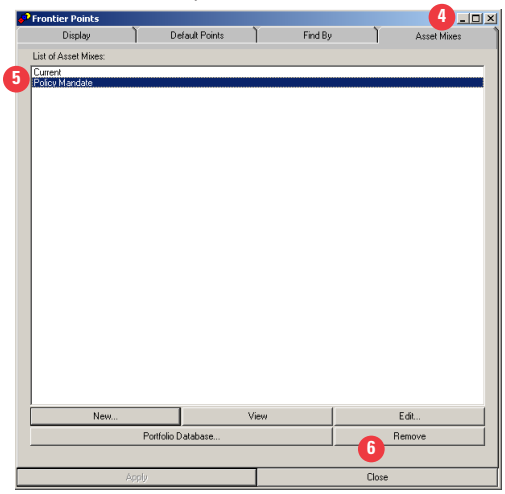
**3.** Right click on the efficient frontier to access the *Frontier Points* window.




**4.** Click on the *Asset Mix* tab to create Benchmark necessary to analyze the risk decomposition results.

**5.** Once you have created your benchmark, also can be known as *policy mandate*, it will be added to the Asset Mix view.

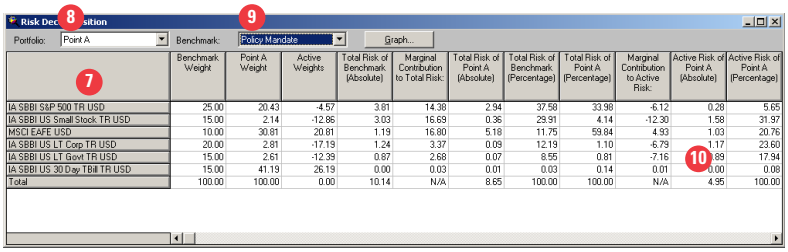
**6.** Click *Close* and you will be taken back to the Risk Decomposition View.




**7.** Go to the table.

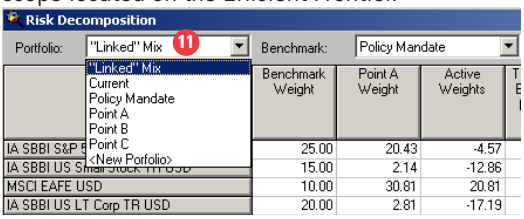
**8.** Select *Point A* from the Portfolio drop-down.

**9.** Select the *Policy Mandate* from the Benchmark drop-down.

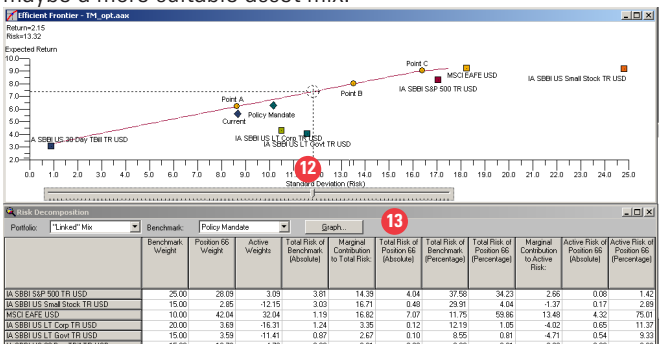



**10.** The Active Risk (tracking error) of Point A is *4.95%*. If the mandate is to have a higher tracking error then you may need to consider another potential portfolio.

**11.** Click on the "*Linked Mix*" from the portfolio drop-down and it will default to the periscope located on the Efficient Frontier.



**12.** Move the slider to *Position 66* on the Efficient Frontier. As you move the slider, your numeric values will change on the Table. The Active Risk changed from 4.95 to 5.75 which maybe a more suitable asset mix.




| | Benchmark Weight | Position 66 Weight | Active Weights | Total Risk of Benchmark (Absolute) | Marginal Contribution to Total Risk: | Total Risk of Position 66 (Absolute) | Total Risk of Benchmark (Percentage) | Total Risk of Position 66 (Percentage) | Marginal Contribution to Active Risk: | Active Risk of Position 66 (Absolute) | Active Risk of Position 66 (Percentage) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| IA SBBI S&P 500 TR USD | 25.00 | 28.09 | 3.09 | 3.61 | 14.39 | 4.04 | 37.58 | 34.23 | 2.66 | 0.06 | 1.42 |
| IA SBBI US Small Stock TR USD | 15.00 | 2.85 | -12.15 | 3.03 | 16.71 | 0.48 | 29.91 | 4.04 | -1.37 | 0.17 | 2.89 |
| MSCI EAFE USD | 10.00 | 42.04 | 32.04 | 1.19 | 16.82 | 7.07 | 11.75 | 59.86 | 13.48 | 4.32 | 75.01 |
| IA SBBI US LT Corp TR USD | 20.00 | 3.69 | -16.31 | 1.24 | 3.35 | 0.12 | 12.19 | 1.05 | -4.02 | 0.65 | 11.37 |
| IA SBBI US LT Govt TR USD | 15.00 | 3.59 | -11.41 | 0.67 | 2.67 | 0.10 | 8.55 | 0.81 | -4.71 | 0.54 | 9.33 |

# Attribution

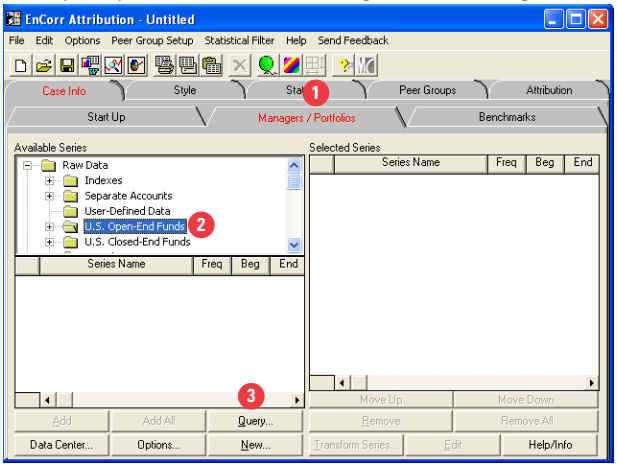
EnCorr Attribution allows you to analyze investment style and performance, providing insight into a manager's actions and ranking in relation to peers. For example, examine a manager's style consistency to gain competitive insight, analyze various statistics relative to style or a specific benchmark, and determine manager rank in terms of performance and risk.

### Exercises

- Creating Style Analysis
- Running Additional Statistics
- Running Peer Analysis
- Learning the Impact of Investors' Decisions vs. Managers' Decisions

### Creating Style Analysis

**1.** As you open *EnCorr Attribution*, go to the *Manager/Portfolio* sub tab.

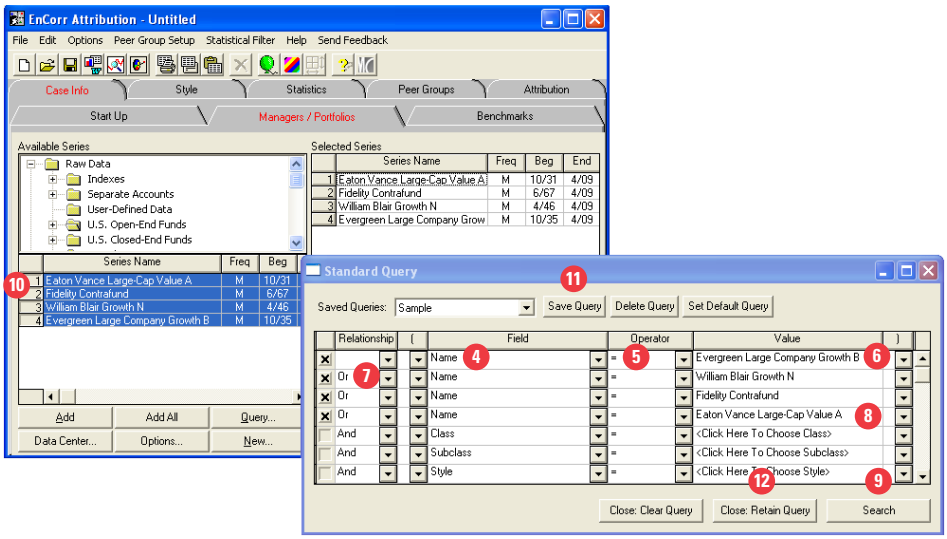



**2.** Highlight *U.S. Open-End Funds* in the *Available Series* window where we will select Investments to analyze. You can also select investments from an existing *Case File* folder.

**3.** Click *Query* to be taken to the *Standard Query* window.

**4.** Go to the first line and locate Name in the *Field* drop down.

**5.** Click = sign in the *Operator* drop down.




**6.** Type *Evergreen Large Company Growth B* in the *Value drop*-down.

**7.** Go to the *next line* and click *Or* in the relationship drop down.

**8.** Follow the same Steps from 4 to 7 to add William Blair Growth N, Fidelity Contrafund, and Eaton Vance Large-Cap Value A.

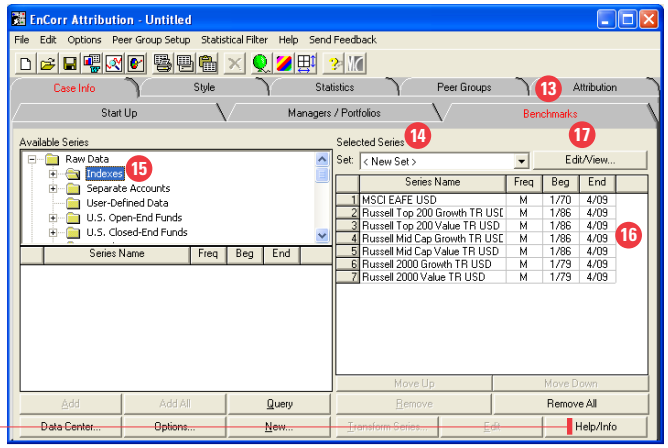
**9.** Click *Search* to retrieve these names.

**10.** Highlight all four names and double click to add to the selected series table.

**11.** Before closing the query, click on Save *Query* and name it *Sample*.

**12.** Click *Close Retain Query.*

**13.** Go to the *Benchmarks* sub tab to select your benchmarks to run the regression.




Learn the definition of a specific index.

**14.** Click on New Set to alter the default index choices.

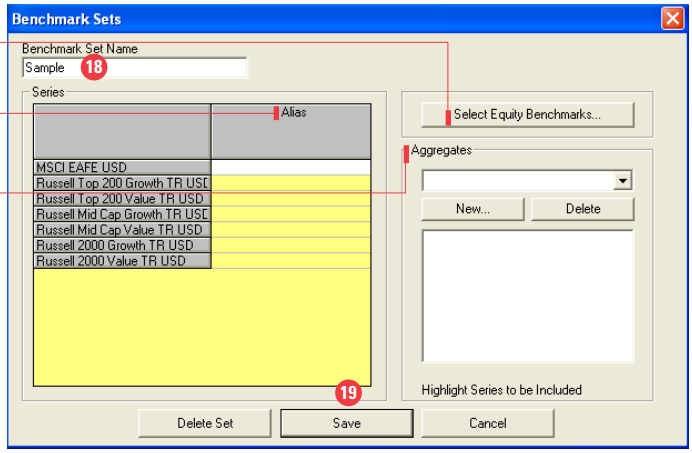
**15.** Highlight *Indexes* in the *Available Series* window.

**16.** Follow Steps 3 to 10 to add the following series: MSCI EAFE USD, Russell Top 200 Growth TR USD, Russell Top 200 Value TR USD, Russell Mid Cap Growth TR USD, Russell Mid Cap Value TR USD, Russell 2000 Growth TR USD, and Russell 2000 Value TR USD. Note that you can open the *Sample Query* and add these names, create a new query, or simply search for the new names without saving the query.

**17**. Click *Edit/View* button.

**18.** Name your *Benchmark Set* as Sample.

**19.** Click *Save* to be taken back to the *Benchmark* Tab.

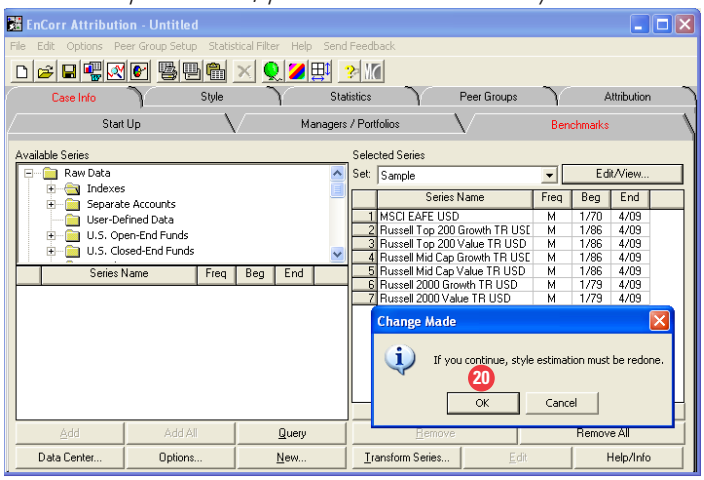



Customize your quadrant view.

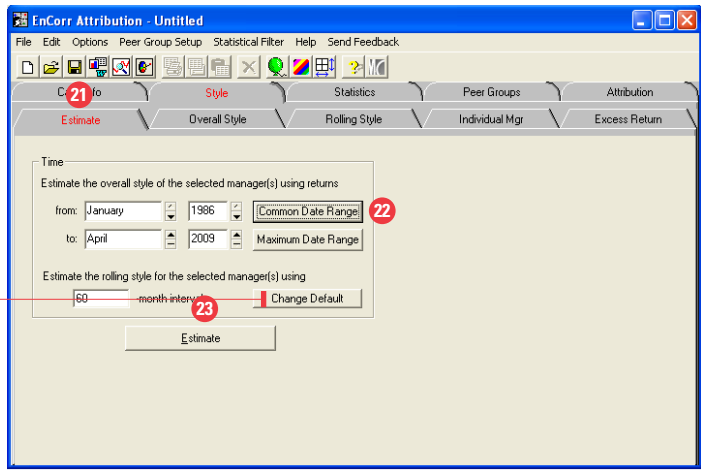
Create alternate names.

Create an aggregate from your benchmarks.

**20.** Go to the *Style Tab.* Notice the pop-up message to indicate that style estimation must be done. Once you click *OK*, you will be taken to the *Style tab.*




**21.** Go to the *Estimate* sub tab.

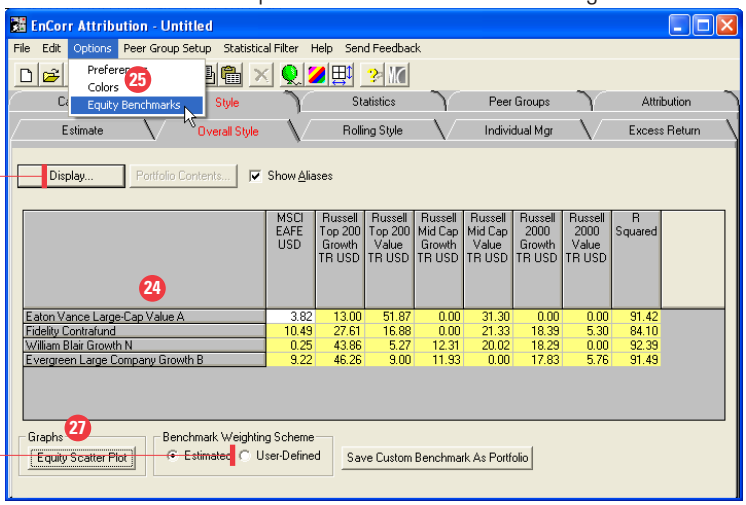



Enter the rolling style interval to determine how many periods will drive each rolling window. 60 months is the default.

**22.** Click on *Common Date Range* to set a common time period for the overall style date calculation.

**23.** Click *Estimate* to be taken to the *Overall Style* sub tab.

**24.** The table view displays the results of the regression analysis. The managers' overall style is calculated using the entire data history available over the estimation period. Analyzing these weights can provide insight into the true behavior of a manager's returns. The R-Squared statistic is a measure of how well the return variations of each manager's estimated benchmark explain the variations in the manager's actual returns.

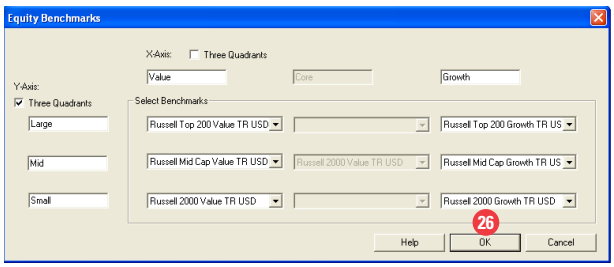



Set your style table display.

Specify your own weighting schemes for analyzing selection returns and portfolio attribution.

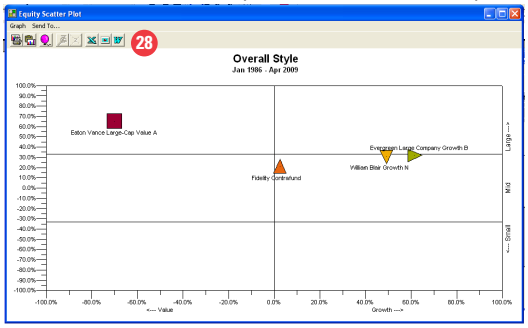
**25.** Go to the *Options* menu and click *Equity Benchmark* where you can set up quadrant view display.

**26.** Click *OK* after you've completed your settings to be taken back to the *Overall Style Table View.*



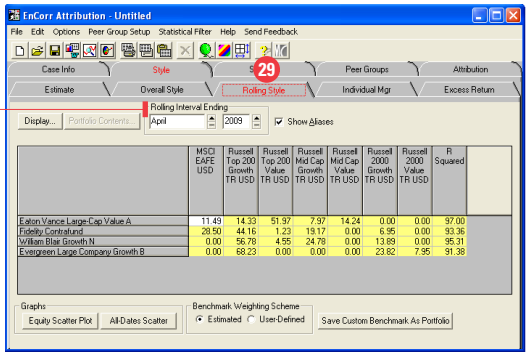

**27.** Next, click *Equity Scatter Plot* to view manager's relative placement to each equity style.

**28.** The chart can be exported to *Excel, Powerpoint, or Word.*




**29.** Close this view and proceed to the *Rolling Style* tab. Rolling style regressions are one period "out of sample." Therefore, there is a one-period lag between the actual ending date of the interval used in the regression and the date shown in the *Rolling Interval Ending* date field.

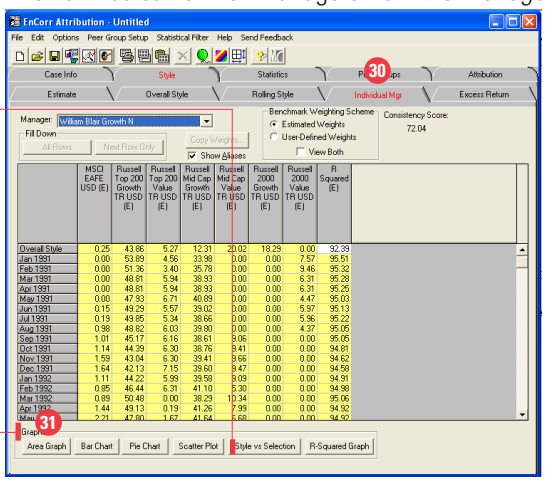
Scroll through the Rolling Interval Ending dates to view the style change for each manager.




**30.** Click on the *Individual Mgr* subtab to view the overall and rolling styles for the individual managers. This subtab concentrates on one manager or portfolio at a time. The first row displays the overall style, while each additional row displays the rolling style for each rolling interval. You can switch managers from the *Manager* drop down list.

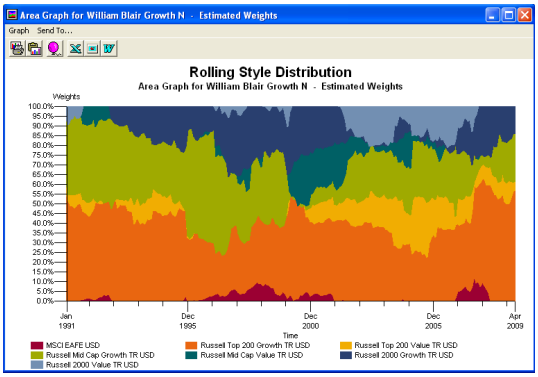
Illustrate the selected fund's percentage of return attributed to investment style and the percentage attributed to selection.

Click on various graph choices to display results.



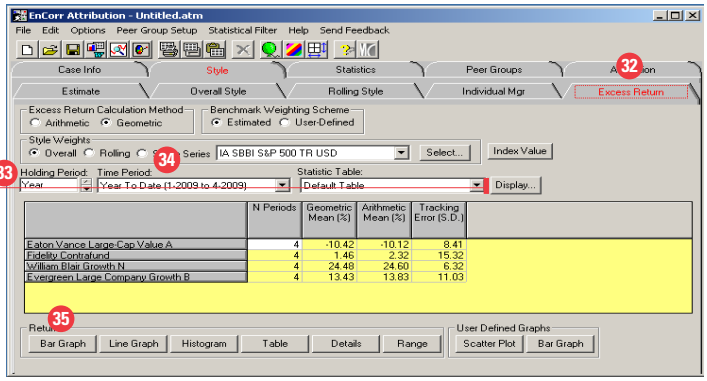
**31.** Click on *Area Graph* to generate the *Rolling Style Distribution Graph*, illustrating the rolling style of the selected manager over time.

## Sample View




**32.** Next, click on the *Excess Return* subtab.

**33.** The *Excess Return* subtab displays summary statistics for each manager's selection returns. You can specify the *Excess Return Calculation Method* (Arithmetic or Geometric difference), the *Style Weights* used (Overall or Rolling or Single Series), and the *Benchmark Weighting Scheme* (Estimated or User-Defined). By analyzing the summary statistics for the managers, you can learn a great deal about the ability of these managers to outperform an estimated or user-defined benchmark. Go to the *Holding Period* and click Year from the drop down to annualize your results.




Utilize the various return display choices.

**34.** Go to *Time Period* and select *Year to Date* to analyze your results.

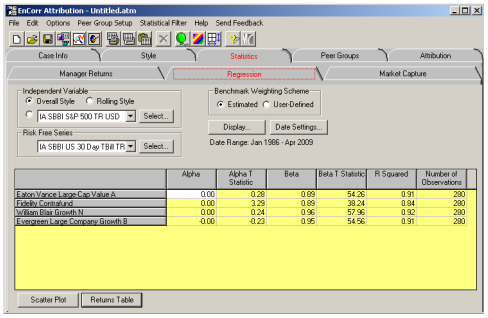
**35.** Click on *Bar Graph* to view your results.

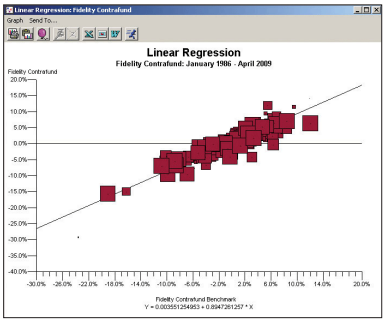
## Sample View


### Running Additional Statistics

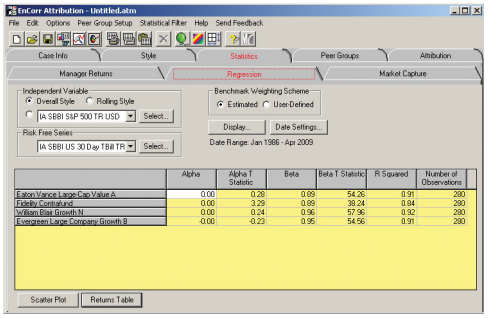
The Statistics tab contains three subtabs that allow you to perform a variety of statistical and regression analyses on your manager's or portfolio's raw returns.

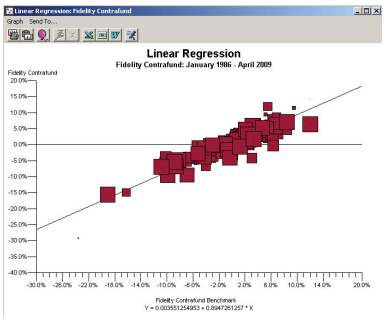
**Use the Manager Returns** subtab to view a manager's range of historical returns and more.



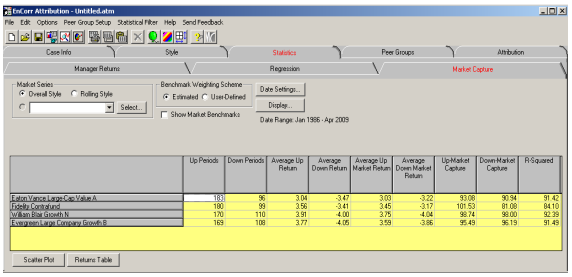



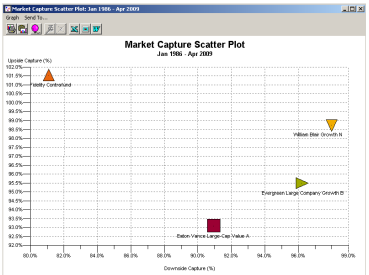

**Use the Regression** subtab to regress managers' returns against benchmark portfolios comprised of each manager's overall style, benchmark portfolios comprised of each manager's rolling style, or any data series of your choice.



**Use the Market Capture** subtab to test your manager's or portfolio's performance under up and down market conditions. Overall Style is the default Market Series benchmark but you can alter this to Rolling Style or your own benchmark by clicking on *Select*.

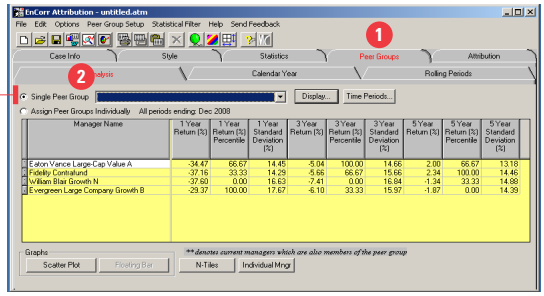





## Running Peer Analysis

**1.** Peer group analysis allows you to examine each manager's performance and statistics relative to its peer group. This peer group can be defined by current managers, new set of managers, or predefined peer groups all found in the *Peer Group Setup* menu. You can also create peer groups using *Cluster Analysis* by finding the benchmarks that best fit each manager. Click on the *Peer Group Tab*.

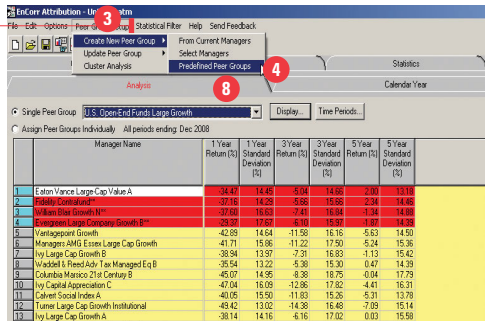
Assign a different peer group to each manager or series to view the results in same display.

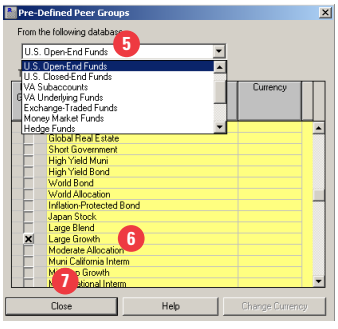



**2.** Click on the *Single Peer Group* drop down and locate *U.S Open-End Funds Large Growth*.

**3.** If there is nothing displayed in your *Single Peer Group* drop down, then go to the *Peer Group Set* up menu and select *Create New Peer Group*.

Filter your results by applying specific parameters.



**4.** Click on *Predefined Peer Groups* to be taken to the *PreDefined Peer Groups* window.

**5.** Select *U.S. Open-End Funds.*

**6.** Select *Large Growth.*

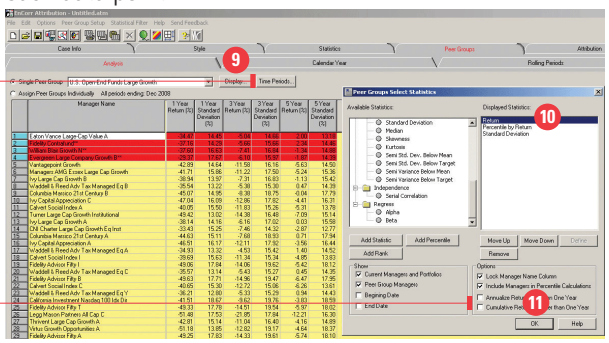
**7.** Click *Close.*

**8.** The *U.S Large Growth Universe* is now listed below your *Managers* highlighted in Red.

**9.** Click *Display* to view your *Available Statistics* Option and to apply Rank or Percentile to each data point.

Select additional Performance Periods or create your own time period.

Adjust your settings when the time period is more than one year or less than one year.



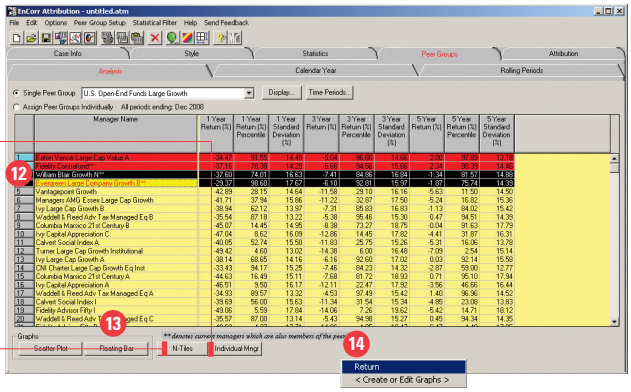

**10.** While highlighting *Return,* click on *Add Percentile* to retrieve the Percentile by Return.

**11.** Click *OK* and your *Return Percentile* will now be displayed.

**12.** Click on William Blair Growth N and Evergreen Large Company Growth B.

View a single manager's statistics alone compared to its peer group for all the selected time periods.

View the peer group statistical breakpoints by quartiles, deciles, or a set of user-defined N-tiles.

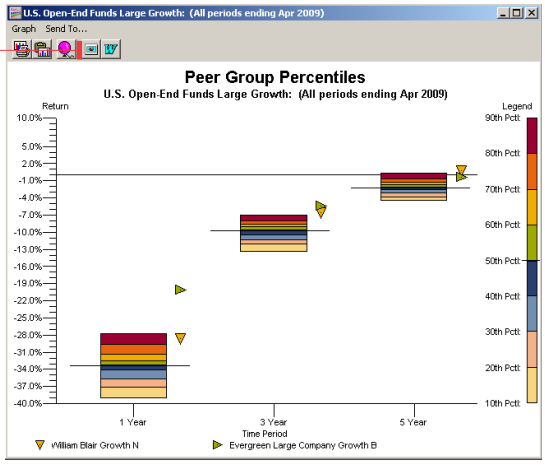



**13.** Click on the *Floating Bar.*

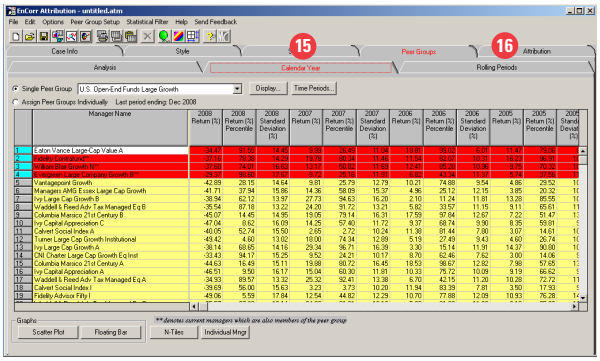
**14.** Click *Return* to view the graphic results.

## Sample View

Send to word or powerpoint.

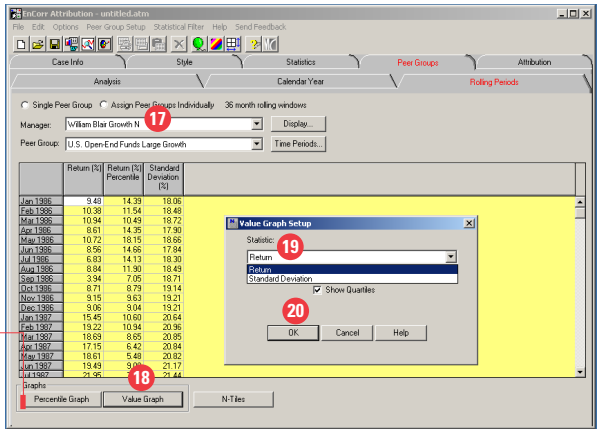



**15.** Go to the *Calendar Year* subtab to view the *Calendar Year* results.




**16.** Go to the *Rolling Periods* subtab to view a manager's performance and statistics relative to its peer group on a rolling period basis. 36 month rolling window is the default but it can be altered from the *Time Period* button.

**17.** Go to the *Manager* drop down and click on *William Blair Growth N.*



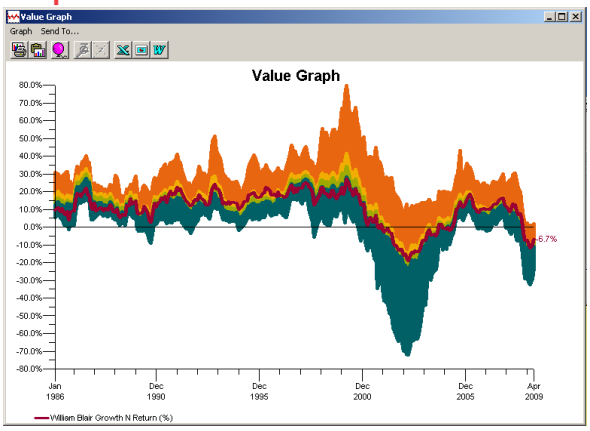

Plot a line graph that displays the managers rolling peer group percentile for the desired statistics.

**18.** Click *Value Graph.*

**19.** Click *Return* in the *Value Graph Setup* window.

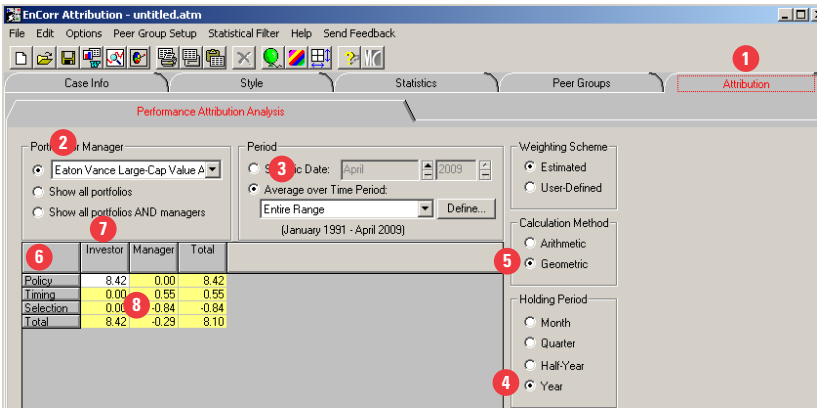
**20.** Click *OK* and you will get a graph displaying the rolling 36-month returns of the manager vs. its peer group.

## Sample View



### Learning the Impact of Investors' Decisions vs. Managers' Decisions

**1.** Performance Attribution breaks a manager's or a portfolio's returns into components based on the investor's and the manager's decisions and timing. It provides a quantitative framework for examining the return on an investment gained or lost because of these decisions. By analyzing returns in this manner, you can see how decisions made by both the investor and the manager contribute to the overall returns on an investment, and you can identify areas in the investment plan that need improvement. Click on the *Attribution Tab* to automatically be taken to the *Performance Attribution Analysis* sub tab.




**2.** Click Eaton Vance Large-Cap Value A from the *Portfolio or Manager* drop down.

**3.** Click *Average over Time Period* and from the drop down, locate Entire Range.

**4.** Click *Year Holding Period* to annualize the results.

**5.** Click *Geometric Calculation Method.*

**6.** There are three types of decisions - policy, timing, and selection.

**7.** There are two decision makers -manager and investor.

**8.** To interpret the results: Policy decisions measure the return attributable to the investor's asset allocation policy. Timing decisions measure whether the investor or manager is invested in the "right" asset class at the "right" time. Selection decisions measure the manager's ability to select securities within an asset class, and the investor's ability to select managers who do a good job of selecting securities.

# Allocator

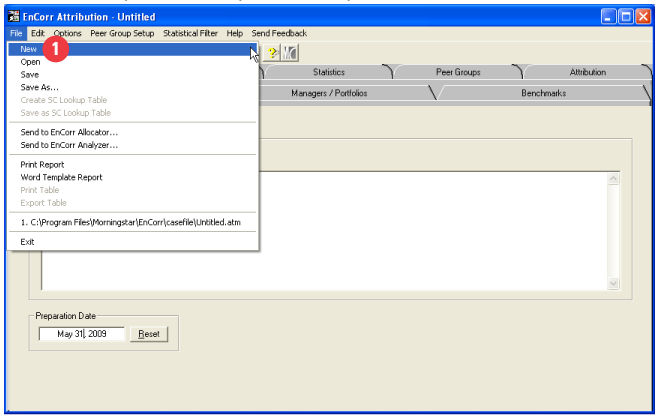
EnCorr Allocator helps you determine the manager mix to implement an asset allocation plan. Some of the highlights include implementing an asset allocation policy for your firm, identifying an optimal allocation of portfolio holdings given specified investment constraints, and comparing your portfolio's performance to the optimal portfolio. By using an algorithm developed by Ibbotson Associates, this tool searches for the portfolio of managers or funds that will minimize the difference between desired and calculated portfolio allocations.

**Exercise**

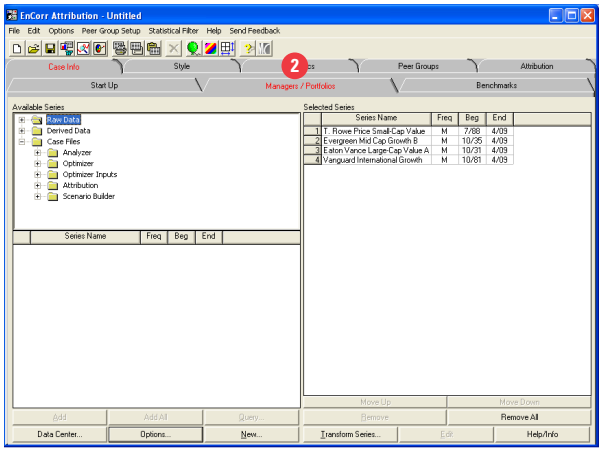
► Creating the Optimal Manager Mix

**Creating Optimal Manager Mix**

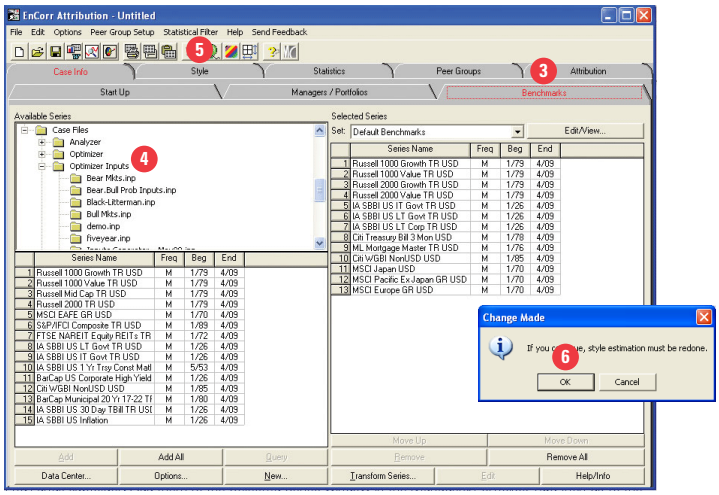
**1.** *EnCorr Allocator* is the final step to the asset allocation process. The first part of the process begins with *EnCorr Inputs Generator* to develop asset class assumptions and with *EnCorr Optimizer* to identity target weights. The second part of the process proceeds with *EnCorr Attribution* to determine the regression of each manager's investment style to the asset class assumptions. The process ends with *EnCorr Allocator* to link your target allocation to the style of every fund to create the optimal manager mix. We will begin with the second part of the process. Open the *EnCorr Attribution Module* and Click *New.*



**2.** Go to the *Managers/Portfolios* tab to select your investments. You can either select your investments for the first time from the raw data folder or retrieve an existing list from the *Case File* folder.




**3.** Go to the *Benchmark* folder to set up your benchmarks to run your regressions against the investments.

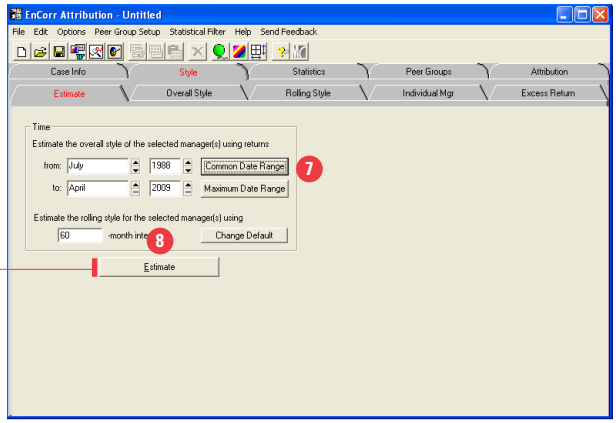



**4.** Go to the Optimizer Inputs subfolder to retrieve your asset class assumption inputs file.

**5.** Click on the *Style* tab and a message will pop up indicating that style estimation must be done.

**6.** Click *OK* to automatically be taken to the *Style* tab.

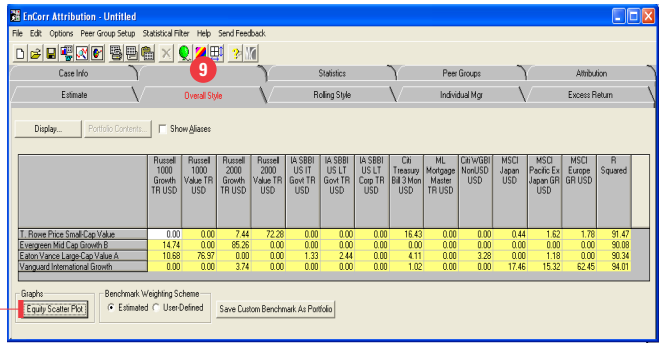
**7.** Click on *Common Date Range* to set a common start date for the overall style.




Only positive weights are applicable when running the Allocator.

**8.** Click *Estimate* to run your regression and to automatically be taken to the *Overall Style* Tab.

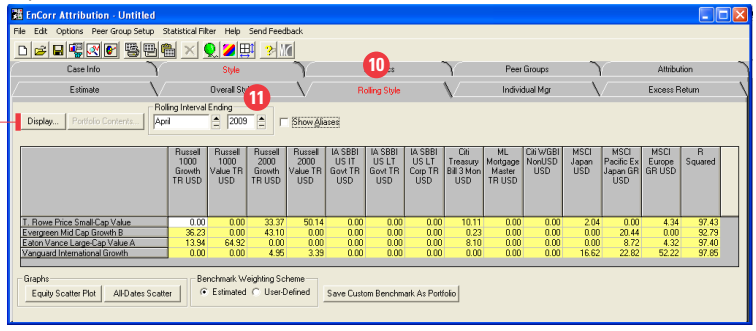
**9.** Here, you can view the regression results of the selected investments with your asset class assumptions for the overall period.




View the results visually for the overall time period.

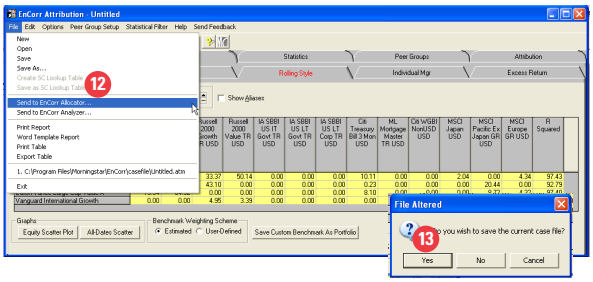
**10.** Click on the *Rolling Style* tab to analyze the *Rolling* Style results based on 60 month intervals default in the *Estimate* tab.

**11.** Click on the up arrow in the month or year to view historical 60 month rolling style intervals.




Modify your existing display.

**12.** We are now ready to proceed to the *Allocator* to link the regression results with the target weights identified in the *Optimizer.* Go to *File* and click on *Send to EnCorr Allocator.*




**13.** You will be prompted to save your file. Click *Yes* and you will be automatically taken to the *Allocator.*

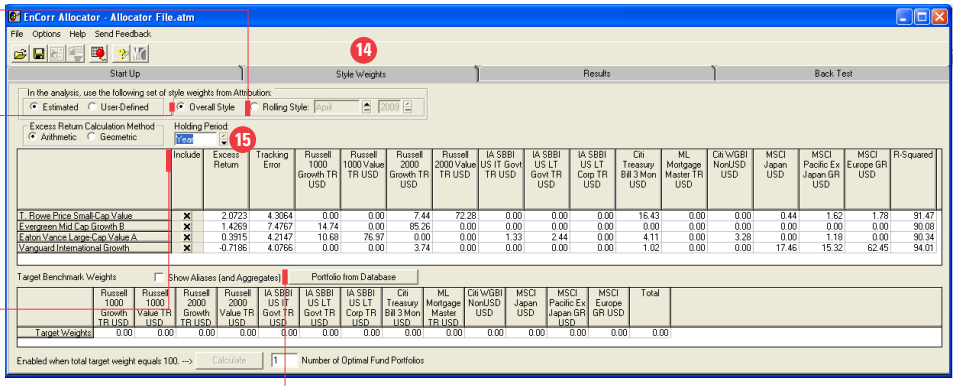
**14.** In the *Allocator* module, go to the *Style Weights* Tab

Represents a series of investment styles over time.

Represents the benchmark mix that most closely replicates the manager's or fund's variability of returns.

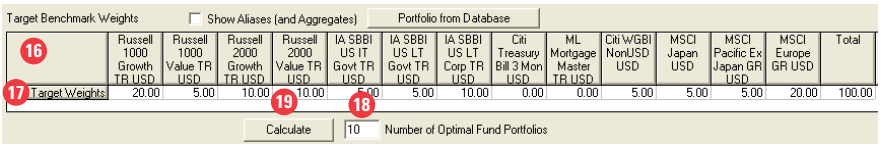
Exclude specific investments from your implementation analysis.

Retrieve your target benchmarks identified in the Optimizer vs having to manually type the benchmark weights.




**15.** Change the *Holding Period* from *Monthly* to *Year* to annualize the *Excess Return* and *Tracking Error* for each asset class.

**16.** Go to the *Target Weights* where you have the option of either manually entering your target weights or retrieving them from the *Portfolio Database.*

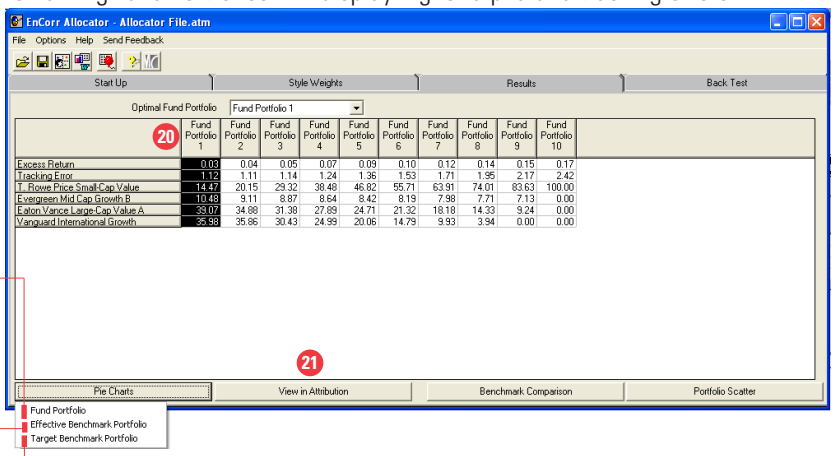



**17.** For the purpose of this exercise, manually type the allocations. The default will be 0.00 until you input the desired weights or retrieve the weights from *Portfolio* database.

**18.** Input *10* to calculate *10 Optimal Fund Portfolios.*

**19.** Click *Calculate* to automatically be taken to the *Results* Tab.

**20.** In the Results Tab, the table will display the 10 Optimal Fund Portfolios. These Fund Portfolios represent the combination that will be as close as possible to the desired weights, given our choice of funds under consideration. These first column will be the portfolio that most closely resembles the Target Weights. As you move away from Fund Portfolio 1, the remaining Fund Portfolios will display higher alpha and tracking errors.



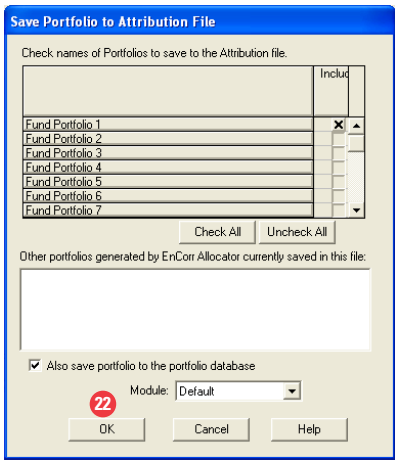

Displays the column you have highlighted in your Fund Portfolio Table.

Displays the regression results of highlighted Fund Portfolio.

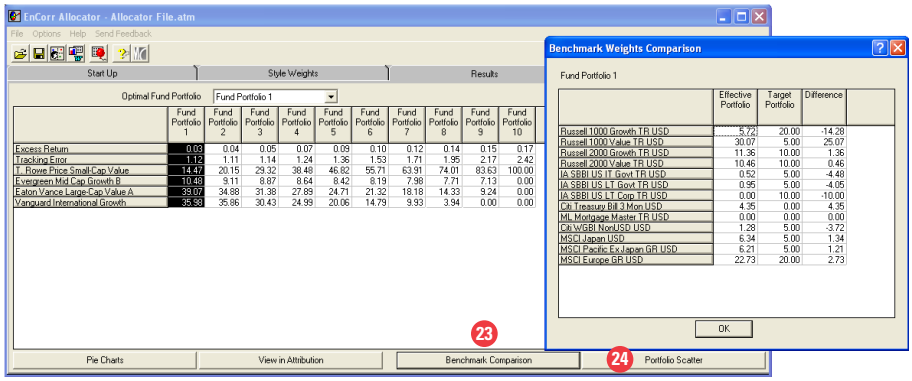
Displays the target weights you inputted in the Style Weights Tab.

**21.** Click on *View Attribution* if you want to send the data to *EnCorr Attribution* to further analyze the results. Note that the regression results will be the same as your *Effective Portfolio* shown in the *Pie Charts* drop down.

**22.** Once you click *OK* and save this portfolio in the *Portfolio Database*, it can also be retrieved in the *Analyzer* or *Scenario* builder for further analysis. For example, compare the new *Fund Portfolio* to the *Current Portfolio*.

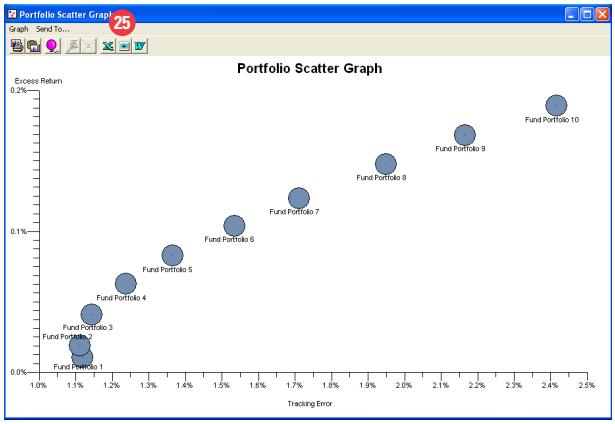



**23.** Click on the *Benchmark Comparison* to identify the difference between the *Effective Portfolio* and the *Target Portfolio*. As you move away from *Fund Portfolio 1*, your differences for each asset class will become larger and more apparent. Note that *EnCorr Allocator* finds the portfolio by minimizing the difference between desired and calculated portfolio allocations. If there's a substantial difference between the *Fund Portfolio* and your target portfolio, it may not be possible to get any closer to your target, given your choice of managers and optimization constraints.

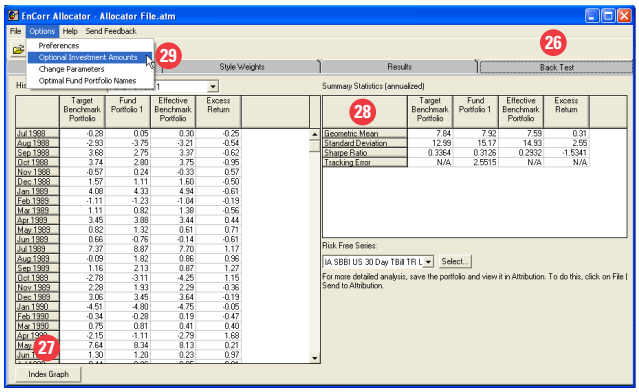



**24.** Click on *Portfolio Scatter* to graphically display the *Excess Return* and *Tracking Error* for each fund portfolio.

**25.** Click on *Powerpoint, Word, or Excel* to export the chart and data.




**26.** Go to the *Back Test* Tab to view the historical monthly *Excess Returns*.




**27.** Click on *Index Line Graph* to view the growth over time.

**28.** Go to the *Summary Statistics Table* to view annualized performance statistics.

**29.** Realistically, there are often limitations on how you can allocate your portfolio assets across funds or managers. For example, you may have limitations on how much you can allocate to any one manager or a mutual fund may have a minimum investment requirement to enter the fund. By optimizing with Optional Dollar Amounts, these considerations are taken into account, creating a more realistic result you can implement. To enter these constraints, click on the Optional Investments Amounts button under the Options drop down. This will open the Optional Investment Amounts dialog box to further define your requirements.

# Scenario Builder

EnCorr Scenario Builder allows you to perform "what if" scenarios. These scenarios can be used to determine how specific investments or markets perform under user-defined market or economic conditions. For example, create January Effect on Small Cap Stocks, Fourth Quarter Effect on Technology Stocks, Inflation Effect, Yield Curve Effect, 1st Term Presidential Election Effect, and Value/Growth Style Effect. Your "What if" scenarios can also be used to create Probability Weighted Inputs by combining two or more individual input files together via user defined weights.

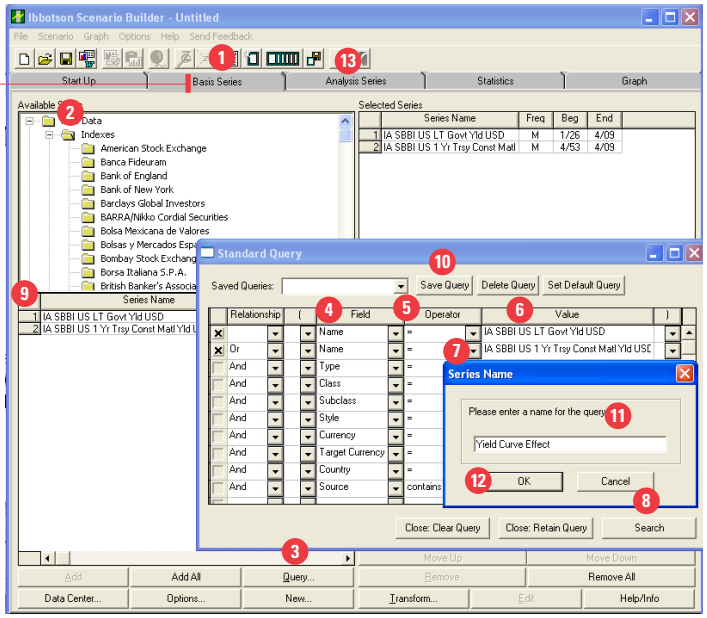
**Exercises**

- Creating a Scenario Builder using Condition Criteria
- Creating a Scenario using Specific Dates
- Creating Scenarios for Probability Weighted Inputs

**Creating a Scenario using Condition Criteria**

**1.** For this example, we will create the *Yield Curve Effect* using the *Condition Criteria* to identify how stock and bond markets performed during periods when the yield curve was upward sloping and downward sloping (inverted). Open Scenario Builder and go to the *Basis Series* Tab to identify the data series for long-term and short-term yields.

Mathematical relationship applied to the condition.



**2.** Highlight *Indexes* in the *Available Series* window.

**3.** Click *Query* to be taken to the *Standard Query* window.

**4.** Go to the first line and locate *Name* in the *Field* drop down.

**5.** Click = sign in the *Operator* drop down.

**6.** Type IA SBBI US LT Govt Yld USD, representing long-term yield, in the Value Column.

**7.** On the next line, select *OR* from the relationship drop down and follow the same Steps from 4 to 6 to type IA SBBI US 1Yr Trsy Const Matl, representing short-term yield, in the *Value* column.

**8.** Click *Search* to retrieve the two series.

**9.** Double click on the two series to add them to the *Series Name* window.

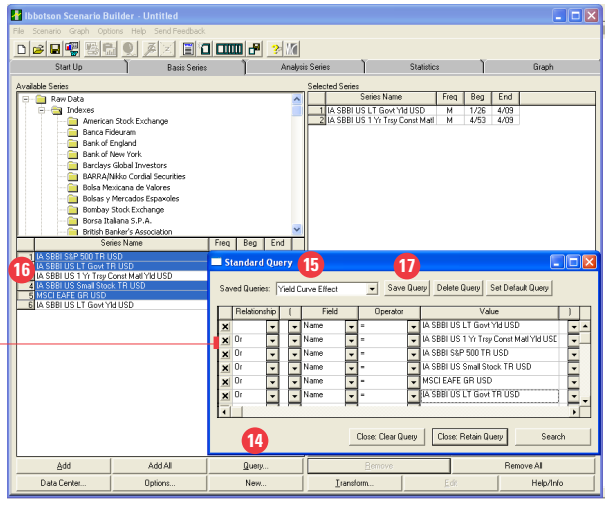
**10.** Click *Save Query*.

**11.** Name the query *Yield Curve Effect.*

**12.** Click *OK* and close the *Query.*

**13.** Go to the *Analysis Tab* to identify the series we will analyze in these specific conditions.

**14.** While highlighting Indexes, click *Query.*




Use and/or relationship when searching for multiple names.

**15.** You can either start a new query or add the series to the *Yield Curve Effect* query. Locate

the saved query, *Yield Curve Effect.*

**16.** Follow Steps 2 to 9 to add IA SBBI S&P 500 TR USD (US Large Cap Equity Market), IA SBBI US Small Stock TR USD (US Small Cap Equity Market), MSCI EAFE GR USD (Non US Large Cap Equity Market), and IA SBBI US LT Govt TR USD US Bond Markets) to your query.

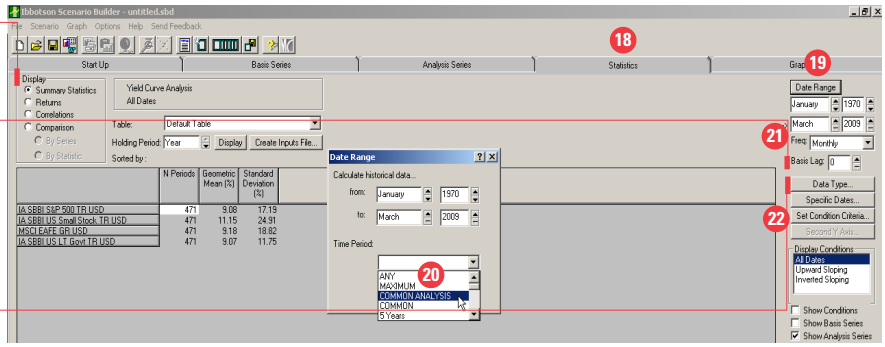
**17.** Click *Save Query* to save the new names to your existing query.

**18.** Go to the *Statistics Tab* to define condition criteria settings.

Select specific display statistics.

Lag your Basis series to analyze the effect of various economic and financial events.

Select from raw or rolling returns.




**19.** Click *Date Range* to be taken to the *Date Range* Window.

**20.** Click *Common Analysis* from the *Time Period* drop down to pick the common start date for the *Analysis Series.*

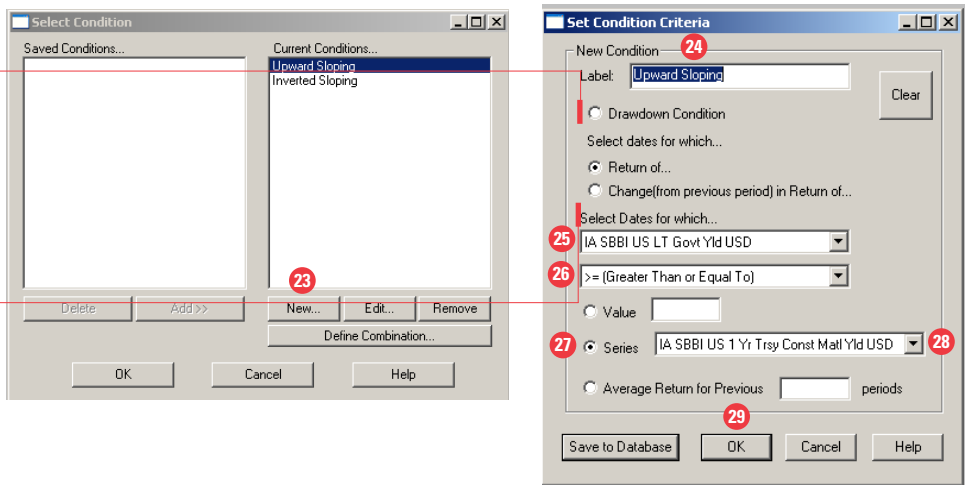
**21.** Click on the *Freq* drop down to view your choices. We will keep the Monthly default to calculate the output.

**22.** Click on *Set Condition Criteria* to be taken to the *Select Condition* window to enter the mathematical relationship of the condition.

Analyze scenarios where your basis series are in drawdown decline or in drawdown recovery.

Represents Basis Series.

**23.** Select *New* to be taken to the *Set Condition Criteria.*




**24.** Label the *New Condition* as *Upward Sloping.* The definition of Upward Sloping is long term yields minus short term yields.

**25.** Click on the IA SBBI US LT Govt Yld USD from the first row drop down to select the first series.

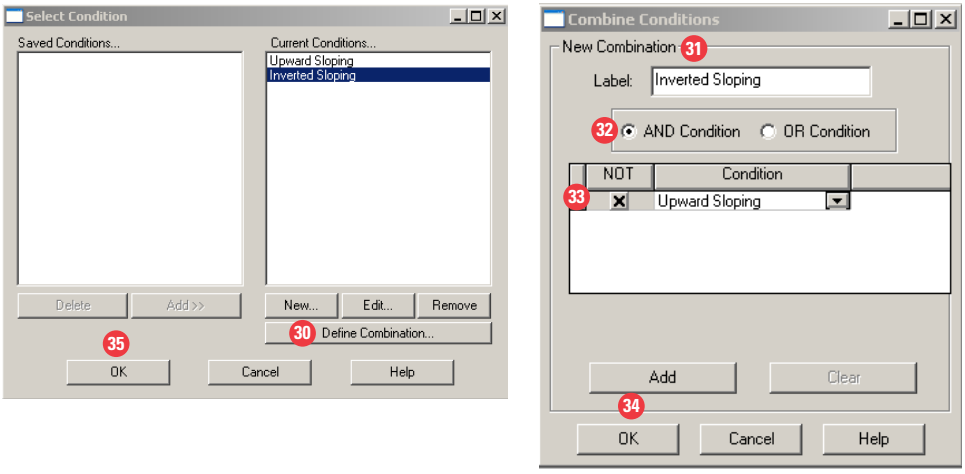
**26.** Next, click *Greater Than or Equal To* from the second row drop down.

**27.** Click *Series* radio button.

**28.** Click on IA SBBI US 1 Yr Trsy Const Matl Yld USD from the *Series* drop down.

**29.** Click *OK* to be taken back to the *Select Condition* window. Here, you will find that *Upward Sloping* position displayed under *Current Conditions.*

**30.** Click on *Define Combination* to be taken to the *Combine Conditions* window.



**31.** Label this condition as *Inverted Sloping*. The definition of Inverted Sloping, also known as downward sloping, is short term yields minus long term yields.

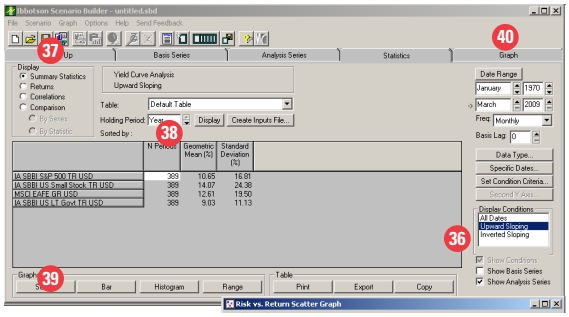
**32.** The AND Condition is checked by default. We will leave this as is.

**33.** Check *NOT* to create a condition that is not Upward Sloping.

**34.** Click *OK* to be taken back to the *Select Condition* window where you will find Inverted Sloping listed along with the Upward Sloping condition.

**35.** Click *OK* again to be taken back to the *Statistics Window*.

**36.** Click *Upward Sloping* in the *Display Conditions* window to view the return impact on the various markets when the *Yield Curve* was upward sloping.



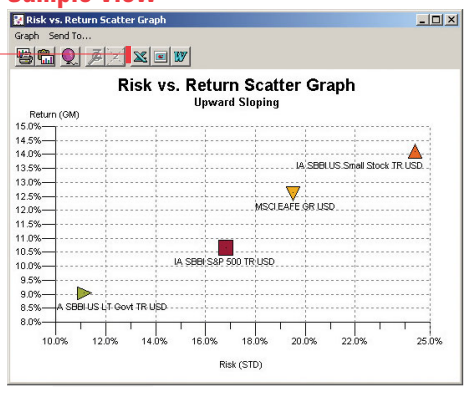

**37.** The default display table is *Summary Statistics*. You can also toggle to the *Returns*, *Correlations,* and *Comparison* tables.

**38.** Go to *Holding Period.* Year is the default, annualizing the results. Click the *Drop* down to view the other choices.

**39.** Click *Graph* where you will have two choices to display the results. Your first choice is the risk vs. return and your second choice is the ability to create your own graph using specific data points for x-axis and y-axis.

## Sample View

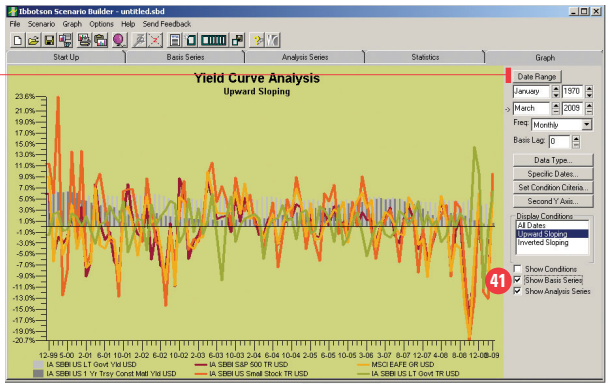
Graphs can be exported to excel, powerpoint, or word.



**40.** Click on the *Graphs* tab to view the historical results for the Upward Sloping condition. At any point, you have the ability to change the frequency as your viewing the results (i.e. monthly to annually).

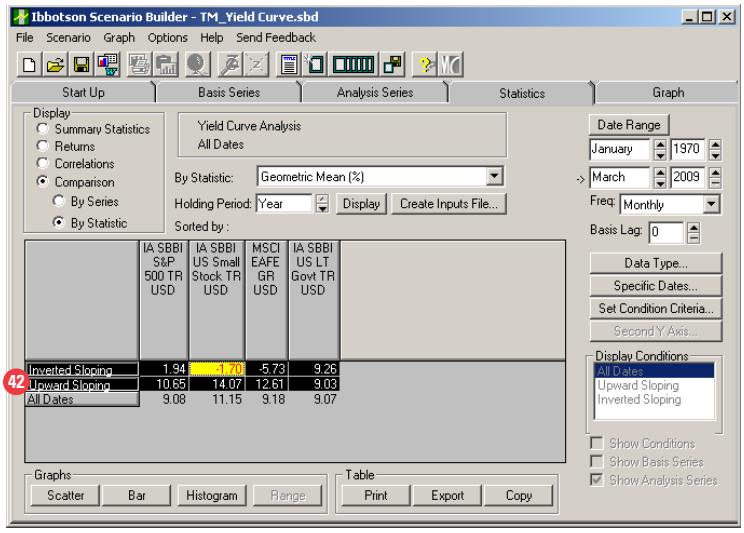
**41.** Click *Show Basis Series* to view the Upward and Downward sloping conditions.

Change your date with Date Range or left click and drag your mouse to the right on the graph to zoom.



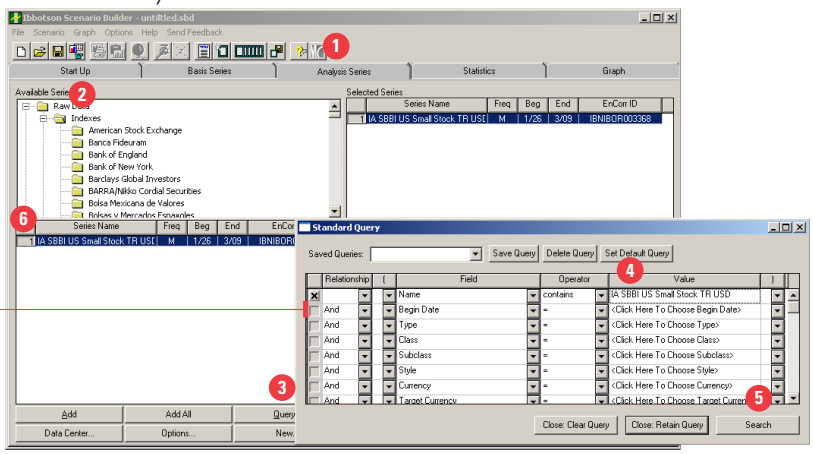

**42.** Have stock and bond markets been impacted by upward sloping and downward sloping yield curves? Based on our analysis, from January 1970 to March 2009, stock markets performed better during upward sloping yield curves and bond markets performed better during downward sloping yield curves.

## Sample View



## Creating a Scenario using Specific Dates

**1.** For this example, we will create the *January Effect* using the *Specific Date* function to identify if the small cap market performed better in January months vs. the non January months. We will start our process in the *Analysis Series Tab* (vs the Basis Series Tab) since we have already defined our condition (January vs. Non-January Months). Go to the *Analysis Series* Tab.




Use and/or relationship when searching for multiple names.

**2.** Highlight Indexes in the *Available Series* window.

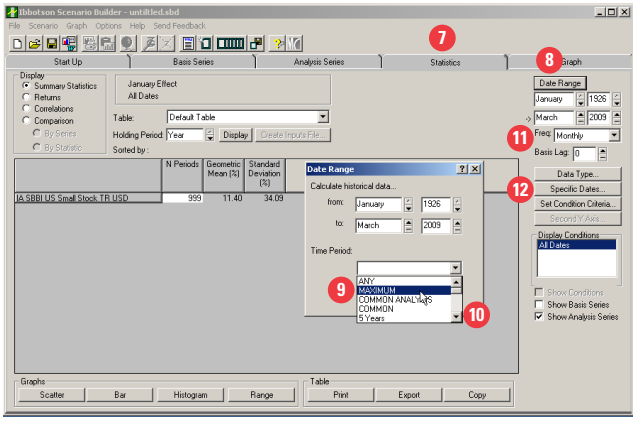
**3.** Click *Query* to be taken to the *Standard Query* window.

**4.** Type IA SBBI US Small Stock TR USD, representing US Small Cap Equity Markets, in the *Value* drop down.

**5.** Click *Search*.

**6.** Double click on IA SBBI US Small Stock TR USD to add to the *Selected Series* window.

**7.** Go to the *Statistics* Tab to define specific date settings.



**8.** Click *Date Range* and you will be taken to the *Date Range* Window.

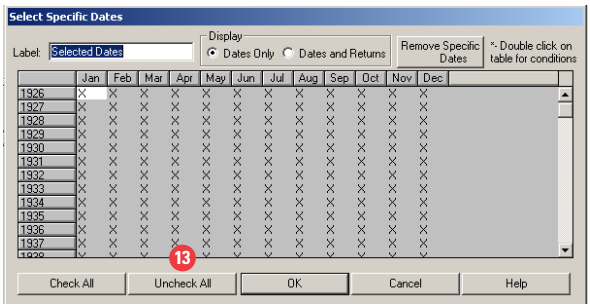
**9.** Click on Maximum, from the *Time Period* drop down, to pick the maximum start date for the *Analysis Series*.

**10.** Click *OK,* hidden behind *Time Period* drop down.

**11.** Click *Freq* drop down to view your choices. We will keep the Monthly default to calculate the output.

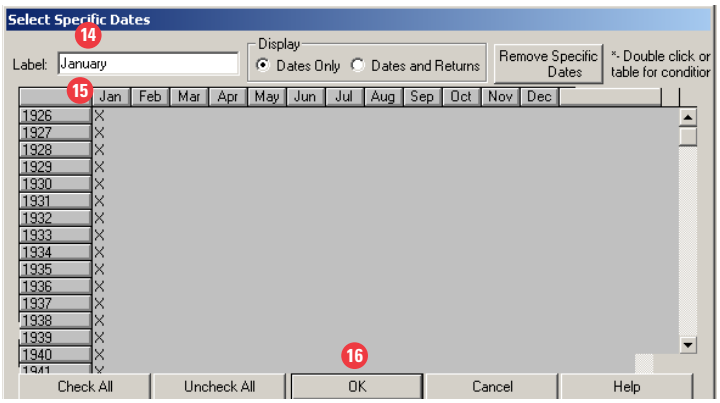
**12.** Click on *Specific Dates* to be taken to Select *Specific Dates* window.

**13.** Click *Uncheck All* to remove the default settings.




**14.** Label the file as *January.*

**15.** Click on the *Jan column* to automatically select all historical January months.

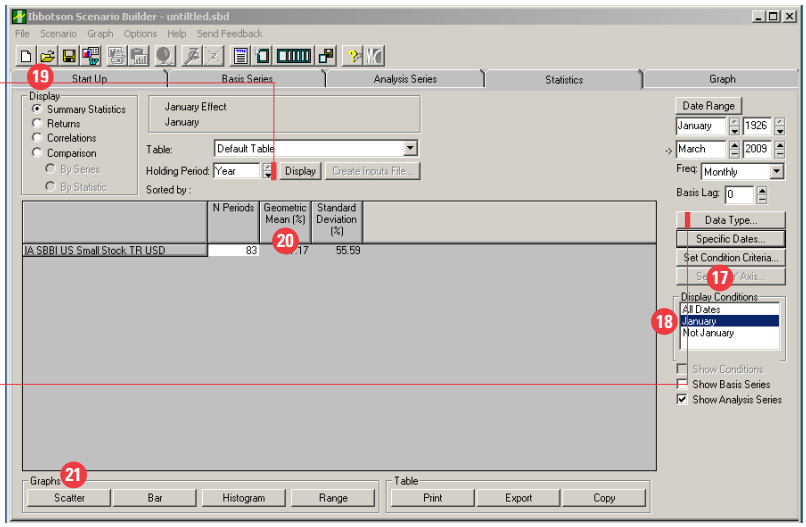



**16.** Click *OK* to be taken back to the *Statistics Window* to view the results.

**17.** Your *Display Conditions* window will now display *January* and *Not January* conditions. The *Not January* condition is an inverse of the *January* settings that you defined. It is not necessary to set specific dates for those *Not January* months between February and December, as they are automatically generated.

Select specific display statistics.

Select from raw or returning returns.




**18.** Click *January* in the *Display Conditions* window to view how the *US Small Cap Market* performed during the months of *January.*

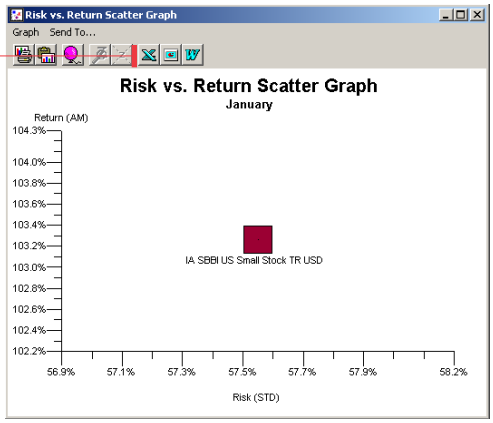
**19.** The default display table is *Summary Statistics.* You can also toggle to the Returns, Correlations, and Comparison tables.

**20.** Go to *Holding Period. Year* is the default which annualizes the results. Click on the *Drop* down to view the other choices.

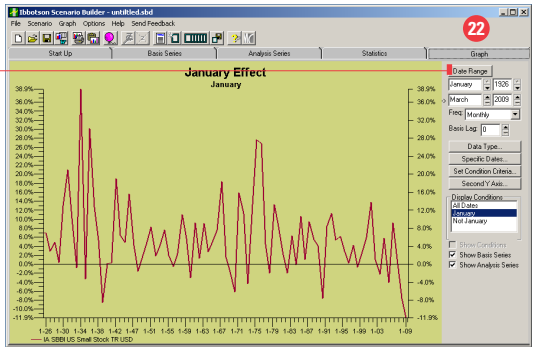
**21.** Click Graph, where you will have two choices to display the results. Your first choice is the risk vs. return and your second choice is the ability to create your own graph using specific data points for x-axis and y-axis.

## Sample View

Graphs can be exported to excel, powerpoint, or word.



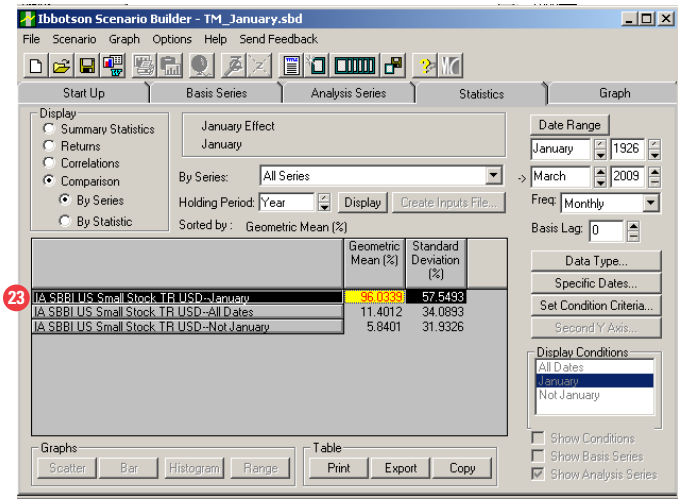
**22.** Click on the *Graphs Tab* to view the historical monthly return series for the January months.




Change your date with Date Range or left click and drag your mouse to the right on the graph to zoom.

**23.** Has the *January Effect* disappeared over time? Based on our analysis, the January months have shown stronger annualized returns than the *Non January* Months.

## Sample Views



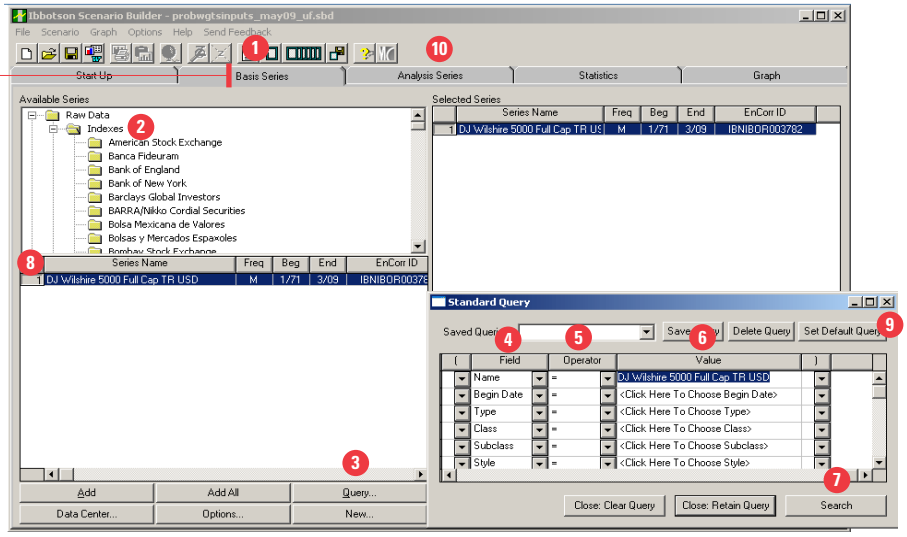

### Creating Scenarios for Probability Weighted Inputs

**1.** "What if" scenarios can also be used to create *Probability Weighted Inputs* by combining two or more individual inputs files together via user defined weights. Both the Scenario Builder and the Inputs Generator will be used to generate the probablity weighted inputs. For this example, we will determine the impact of the US equity market on various asset classes from March 1999 to February 2009. One scenario will be to identify what asset classes performed best and worst during negative US equity markets and the other scenario will be to identify what asset classes performed best and worst during positive US equity Markets. Once completed, these scenarios will be used to create input files. Go to the *Basis Series* Tab to identify the proxy for the US Equity Market.

**2.** Highlight *Indexes* in the *Available Series* window.

**3.** Click *Query* to be taken to the *Standard Query* window.

Mathematical relationship applied to the condition.




**4.** Go to the first line and locate *Name* in the *Field* drop down.

**5.** Click *= sign* in the *Operator* drop down.

**6.** Type DJ Wilshire 5000 Full Cap TR USD, representing the US Equity Market, in the *Value column*.

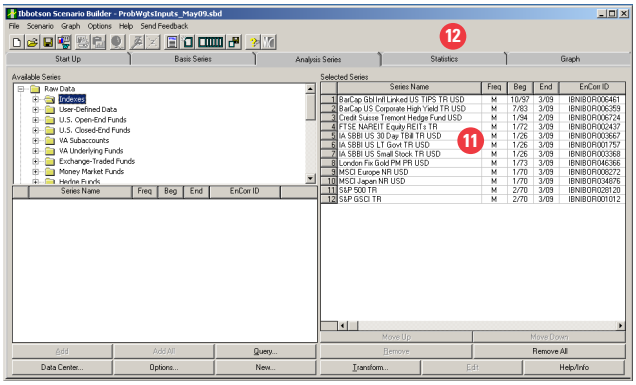
**7.** Click *Search*.

**8.** Double click on DJ Wilshire 5000 Full Cap TR USD to add to the *Series Name* window.

**9.** Close the *Query*.

**10.** Go to the *Analysis* Tab to identify our various asset classes.

**11.** Follow Steps 2 to 8 to add the following global asset classes: BarCap Gbl Infl Linked US TIPS TR USD, BarCap US Corporate High Yield TR USD, Credit Suisse Tremont Hedge Fund USD, FTSE NAREIT Equity REITs TR, IA SBBI US 30 Day TBill TR USD, IA SBBI US LT Govt TR USD, IA SBBI US Small Stock TR USD, London Fix Gold PM PR USD, MSCI Europe NR USD, MSCI Japan NR USD, S&P 500 TR, S&P GSCI TR.



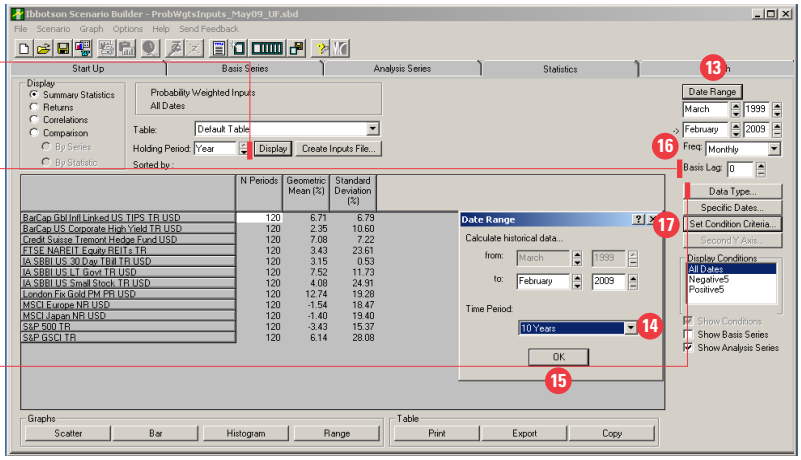

**12.** Go to the *Statistics* Tab.

**13.** Click *Date Range* to be taken to the *Date Range* Window.

Select specific display statistics.

Lag your Basis series to analyze the effect of various economic and financial events.

Select from raw or returning returns.




**14**. Click on *10 years* from the time period drop-down.

**15.** Click *OK*.

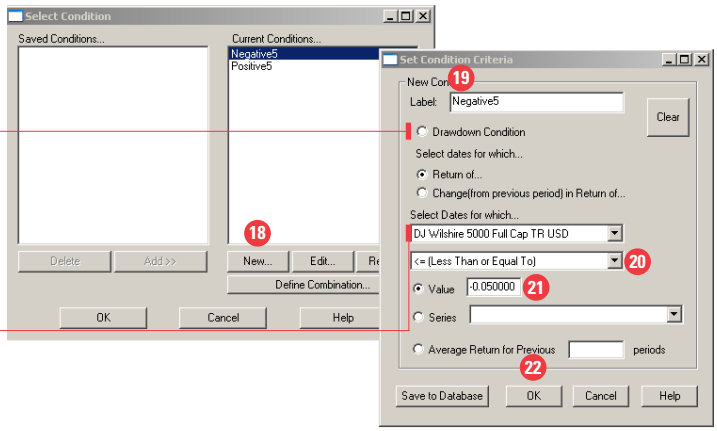
**16.** Click on the *Freq* drop down to view your choices. We will keep the Monthly default to calculate the output.

**17.** Click on the *Set Condition Criteria*.

**18.** Click *New* to set your first condition, identifying asset classes that performed best and worst during negative US equity markets.

Analyze scenarios where your basis series are in drawdown decline or in drawdown recovery.

Represents Basis Series




**19.** Label the condition *Negative5*.

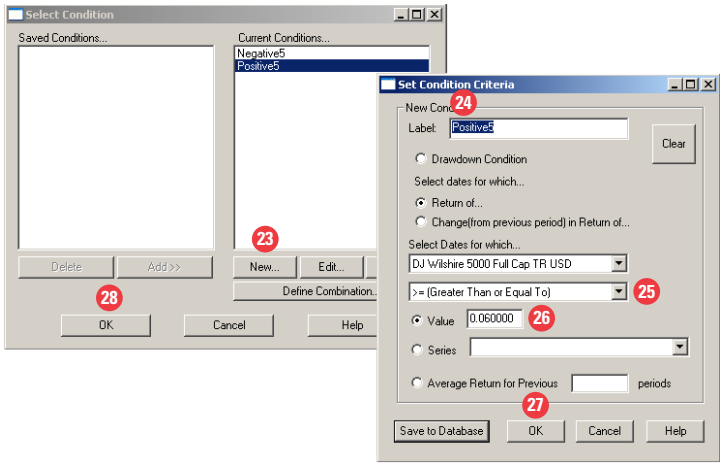
**20.** Click <= from the operator drop down.

**21**. Type -0.05 for the *Value* which represents 5%.

**22.** Click *OK*.

**23.** Click *New* to add your second *Condition*, identifying asset classes that performed best and worst during positive US equity markets.

**24.** Label the condition *Positive5*.



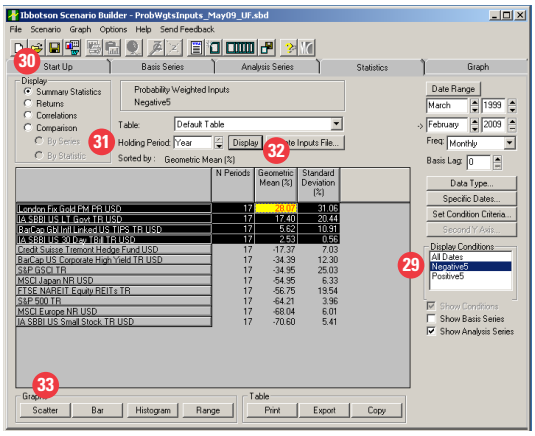

**25.** Click >= from the operator drop down.

**26.** Type 0.06 for the *Value* which represents 6%.

**27.** Click *OK*.

**28.** You've now completed *Negative5* and *Positive5* scenarios. Click *OK* in the *Select Condition* window.

**29.** Click *Negative5* in the *Display Conditions* window to view the results.




**30.** The default display table is *Summary Statistics*. You can also toggle to the *Returns, Correlations,* and *Comparison* tables.

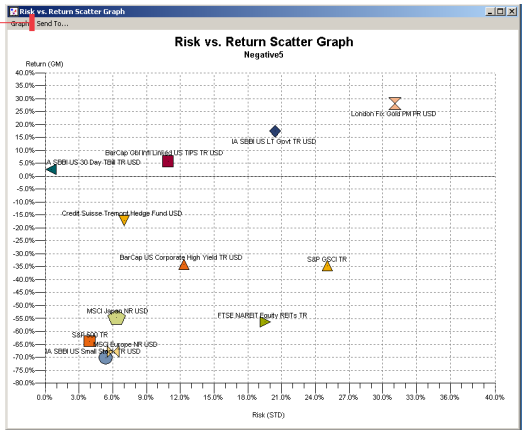
**31.** Go to *Holding Period*. Year is the default which annualizes the results. Click on the Drop down to view the other choices.

**32.** Sort by the *Geometric Mean* column to view the results.

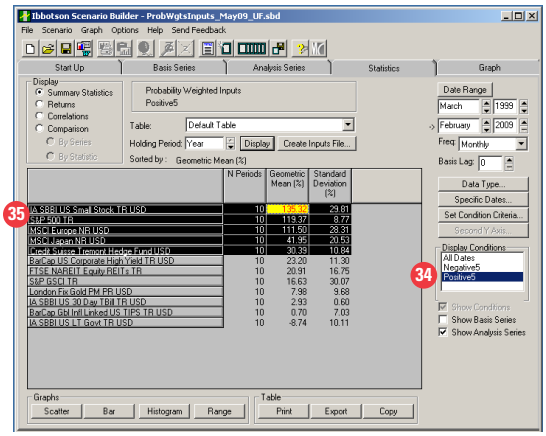
**33.** Click *Scatter,* where you will have two choices to display the results. Your first choice is the risk vs. return and your second choice is the ability to create your own graph using specific data points for x-axis and y-axis.

## Sample View

Graphs can be exported to Excel, Powerpoint, or Word.

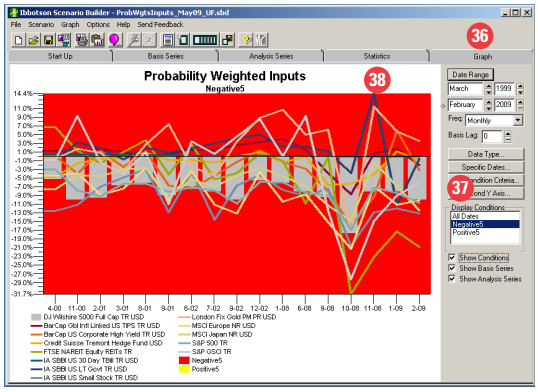


**34.** Click *Positive5* in the *Display Conditions* window to view your results.




**35.** Follow Steps 30 to 33 to analyze your results.

**36.** Next, click *Graphs* tab.

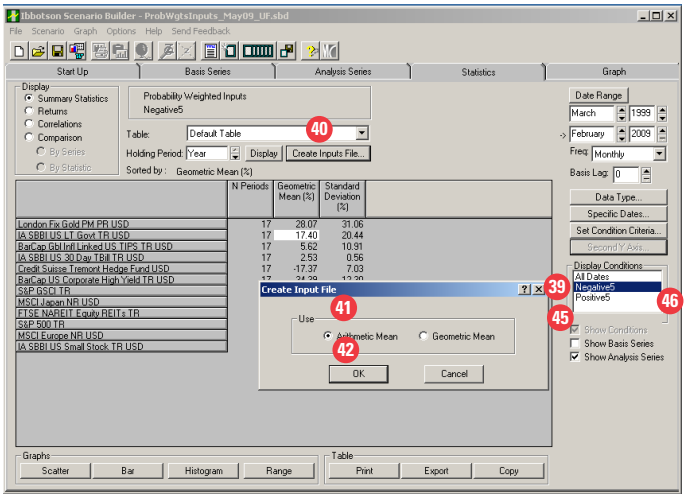



**37.** The line graph is another method to analyze your two scenarios historically. Toggle between *Negative5* and *Positive5* display conditions to analyze your results further.

**38.** Based on the results, has there been an impact of *US Equity Markets* on the *Global Asset Classes?* During the *Positive5* scenario (>= 6%), both US and NonUS equity markets benefited. During the *Negative5* scenario (<=5%), both Commodities and Bonds benefited. Go back to the *Statistics* Tab to create Input files for these two scenarios.

**39.** Click *Negative5* in the *Display Conditions* window.

**40.** Click *Create Input* file.

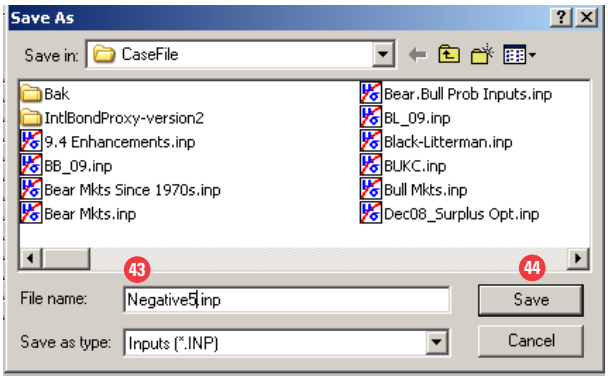



**41.** The default is *Arithmetic Mean.* We will keep this as is.

**42.** Click *OK* to be taken to the *Save As* window.

**43.** Type *Negative5* for the *File Name.*

**44.** Click *Save.*

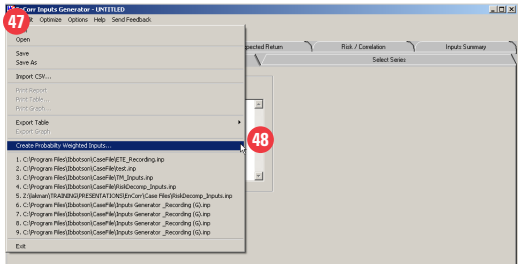



**45.** Click *Positive5* in the *Display Conditions* window to view your results.

**46.** Follow Steps 40 to 44 to create *Positive5 Input File.*

**47.** Go to the *Inputs Generator* where we will create our *Probability Weighted Inputs.*

**48.** Click on *Create Probability Weighted Inputs,* from the *File* drop down, to combine the two scenario input files and assign user defined weights. These weights will be based on the belief that the probability of each condition occurring in the future is high. To protect the client's portfolio during potential down markets in the future, more weight will be assigned to negative periods.




**49.** Click *Add* to browse for the *Negative5* input file.

**50.** Click *Open* to add this file to the *Probability Weighted* Inputs window.

**51.** Follow Steps 49 and 50 to add the *Positive5* input file.

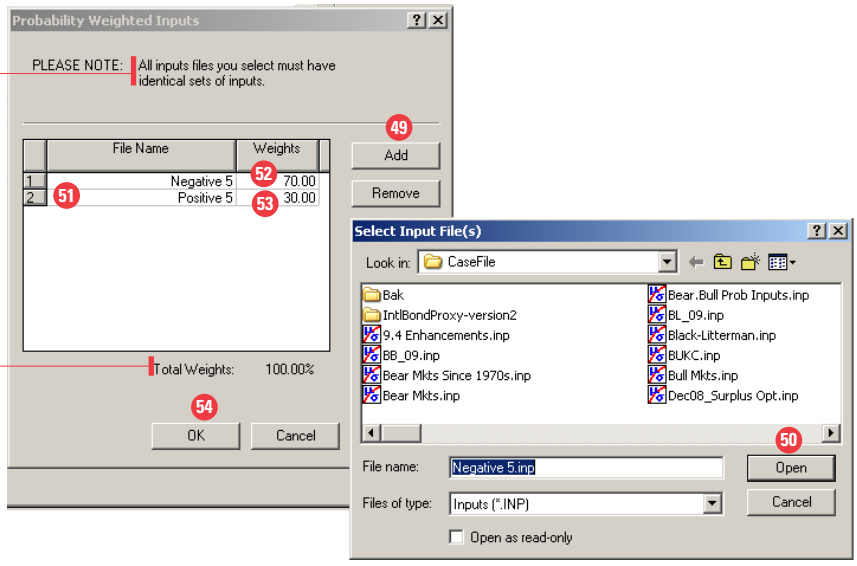
**52.** Assign 70% user defined weight to the *Negative5 Input* file.

**53.** Assign 30% user defined weight to the *Positive5 Input* file.

**54.** Click *OK* and you've successfully combined the input files based on the expectation for each condition to occur. The result will be a single estimate that combines both forecasting analysis and user expectations. You can continue to build your asset class assumptions in the Inputs Generator to produce the Forecasted Expected Returns, Standard Deviations, and Correlations, all necessary components to run the Mean Variance Optimization in the Optimizer.

Add multiple input files as long as they have same inputs.

Necessary to total to 100%.



# Data Center

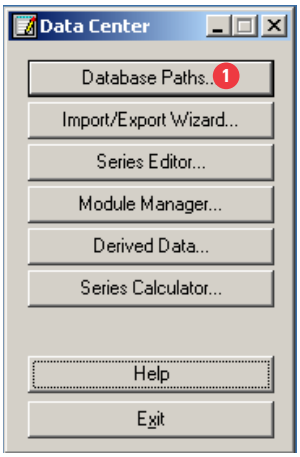
EnCorr Data Center offers you specific features on functionality. For example, you have the ability to create return streams, edit data series, manage folders, and more. EnCorr Data Center can run as a stand-alone application or it can be retrieved through the standard Select Series dialog in EnCorr Analyzer, EnCorr Inputs Generator, EnCorr Attribution, and EnCorr Scenario Builder. Once you have opened EnCorr Data Center, we will begin the following exercises from the Data Center window.

**Exercises**

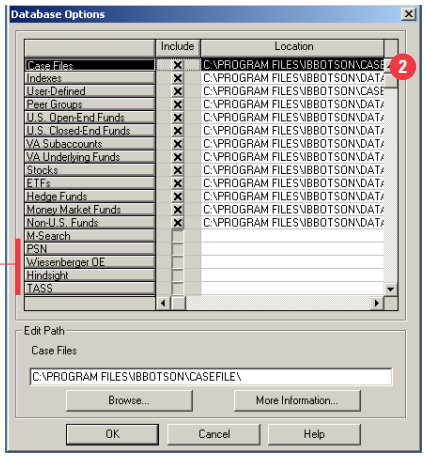
- Modifying Database Locations with Database Paths
- Importing and Exporting Data in Import/Export Wizard
- Creating and Editing Data Series with Series Editor
- Creating New User-Defined Data Modules with Module Manager
- Managing Portfolio, Exchange Rate, and Combined Series Databases with Derived Data
- Performing Mathematical Operations with Series Calculator

**Modifying Database Locations with Database Paths**

**1.** Click on *Database Paths* from the *Data Center* window.

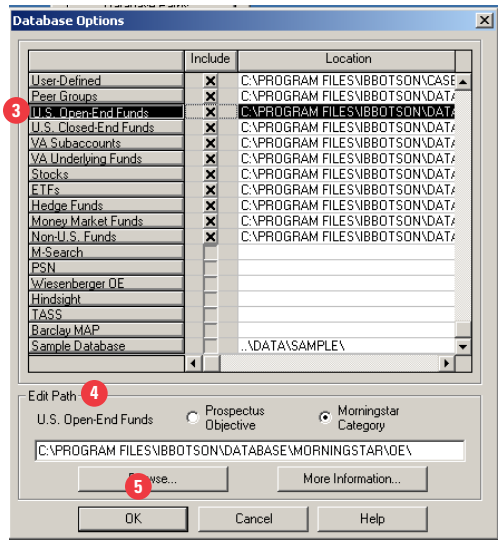


**2.** In the *Database Options* window, you can alter the default locations to read your own path.




Many outside vendors allow Morningstar EnCorr to connect to either a special data feed or link to a database in its 'native format'.

**3.** Click on *U.S. Open-End Funds*.

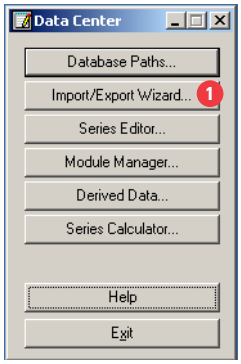



**4.** In the *Edit Path*, decide how your want to view your *U.S. Open-End* funds displayed in the *Select Series* Window either by Prospective Objective or Morningstar Category.

**5.** Click *OK* to save your settings.

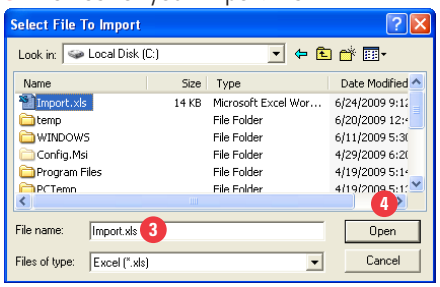
### Importing and Exporting Data with Import/Export Wizard

**1.** Before we begin, your excel spreadsheet should contain two columns. The first column will contain the dates and the second column will contain the returns in decimal or percentage format. You can also decide to have headers for each column. More format choices are available in *Help*. Click *Import/Export Wizard* from the *Data Center* window.



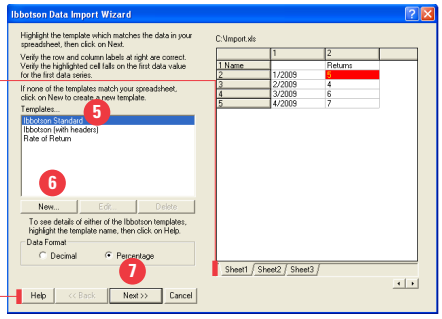

**2.** Click on *Import a File* in the *Import* Window and you will be taken to the *Select File to Import* window.


**3.** Browse for your import file.




**4.** Click *Open* to be taken to the *Ibbotson Data Import Wizard.*

**5.** Select the appropriate template for your spreadsheet.



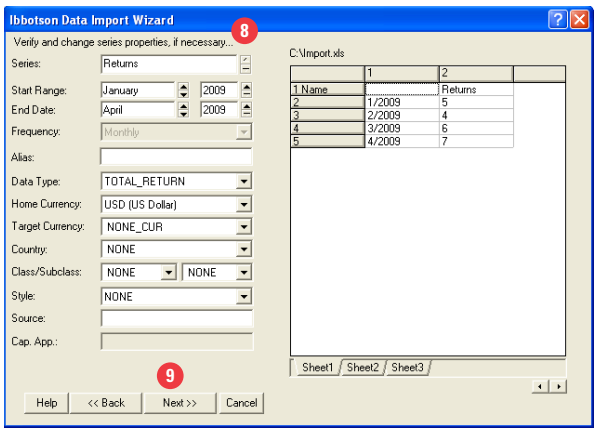

Import from various tabs in your spreadsheet, provided the formats are the same across all sheets.

View the various import formats.

**6.** You can also create a custom template by clicking on *New.*

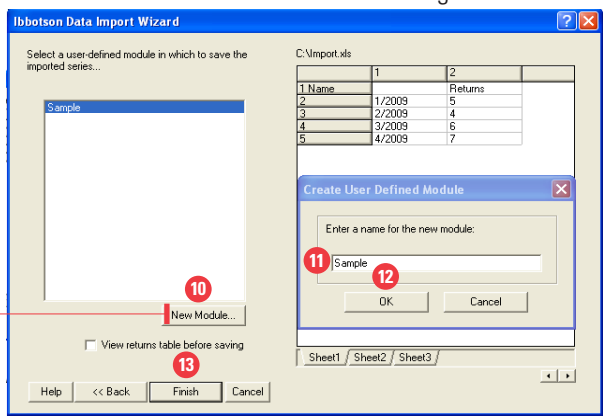
**7.** Click *Next.*

**8.** In the *Ibbotson Data Import Wizard* window, verify and change the series properties.




**9.** Click *Next.*

**10.** Select *New Module* to create a new *User Defined Module* to store your imported series. You can also store the series in an existing module.



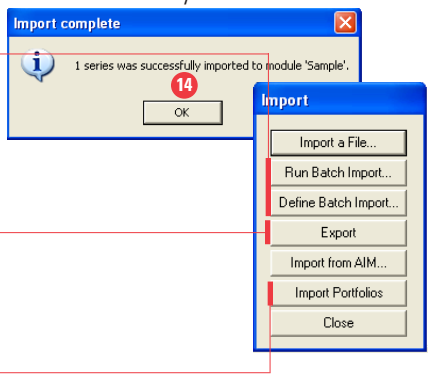

Located in The Raw Data folder in Select Series window.

**11.** Name the new module as *Sample*.

**12.** Click *OK*.

**13.** Click *Finish* and a pop-up will appear on your screen indicating your *Import* is complete.

**14.** Click *OK* and you're taken back to the *Import File* Window.



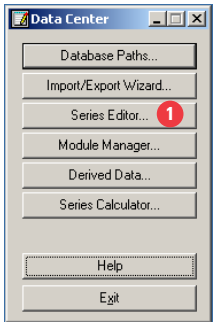

Define your batch import and import all files at the same time rather than individually.

Export data to a standard import format to easily create a backup.

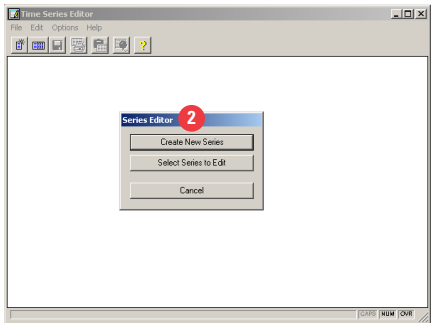
Import fixed weight portfolios that can also contain rebalancing information.

### Creating and Editing Data Series with Series Editor

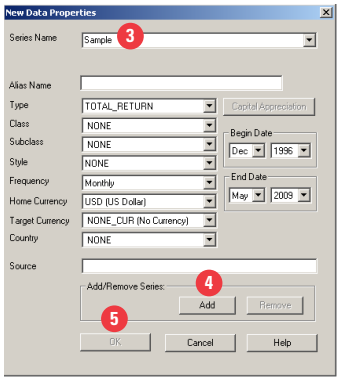
**1.** Click on *Series Editor* from the *Data Center* window.




**2.** Click on *Create New Series* in the *Series Editor* window.



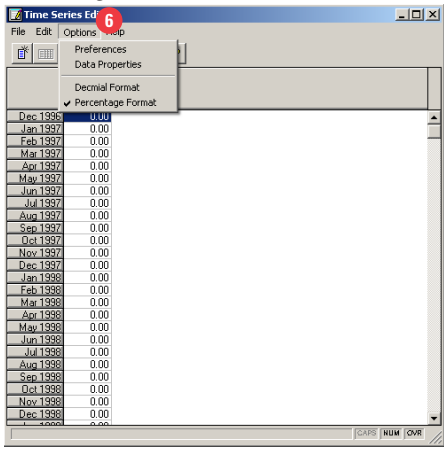
**3.** Type *Sample* to begin creating your new series in the *New Data Properties* window. If necessary, continue to describe the rest of the properties.



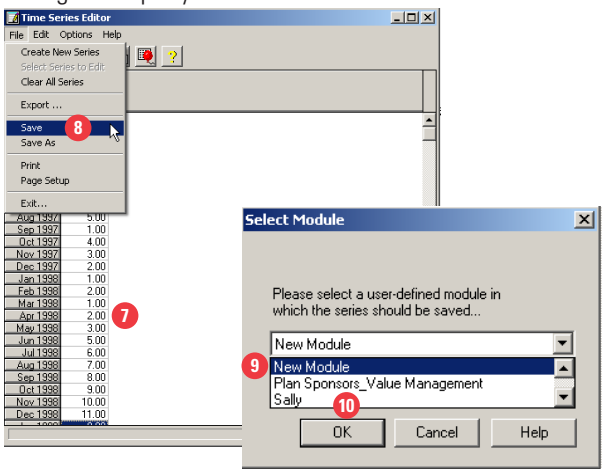

**4.** Click *Add* and the *OK* button will be highlighted.

**5.** Click *OK* and you will be taken to the *Time Series Editor* window.

**6.** In the options drop down, you have a choice of inputting your numbers in *Decimal* or in *Percentage Format.*




**7.** Begin to input your numbers.

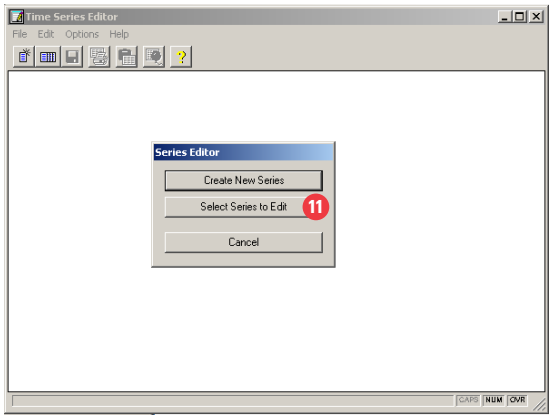


**8.** Click *Save* to save your new series and to be taken to the *Select Module* window.

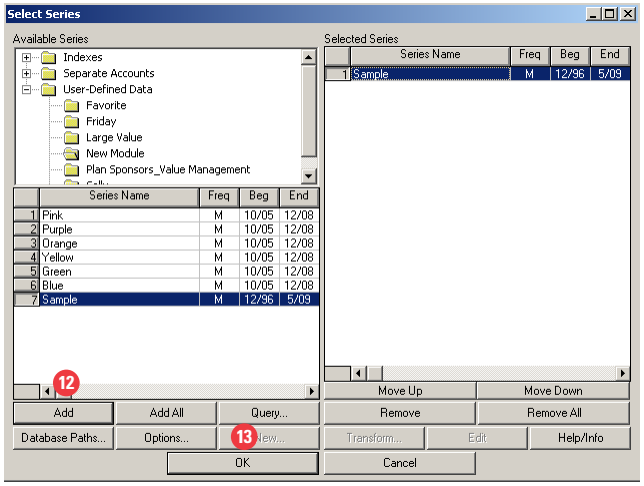
**9.** Select the user-defined module where you want to save your series.

**10.** Click *OK* and you've successfully created a new series.

**11.** To edit or update an existing series whether it's a database series or your user-defined series, use the *Series Editor* dialog. Click on *Select Series* to *Edit* from the *Data Center* window.

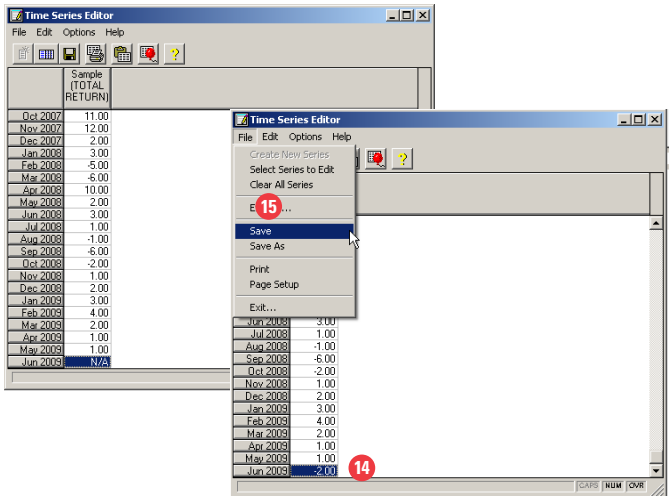



**12.** In the *Select Series* window, identify the desired series and click on *Add* to add to the *Select Series* window. We will use the *Sample* series to edit.




**13.** Click *OK* and you will be taken to the *Time Series Editor.*

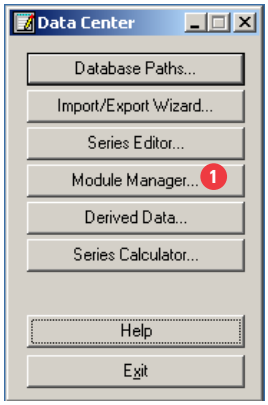
**14.** Proceed to edit the returns or update the June 2009 number in this case. The ability to update your series allows you to continue with your process vs. having to wait for the number to be updated. When the official update occurs, your edited returns for the specific database will be overridden by the official returns supplied by the provider.



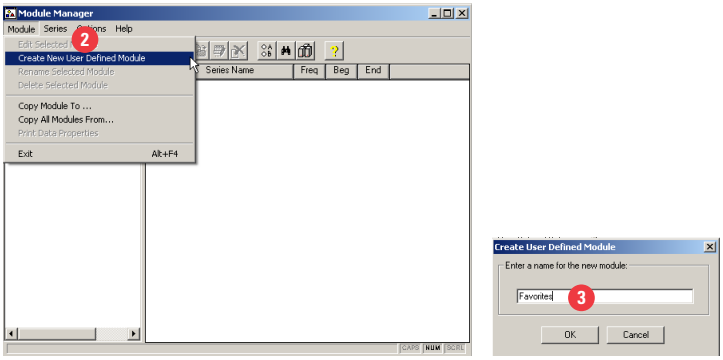

**15.** Click *Save* from the *File* drop down to save your edits.

### Creating New User-Defined Data Modules with Module Manager

**1.** In this section, we will create a *Favorites* folder to easily retrieve specific indexes. Select *Module Manager* from the Data Center window.

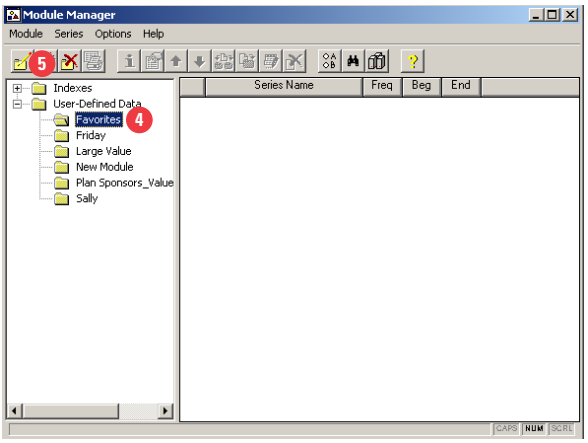


**2.** Go to the *Module* drop down and click on *Create New User Defined Module.*



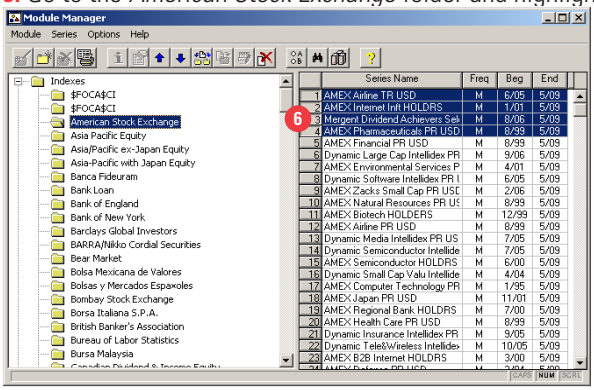

**3.** Enter *Favorites* as the name of your new module.

**4.** Click *OK* and you will see *Favorites* displayed in the User-defined data.

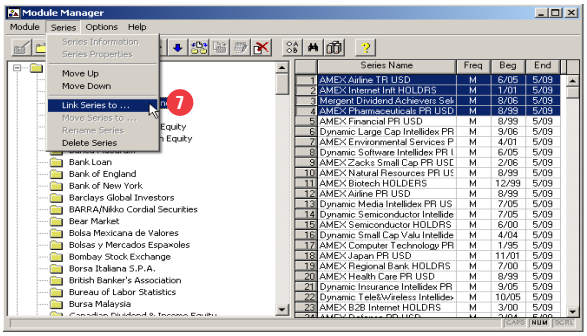



**5.** Click on Indexes.

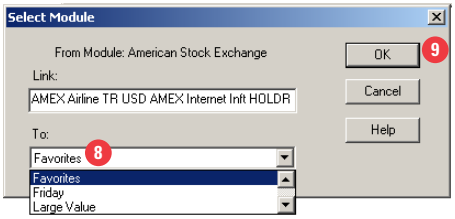
**6.** Go to the *American Stock Exchange* folder and highlight *4 Series Names.*



**7.** Go to the *Series* drop-down and click on *Link Series to …*

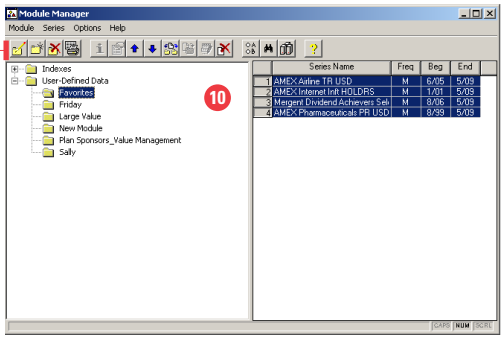



**8.** Click on the drop down to locate the *Favorites* user defined folder.




**9.** Click *OK* and your selected series will now appear in the *Favorites* folder.

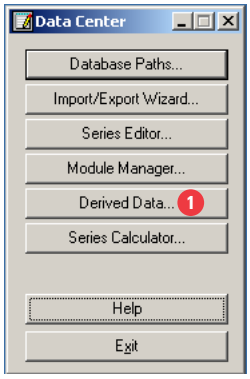
**10.** These series will automatically update as you do your updates.




Edit, copy, rename, or delete selected modules.

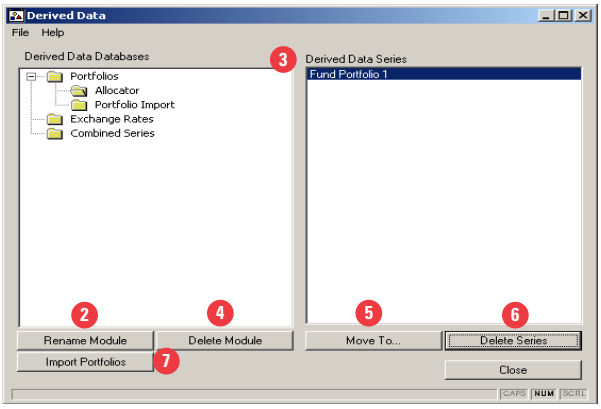
### Managing Portfolio, Exchange Rate, and Combined Series Databases with Derived Data

**1.** Click on *Derived Data* from the *Data Center* window.




**2.** To rename a data module, select the module you want to rename and click on the *Rename Module*.

**3.** View the *Derived Data Series* of each module in the corresponding *Derived Data Series* window.




**4.** To delete a data module, select the module you want to remove and click on the *Delete Module*. A warning message will appear to confirm your decision.

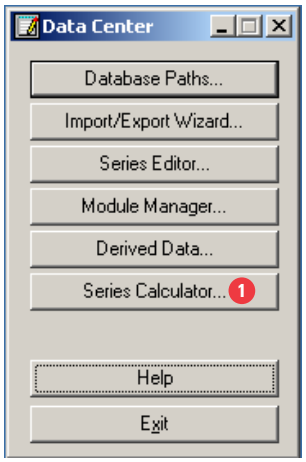
**5.** To move data modules to another database, highlight the *Derived Data Series* and you will be prompted to move the series to the desired location.

**6.** To delete a *Derived Data Series*, highlight the series and then click on *Delete Series*.

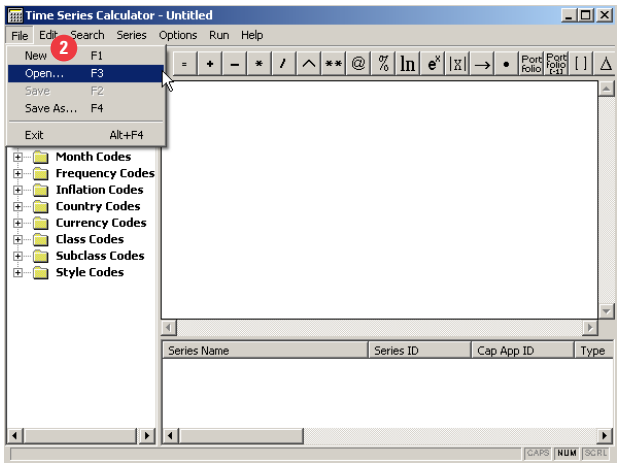
**7.** To import fixed weight portfolios from an excel spreadsheet, comma separated text file, or tab separated text file, click on *Import Holdings*.

### Performing Mathematical Operations with Series Calculator

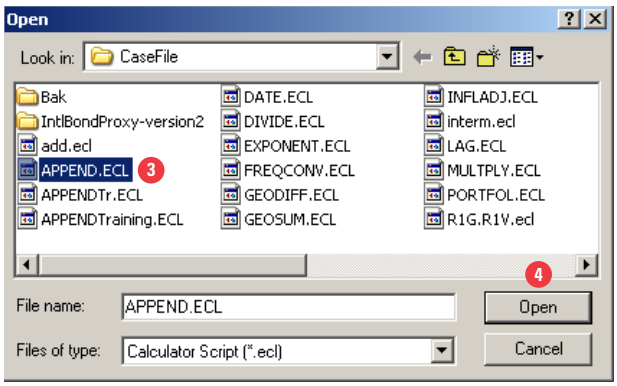
**1.** In this section, you can calculate mutual fund returns after management fees, append one index with a short back history to another index with a longer back history, add a constant value to an index, and lag or lead an index. In this exercise, we will append one index with a short back history to another index with a longer back history. Click *Series Calculator* from EnCorr Data Center window.




**2.** Select *Open* from the *File* drop down.

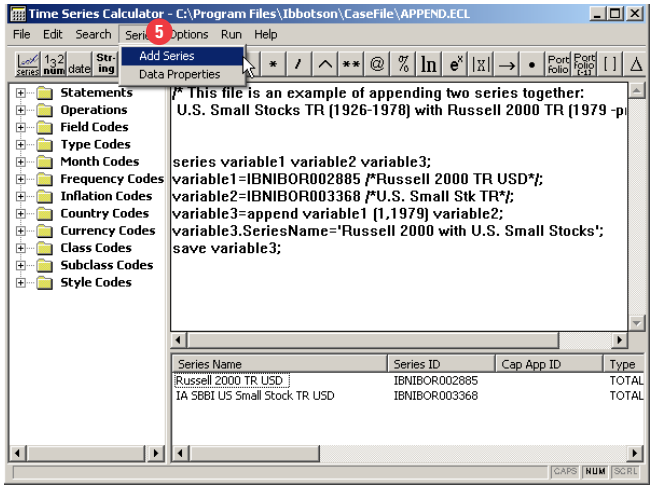


**3.** Locate *Append.ecl* which is a predefined script. Other pre-defined scripts are also available to select from.

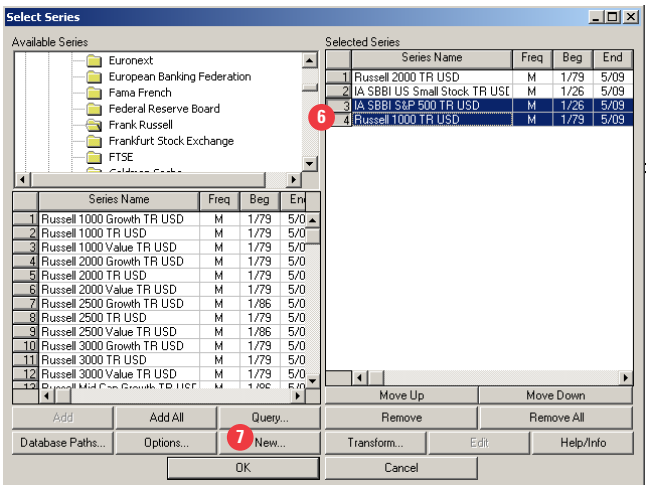



**4.** Click *Open* and the script will populate your *Time Series Calculator* window.

**5.** Before we append the default series, it is necessary to add the new series. Go to the *Series* drop down and click *Add Series.*

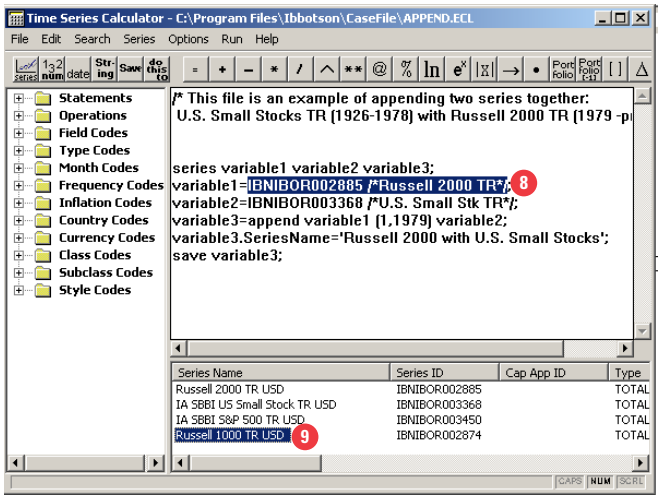


**6.** Locate IA SBBI S&P 500 TR USD and Russell 1000 TR USD to add to the *Selected Series* window.



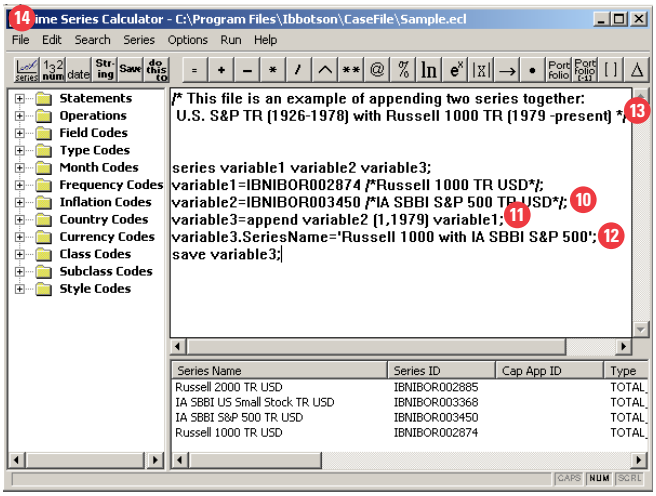

**7.** Click *OK* to be taken back to the *Time Series Calculator* window where IA SBBI S&P 500 TR USD and the Russell 1000 TR USD are now listed.

**8.** Go to the *Variable 1* row and highlight everything after the "=" sign up to the semicolon to substitute the Russell 2000 TR USD with Russell 1000 TR USD.




**9.** Double click on Russell 1000 TR USD in the *Series Name* window to replace Russell 2000 TR USD.

**10.** Go to *Variable 2* and follow Steps 8 and 9 to replace U.S. Small Stk TR with IA SBBI S&P 500 TR USD.



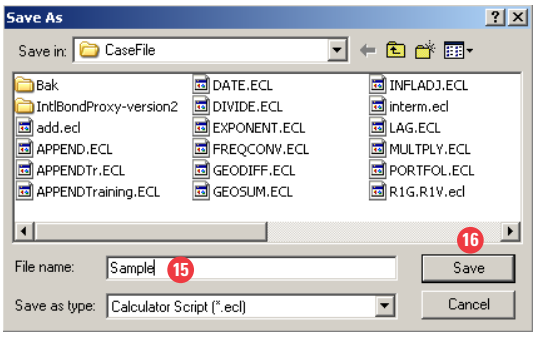

**11.** In the first *Variable 3* row, change the order of the variables to read *Variable 2* first, then *Variable 1*. This is necessary to capture the IA SBBI S&P 500 TR USD history prior to the Russell 1000 TR USD inception date.

**12.** Go to the second *Variable 3* choice and change the name to read "Russell 1000 with IA SBBI S&P 500."

**13.** Change the display name at the top to read U.S. S&P TR (1926-1978) with Russell 1000 TR (1979 -present). Note that you can abbreviate the name further or type in the official name.

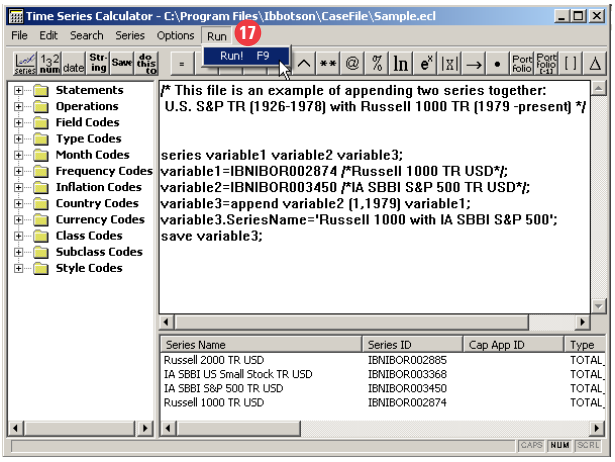
**14.** To save the new calculator script, go to *File, Save As.*

**15.** Name the file *Sample.*

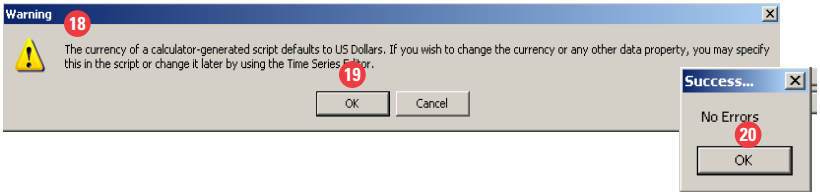



**16.** Click *Save.*

**17.** Click *Run* to calculate this mathematical equation in the *Time Series Calculator.*




**18.** A *Warning* pop-up will appear to inform you if there are any changes to currency or other data property, those changes can be done in the Series Editor.




**19.** Click *OK* and you will get a *Success* window to confirm your calculation.

**20.** Click *OK* again and you have successfully calculated the mathematical equation of a data series containing the Russell 1000 TR USD from its inception (January 1979) to present and the IA SBBI S&P  500 TR USD capturing the prior history from it's inception (January 1926) to the start of the Russell 1000 TR USD inception.

**21.** Open the *EnCorr Module* to locate your new series within the *User-Defined Data* subfolder.