

# Portfolio Workbench

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## Reference Manual

**Pleasant Bay Analytics**

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This Reference Manual describes more detail on various settings panels of the Portfolio Workbench.

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# **Introduction**

This Reference Manual describes more detail on some of the various settings panels of the Portfolio Workbench.

It will be revised periodically to cover various uses of the product.

# Settings - Calculations Panel

The screenshot shows the 'Portfolio Workbench Settings' dialog box with the 'Calculations' tab selected. The 'Calculation Settings' section contains the following fields and options:

- Lookback Period: 63
- TrendVal Period: 63
- SmoothVal Period: 7
- Target Beta (-0.5 to 1): 0.5
- Rebalance Interval: 1
- Trade Size: 100
- Position Size: 10000
- Objective: Market Neutral (dropdown menu)
- Compounding: Margin for Hedge - Fixed Trade Size (dropdown menu)

At the bottom of the dialog are 'OK' and 'Cancel' buttons.

**Lookback Period:** The number of trading days of data used for measuring the various parameters.

**TrendVal Period:** The number of trading days used to smooth the blue Trend Value.

**SmoothVal Period:** The number of trading days of data used to smooth the black Smooth average.

**Target Beta:** The desired portfolio beta when designing a portfolio in the Target Beta mode.

**Rebalance Interval:** The number of days before the portfolio values are rebalanced.

**Trade Size:** The final value on Minus Market charts (Default = 100).

**Position Size:** The value of each position. Used to determine the default number of shares for each ticker symbol in a portfolio.

**Objective:** The portfolio objective:

- **Unhedged:** Uses only the specified securities with no hedge.
- **Minimum Risk:** Hedges for a portfolio that minimizes the standard deviation of the portfolio returns.

- **Market Neutral:** Hedges the portfolio to cancel the market component (beta = 0).
- **Target Beta:** Hedges the portfolio to a beta = to the Target Beta parameter.

**Compounding:** This specifies how the values are to be compounded from bar to bar when testing a single security:

- **No Margin Required – Fixed Trade Size:** In this mode the security and the hedge together will equal the Position Size and the number of shares of each will be recalculated each time the calculation is rebalanced. For example, with a \$10000 Position Size the security position might be \$6500 and so the hedge might be \$3500 for a total of \$10000.
- **Margin for Hedge – Fixed Trade Size:** In this mode with a \$10000 Position Size the security position would always be \$10000 and the hedge might be \$5400. This assumes the hedge position is bought on margin. In this mode, the slope of the MinusMarket chart corresponds to the Alpha of the security so this is the default setting.
- **No Margin Required – Trade Size = Account Size:** In this mode, the initial security and the hedge size together will equal the Position Size but each subsequent position will total the Position Size plus any profits or losses in the position.
- **Margin for Hedge – Trade Size = Account Size:** In this mode, the initial security position will equal the Position Size but for each subsequent trade, the security position will total the Position Size plus any profits or losses in the position. Margin will be used for the hedge portion for all positions.
- **Constant Security Shares – Vary Hedge:** In this mode the account holds a fixed number of shares of the security and the hedge is adjusted automatically as required. This simulates what happens in a portfolio where the user keeps the number of shares of each stock constant.

## Settings – Chart Panel

The screenshot shows the 'Portfolio Workbench Settings' dialog box with the 'Chart' panel selected. The 'Display Settings' section has two unchecked checkboxes: 'Thicker Lines on Chart' and 'Display Shadows on Chart Lines'. The 'Chart Settings' section has two input fields: 'Number of trading days to load' set to 2600 and 'Number displayed on chart' set to 504. Below these fields is a note: 'A year is typically 252 trading days' and a blue italicized warning: 'If you adjust the number of days to load, the app will reload all data (requires restart)'. The 'Normalization' section has one unchecked checkbox: 'Fix Y axis min and max as', with 'Min' set to -100 and 'Max' set to 300. At the bottom are 'OK' and 'Cancel' buttons.

**Number of trading days to load:** There are about 252 trading days in a year so the default setting of 2600 is about five years of data. You can change this to any value up to at least 2600 (ten years). You should load at least 100 more days of data than are displayed on the chart to assure proper initialization.

Generally it is best to keep this value fixed since this determines the number of days of data that is stored in the local data base for each ticker. Using the local data base eliminates the need for the App to download past data for the tickers that have been previously used.

If you change this value, the App will clear the data base and then load all the past data again corresponding to the new settings.

**Number displayed on chart:** This sets the number of days that are displayed on the main chart. This can be set as your charts require. The default of 504 days corresponds to about two years.

## Settings – Portfolio Panel

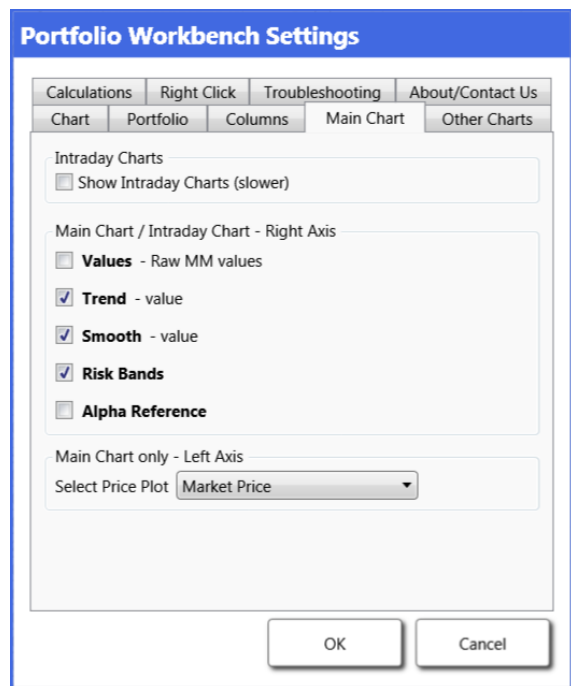
The screenshot shows the 'Portfolio Workbench Settings' dialog box with the 'Portfolio' panel selected. The 'Portfolio Display' section has a dropdown menu for 'Font Size for Grids' set to 11. Below it are three input fields: 'Return Color Threshold (%)' set to 5.00, 'RAR Color Threshold' set to 1, and 'Correlation Color Threshold' set to 0.5. At the bottom are 'OK' and 'Cancel' buttons.

**Return Color Threshold:** Return values in the Matrix whose magnitude is greater than the specified value are colored green for positive values and red for negative values. This value is also used internally for scanning tickers so it should be set to the lowest value of Alpha that you would accept in a portfolio.

**RAR Color Threshold: Risk:** Adjusted-Return (RAR) values in the Matrix whose magnitude is greater than the specified value are colored green for positive values and red for negative values.

**Correlation Color Threshold:** Correlation values in the Matrix whose magnitude is greater than the specified value are colored green for positive values and red for negative value.

## Settings – Main Chart Panel



**Show Intraday Charts:** Most of the charts in the Portfolio Workbench are built using daily data. By turning on this option, you can add a smaller intraday chart of the most recent data. This is often useful for timing trades.

**Values:** This shows the daily MinusMarket chart values as gray dots. This plot may be useful for timing trades but leaving these turned off makes the charts less complicated-looking.

**Trend:** This turns on and off the smooth blue curve that tracks the center of the gray dots. Generally this is left on for most usages.

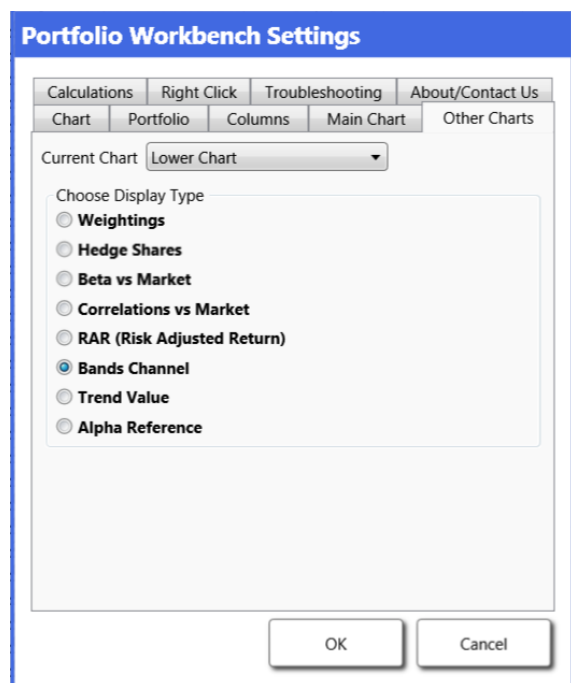
**Smooth:** This plots a much more detailed smooth black curve on the gray dots to more clearly show the cyclical component in the MinusMarket chart.

**Risk Bands:** These risk bands are drawn on each side of the blue curve to illustrate the dispersion in the MinusMarket values. The bands are calculated to be two standard errors above and below the blue line so should contain about 95% of the gray dots.

**Alpha Reference:** This curve is derived from an alternative calculation of the alpha of the security to provide an absolute alpha reference on the chart. It will be most similar to the “Margin for Hedge – Fixed Trade Size” mode of compounding.

**Set Price Plot:** This provides the option of additionally displaying the Market, Security, or Hedge price values on the left scale of the main chart.

## Settings – Other Charts Panel



**Introduction:** In addition to the Main Chart there are four other charts that can be used to display the value of various parameters back in time. They are the Lower Chart, which is plotted directly under the main chart, and three smaller charts that are displayed when the Extended View is selected. This panel allows you to specify what is plotted in each chart.

**Weightings:** This shows the relative weightings of the security (WeiS – green) and the hedge (WeiH – red). A negative value denotes a short position.

**Hedge Shares:** This shows the number of shares of the security (ShaS – green) and the hedge (ShaH – red) over time. When plotting the values for a portfolio, the ShaS values will always be 1, essentially using 1 share of the total portfolio.

**Beta vs Market:** Shows a plot of the beta of the unhedged security (green), the hedge (red), and the hedged portfolio (blue) back in time.

**Correlation vs Market:** Shows a plot of the correlation coefficient of the unhedged security (green), the hedge (red), and the hedged portfolio (blue) back in time.

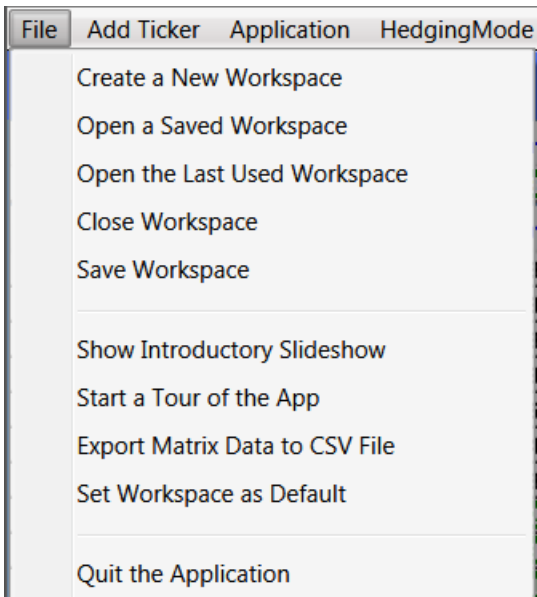
**RAR (Risk Adjusted Return):** Shows a plot of the RAR of the hedged portfolio (blue) back in time. This is the ratio of the annualized return divided by the annualized standard deviation of returns. It is approximately equal to the annualized Sharpe Ratio of the position.

**Bands Channel:** This shows an expanded view of bands of the main chart to aid in timing entries and exits. The gray MinusMarket dots tend to move back and forth between the top and bottom of this channel. Entering a long position when the value is near the bottom of the channel can often get the trade off to a profitable start as the value moves back toward the middle of the band.

**Trend Value:** This is the display of the smooth blue curve in the center of the gray MinusMarket dots.

**Alpha Reference:** This curve is derived from an alternative calculation of the alpha of the security to provide an absolute alpha reference on the chart. It will be most similar to the “Margin for Hedge – Fixed Trade Size” mode of compounding.

## The File Menu



**Workspaces:** The Portfolio Workbench uses “Workspaces” to save the configuration of any study. The default location for storing these is usually C:\blp\data.

The File menu has commands to open and store these workspaces similar to other Windows programs but it also has a few other commands for special purposes.

**Show Introductory Slideshow:** Shows an 11-slide introduction that summarizes the capabilities of the product.

**Start a Tour of the App:** We provide three tours illustrating the capabilities of the products. Taking these tours is a quick way to learn the most common commands and the portfolio design process.

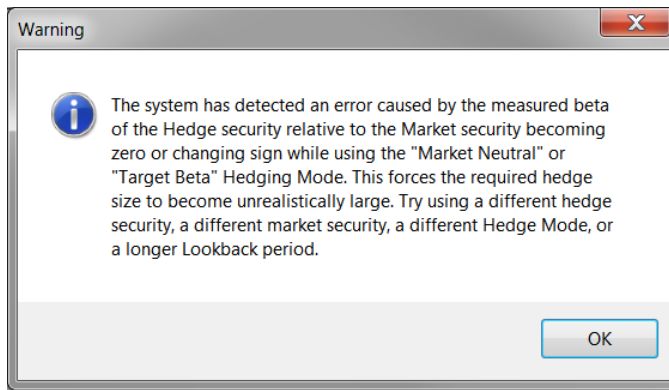
**Export Matrix Data to CSV file:** The Matrix shows the current values of a great many parameters for the securities listed in the Matrix. This command allows you to export this data to a “CSV” file that can be opened directly in Microsoft Excel for further procession.

**Save Workspace as Default:** If you create a configuration and settings of the Portfolio Workbench that you would like to save as the default for new workspaces of that type, you can do so with this command. Using it will set the defaults as they are in the currently open workspace.



# Error Messages & Troubleshooting

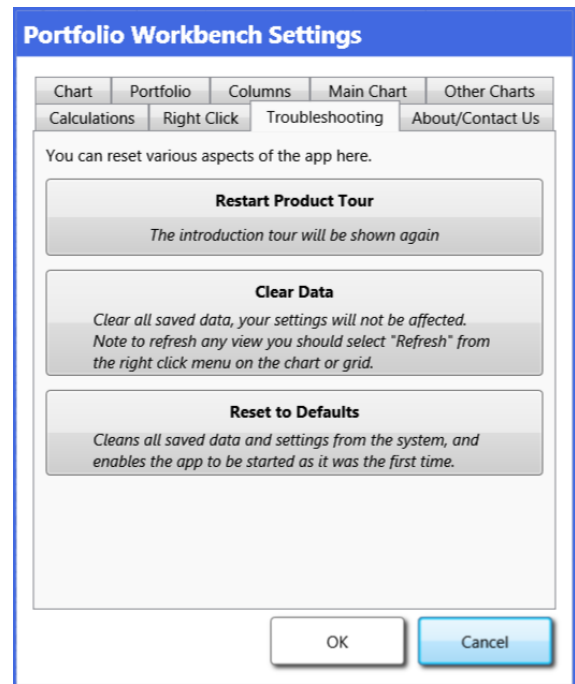
## Measured Beta Becoming Zero



This warning message can occur when loading a workspace. Click OK and continue the loading process. If it occurs only occasionally simply disregard it since it likely caused by a temporary situation that clears itself once all the data is loaded.

You can check the Beta plot to see if the Beta of the hedge changed sign at any point in the past. If it has, that is not a problem if it was far back in time but you can eliminate the error by choosing a market ticker and a hedge ticker that are consistently either positively or negatively correlated. One simple alternative is to simply use the same ticker for both the hedge and the market.

## Resetting the Portfolio Workbench



If the program stops working correctly something may have caused a workspace or the price database to become corrupted.

We recommend starting a new workspace as a first course of action. Usually that will fix the problem.

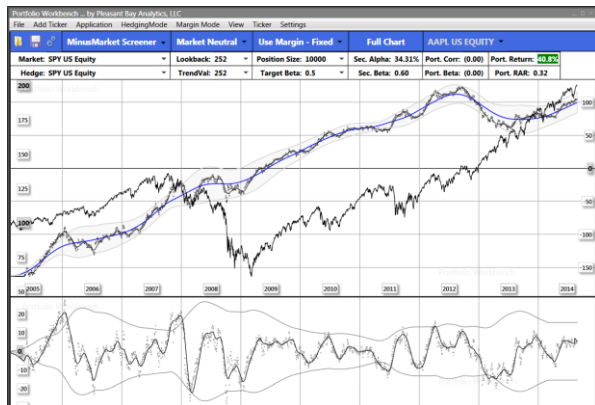
However, if that does not work, you can clear all the data and reset all settings to their Default values by using the Troubleshooting panel as shown above.

# Designing Portfolios for Different Holding Periods

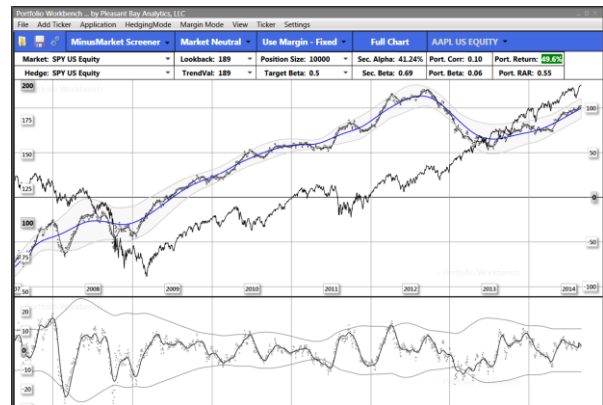
The design method works on any time scale, even down to trade times of minutes. But since the Portfolio Workbench uses daily data, the practical range of holding periods is perhaps one month to a few years. The chart below shows the parameter values that are useful for various holding period objectives for a typical multi-security portfolio.

Months Holding Period	12-40	9-30	6-20	3-10	2-6	1-3
Days Loaded on Chart	2400	1800	1200	600	400	200
Lookback Period	252	189	126	63	42	21
TrendVal Period	252	189	126	63	42	21
SmoothVal Period	25	19	13	7	5	3

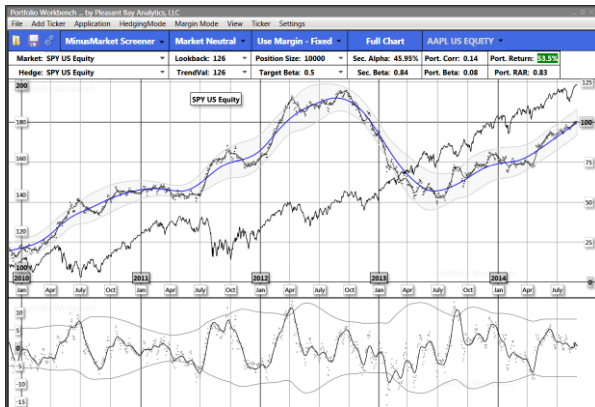
Months Holding Period = 12 - 40:



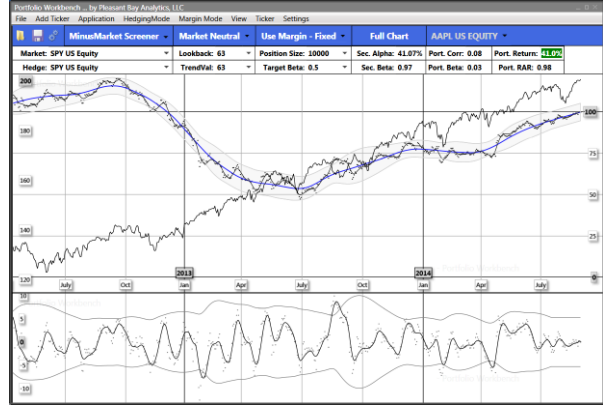
Months Holding Period = 9 - 30:



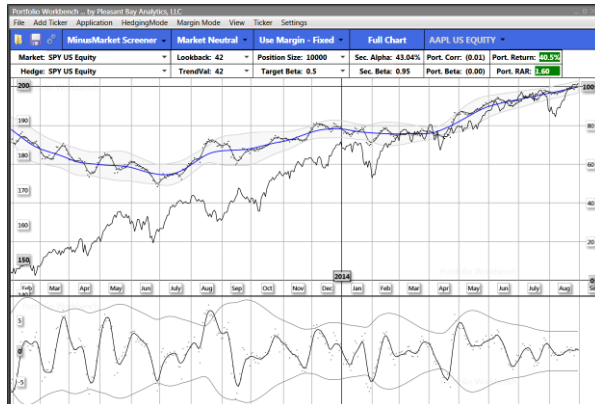
Months Holding Period = 6 - 20:



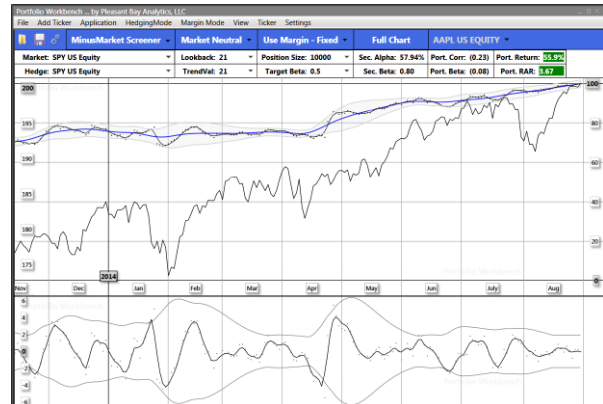
Months Holding Period = 3 - 10:



Months Holding Period = 2 - 6:



Months Holding Period = 1 - 3:



## Values Specified in the Matrix Window

Symbol	The Bloomberg ticker symbol	WeiS	The relative value weighting of the specified ticker symbol.
Shares	If gray, this is the number of shares required so that the position is equal to the specified Position Size. If black, then this is the value as specified by the user. Use negative numbers for short positions.	WeiH	The relative value weighting of the specified hedge symbol.
X	When this is set to X, the portfolio will include this ticker.	PriS	The current price of the specified ticker symbol.
PBA	A proprietary ranking that helps find tickers with good long-term and short-term performance. If you sort on this column, the tickers near the top of a column (green) tend to be good long positions. If you sort again, the sort will reverse and find good short positions (red).	PriH	The current price of the specified hedge symbol.
RetP	An estimate of the current annualized rate-of-return for the hedged portfolio specified in percent.	CorrS	The correlation coefficient of the specified ticker symbol's returns to the specified market symbol's returns.
RarP	A risk-adjusted return measure for the hedged portfolio, which is the annualized return divided by the annualized standard deviation of returns. This is similar to the Sharpe Ratio (except for the risk-free rate term).	CorrP	The correlation coefficient of the hedged portfolio's returns to the specified market symbol's returns.
RarL	A longer term version of RarP with a look-back interval about five time longer than the Lookback setting in days.	BetaS	The beta of the specified ticker symbol to the market symbol.
ShaS	The number of shares of the specified ticker symbol being used for the calculations. Negative values are short positions.	BetaH	The beta of the specified hedge symbol vs. the market symbol.
ShaH	The number of shares of the specified hedge symbol being used for the calculations. Negative values are short positions.	BetaP	The beta of the hedged portfolio vs. the market symbol.
		RiskP	The annualized standard deviation of the hedged portfolio returns specified in percent..
		RetL	Annualized rate-of-return for the hedged portfolio with a look-back interval about five time longer than the Lookback setting in days specified in percent.
		RiskL	Annualized standard deviation for the hedged portfolio returns with a look-back interval about five time longer than the Lookback setting in days specified in percent.
		AlphaS	An estimate of the current alpha of the specified ticker symbol expressed as a fraction (0.25 = 25% per year).

## Values Specified in the Header

<b>Portfolio Designer</b> ▼
<b>Market:</b> SPY US Equity ▼
<b>Hedge:</b> SPY US Equity ▼

**Market** Specifies the ticker symbol to be used to specify the market.

**Hedge** Specifies the ticker symbol to be used to specify the hedge security.

<b>Minimum Risk</b> ▼
<b>Lookback:</b> 252 ▼
<b>TrendVal:</b> 252 ▼


**Lookback** The length of the lookback window in trading days used for measuring the parameters of the various price series. One month is about 21 trading days.

**TrendVal** The length used to smooth the various curves used in the charts. It is often set to the same value as the Lookback value but does not have to be.

<b>Use Margin - Fixed</b> ▼
<b>Position Size:</b> 10000 ▼
<b>Target Beta:</b> 0.5 ▼

**Position Size** - The value of each position. Used to determine the default number of shares for each ticker.

**Target Beta** The desired value of the portfolio beta when using the Target Beta portfolio objective.

 <b>TLT US Equity</b> ▼
<b>Alpha:</b> 4.89%
<b>Beta:</b> (0.21)

**Alpha** An estimate of the current alpha of the specified ticker symbol

expressed as a fraction ( $0.25 = 25\%$  per year). (AlphaS)

**Beta** The beta of the specified ticker symbol to the market symbol. (BetaS)

<b>Hedged (Medium Term)</b>	
<b>Corr:</b> 0.70	<b>Return:</b> 27.00%
<b>Beta:</b> 1.06	<b>RAR:</b> 0.43

**Corr** The correlation coefficient of the hedged portfolio's returns to the specified market symbol's returns. (CorrP)

**Beta** The beta of the hedged portfolio vs. the market symbol. (BetaP)

**Return** An estimate of the current annualized rate-of-return for the hedged portfolio specified as a percentage. (RetP)

**RAR** A risk-adjusted return measure for the hedged portfolio, which is the annualized return divided by the annualized standard deviation of returns. This is similar to the Sharpe Ratio (except for the risk-free rate term).

<b>(Longer Term)</b>
<b>Return:</b> 21.09%
<b>RAR:</b> 0.22

**Return** Annualized rate-of-return for the hedged portfolio with a look-back interval about five time longer that the Lookback setting in days as a percentage. (RetL)

**RAR** A longer term version of RAR above with a look-back interval about five time longer that the Lookback setting in days. (RarL)

# Understanding the Compounding Setting

## No Margin - Fixed

Portfolio #	Hedge	PBA	RetP	RarP	AlphaS	ShaS	ShaH	PriS	PriH	
Active	(97.22)	7.75	0.27	1.37	0.24	1.00	(97.22)	360.31	186.88	
Symbol	Shares	X	PBA	RetP	RarP	AlphaS	ShaS	ShaH	PriS	PriH
ACT UN Equ	21	✓	4.53	0.18	0.61	0.45	21.09	(31.48)	195.20	186.88
CVS UN Equ	70	✓	0.09	0.12	0.54	0.23	70.87	(25.57)	73.68	186.88
D UN Equity	91	✓	0.05	0.11	0.54	0.22	91.76	(17.98)	72.36	186.88
TWC UN Equ	40	✓	0.09	0.04	0.15	0.14	40.82	(22.86)	140.30	186.88

It is important to understand the Compounding setting. Note that the in the above picture, the numbers in the Shares column are colored gray so this indicates that the values are calculated by the system. Those values are determined by the setting of the Compounding parameter.

The values above are for the selection “No Margin – Fixed”. In this case, the Value of the stock “ACT” and the value of the hedge, “SPY” will total the Position Size = \$10000.

$$\text{Value} = \text{ShaS} * \text{PriS} + \text{ShaH} * \text{PriH}$$

$$\text{Value} = 21.09 * 195.20 + 31.48 * 186.88 = 9999.75$$

This simulates the strategy of investing a fixed \$10000 without using margin and withdrawing profits.

## Use Margin - Fixed

Portfolio #	Hedge		PBA	RetP	RarP	AlphaS	ShaS	ShaH	PriS	PriH
Active	(192.35)		8.39	0.29	1.42	0.25	1.00	(192.35)	373.38	186.88
Symbol	Shares	X	PBA	RetP	RarP	AlphaS	ShaS	ShaH	PriS	PriH
ACT UN Equ	51	✓	4.14	0.41	0.80	0.45	51.23	(76.48)	195.20	186.88
CVS UN Equ	135	✓	2.58	0.23	0.55	0.23	135.72	(48.97)	73.68	186.88
D UN Equity	138	✓	0.08	0.20	0.52	0.22	138.20	(27.08)	72.36	186.88
TWC UN Equ	71	✓	1.74	0.10	0.19	0.14	71.28	(39.92)	140.30	186.88

The values above are for the selection “Use Margin – Fixed”. In this case, the Value of the stock “ACT” will total the Position Size = \$10000

$$\text{ValueS} = \text{ShaS} * \text{PriS}$$

$$\text{ValueS} = 51.23 * 195.20 = 10000.10$$

This simulates the strategy of investing a fixed \$10000 but using margin and withdrawing profits.

The value of the hedge, “SPY” will be purchased on margin:

$$\text{ValueH} = \text{ShaH} * \text{PriH}$$

$$\text{ValueH} = 76.48 * 186.88 = 14292.58$$

## No Margin - Account

Portfolio #	Hedge	PBA	RetP	RarP	AlphaS	ShaS	ShaH	PriS	PriH	
Active	(187.53)	8.09	0.29	1.39	0.26	1.00	(187.53)	374.91	186.88	
Symbol	Shares	X	PBA	RetP	RarP	AlphaS	ShaH	PriS	PriH	
ACT UN Equ	53	✓	5.23	0.17	0.69	0.45	53.10	(79.27)	195.20	186.88
CVS UN Equ	110	✓	0.07	0.11	0.55	0.23	110.65	(39.92)	73.68	186.88
D UN Equity	144	✓	0.04	0.11	0.54	0.22	144.66	(28.35)	72.36	186.88
TWC UN Equ	71	✓	0.08	0.04	0.14	0.14	71.27	(39.92)	140.30	186.88

The values above are for the selection “No Margin – Account”. In this case, the Value of the stock “ACT” and the value of the hedge, “SPY” will total the Position Size = \$10000 on the first bar of the price data but on each subsequent bar of data, the sum of the two positions will be set to the value of the account, including any profit or loss since the first bar of data.

$$\text{Account Value} = \text{ShaS} * \text{PriS} + \text{ShaH} * \text{PriH}$$

This simulates the strategy of reinvesting all profits without using margin.

## Use Margin - Account

Portfolio #	Hedge	PBA	RetP	RarP	AlphaS	ShaS	ShaH	PriS	PriH	
Active	(553.36)	8.41	0.31	1.36	0.28	1.00	(553.36)	399.87	186.88	
Symbol	Shares	X	PBA	RetP	RarP	AlphaS	ShaS	ShaH	PriS	PriH
ACT UN Equ	201	✓	5.67	0.37	0.86	0.45	201.73	(301.17)	195.20	186.88
CVS UN Equ	262	✓	2.79	0.21	0.57	0.23	262.30	(94.63)	73.68	186.88
D UN Equity	270	✓	0.06	0.18	0.52	0.22	270.67	(53.05)	72.36	186.88
TWC UN Equ	186	✓	1.60	0.08	0.16	0.14	186.70	(104.57)	140.30	186.88

The values above are for the selection “Use Margin – Account”. In this case, the Value of the stock “ACT” will equal the Position Size = \$10000 on the first bar of the price data but on each subsequent bar of data, the “ACT” position will be set to the value of the account, including any profit or loss since the first bar of data.

$$\text{Account Value} = \text{ShaS} * \text{PriS}$$

This simulates the strategy of reinvesting all profits using margin for the hedge.

## Constant Shares - Automatic Shares

Portfolio #	Hedge	PBA	RetP	RarP	AlphaS	ShaS	ShaH	PriS	PriH	
Active	(917.61)	8.58	0.31	1.36	0.28	1.00	(917.61)	395.52	186.88	
Symbol	Shares	X	PBA	RetP	RarP	AlphaS	ShaS	ShaH	PriS	PriH
ACT UN Equ	317	✓	6.75	0.44	0.86	0.45	317.06	(473.34)	195.20	186.88
CVS UN Equ	486	✓	3.21	0.32	0.60	0.23	486.86	(175.65)	73.68	186.88
D UN Equity	431	✓	0.07	0.24	0.54	0.22	431.67	(84.60)	72.36	186.88
TWC UN Equ	325	✓	1.62	0.11	0.17	0.14	325.87	(182.52)	140.30	186.88

In the Constant Shares mode, the number of shares for each ticker symbol is automatically

determined so that its value matches the specified Position Size on the first bar of the price data and remains the same for each subsequent bar of data.

This simulates the strategy of keeping the position size in number of shares constant and having the hedge size adjust automatically.

### *User Determined Shares*

Portfolio	Hedge	PBA	RetP	RarP	AlphaS	ShaS	ShaH	PrIS	PrIH	
Active	(191.86)	8.14	0.28	1.39	0.25	1.00	(191.86)	370.51	186.88	
Symbol	Shares	X	PBA	RetP	RarP	AlphaS	ShaS	ShaH	PrIS	PrIH
ACT UN Equ	50	✓	4.14	0.41	0.80	0.45	51.23	(76.48)	195.20	186.88
CVS UN Equ	125	✓	2.58	0.23	0.55	0.23	135.72	(48.97)	73.68	186.88
D UN Equity	150	✓	0.08	0.20	0.52	0.22	138.20	(27.08)	72.36	186.88
TWC UN Equ	75	✓	1.74	0.10	0.19	0.14	71.28	(39.92)	140.30	186.88

By clicking on the values in the Shares column, the user can specify the number of shares to use in the Constant Shares mode.

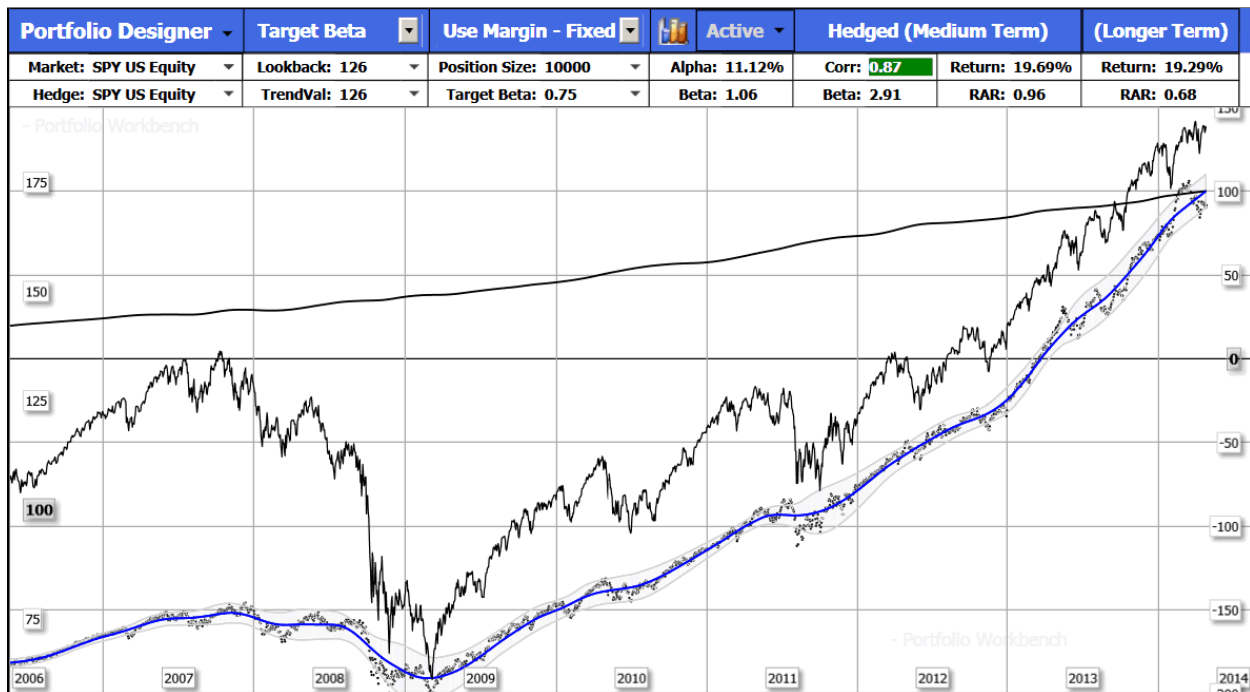
When this has been set by the user, the numbers in the Shares column are colored black. This simulates a portfolio with that fixed number of shares for all bars of price data.

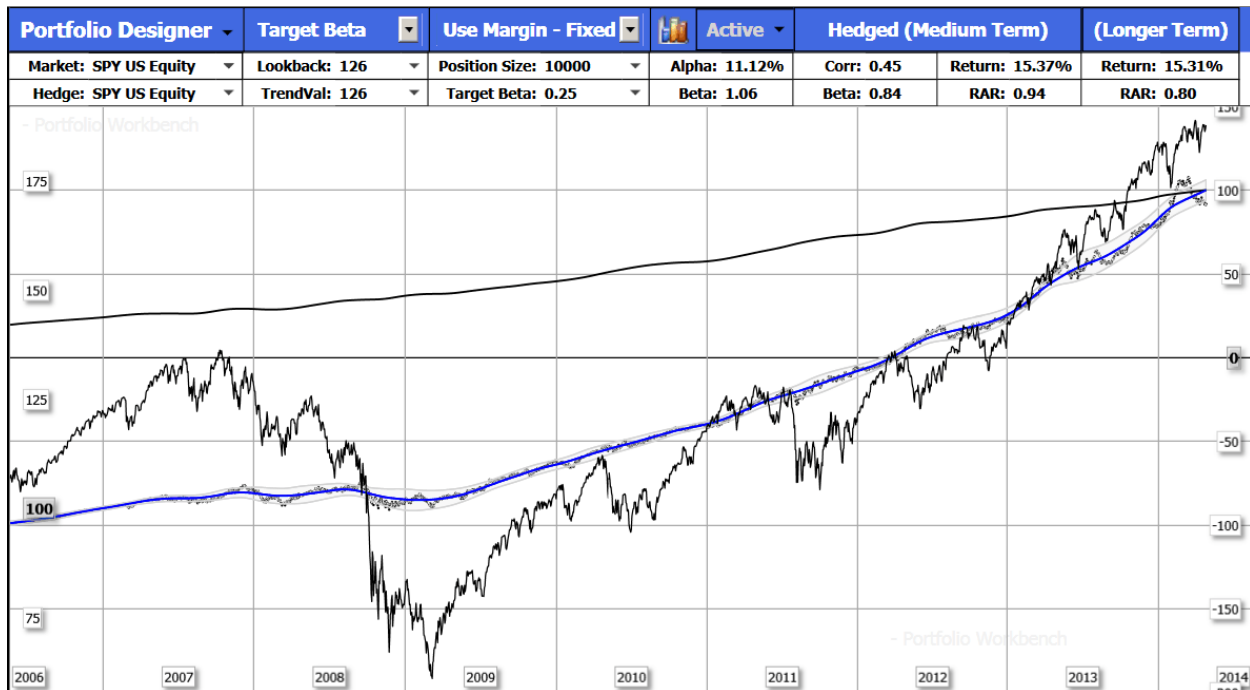
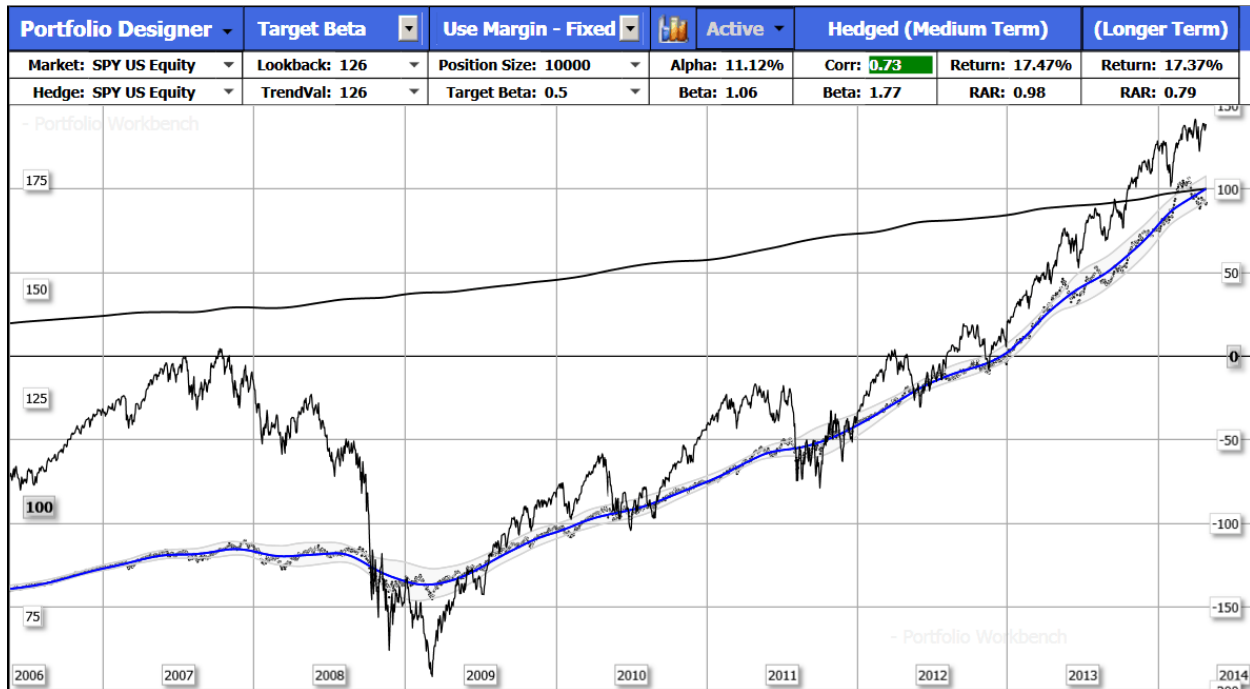
## Understanding the Target Beta Setting

The Target Beta hedging mode allows setting the portfolio Beta to any specified value from -0.5 to +1.0. Setting the Target Beta to 0.0 is the same as Market Neutral.

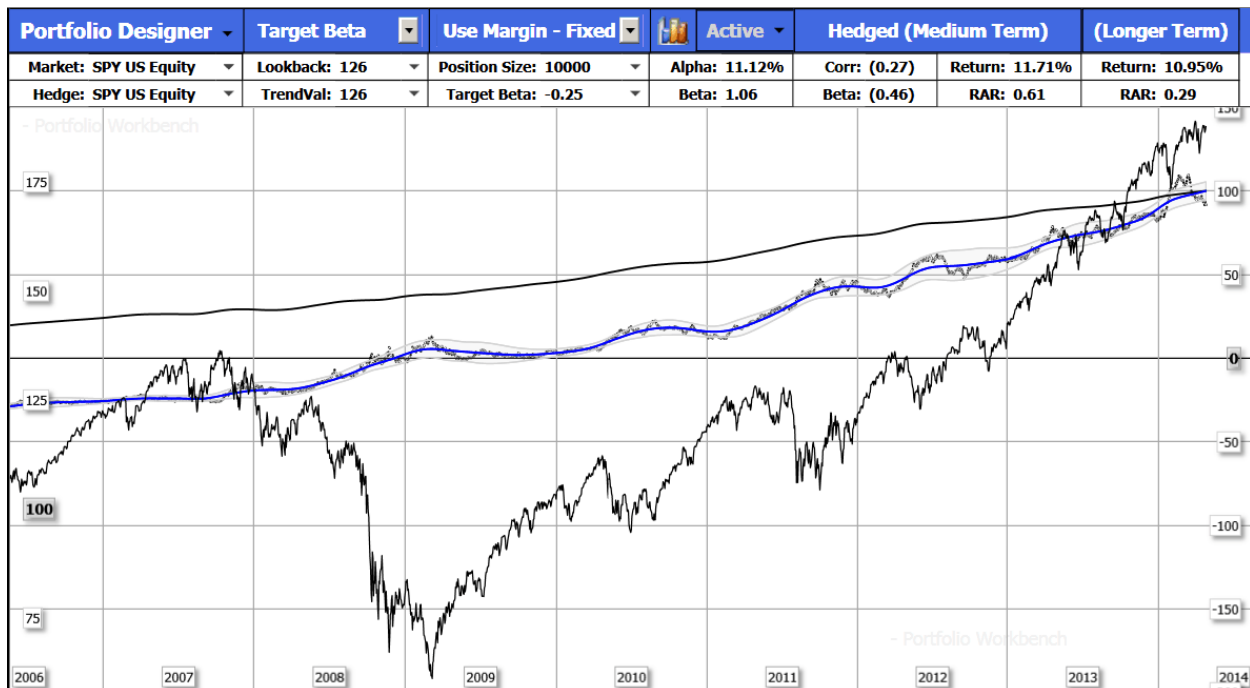
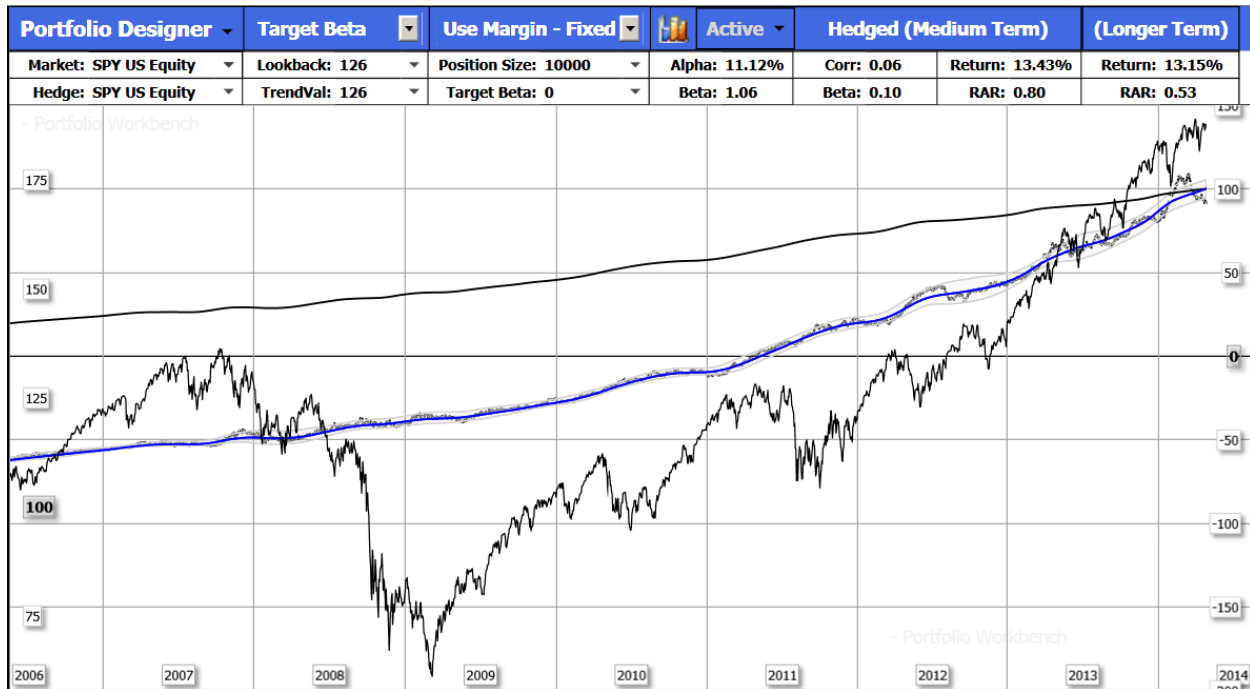
If the market is trending up then setting the target beta to +0.5 or +0.7 can capture some of the market movement adding to the underlying alpha of the portfolio. If the market is trending down then setting the target beta to 0.0 or -0.5 can capture some of the downward market movement.

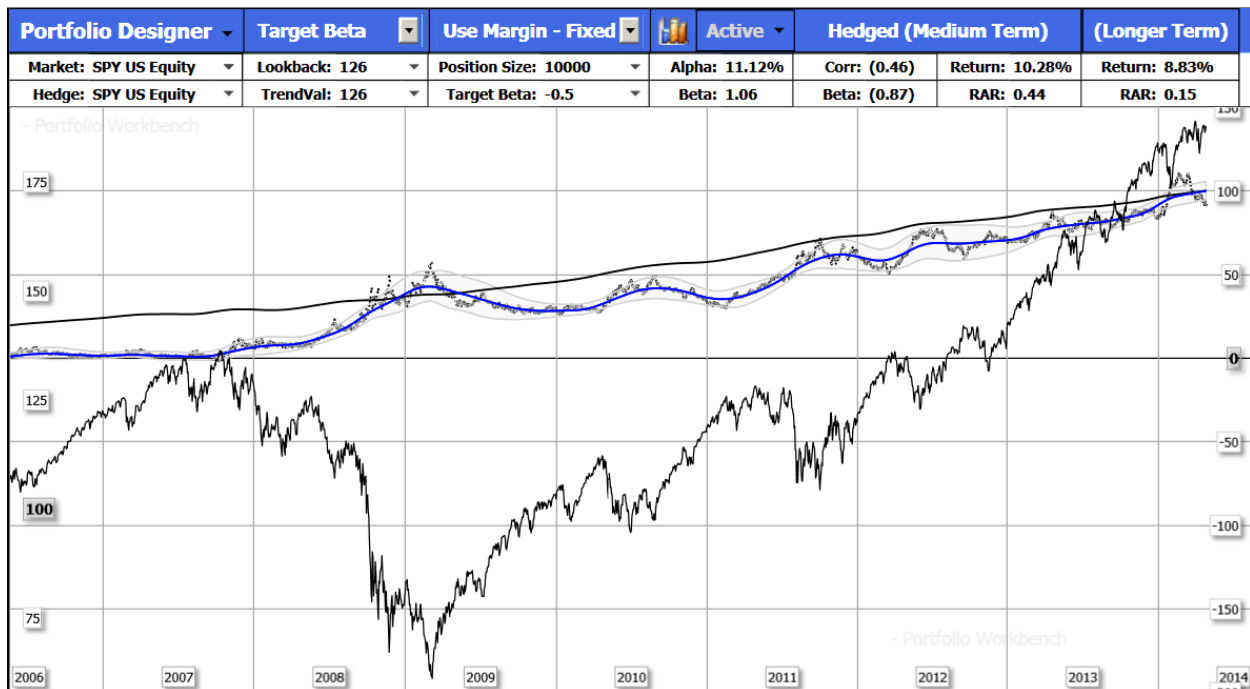
The pictures below show several cases where the same portfolio is set for various values of Target Beta.



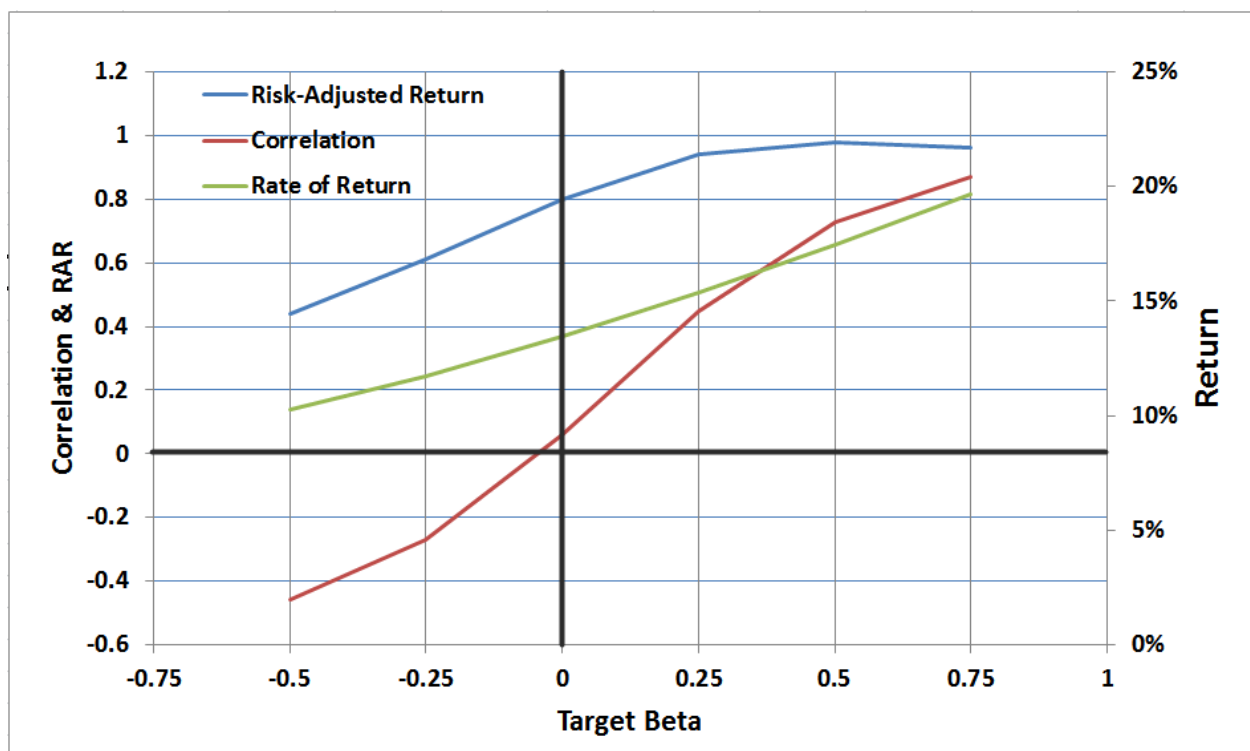




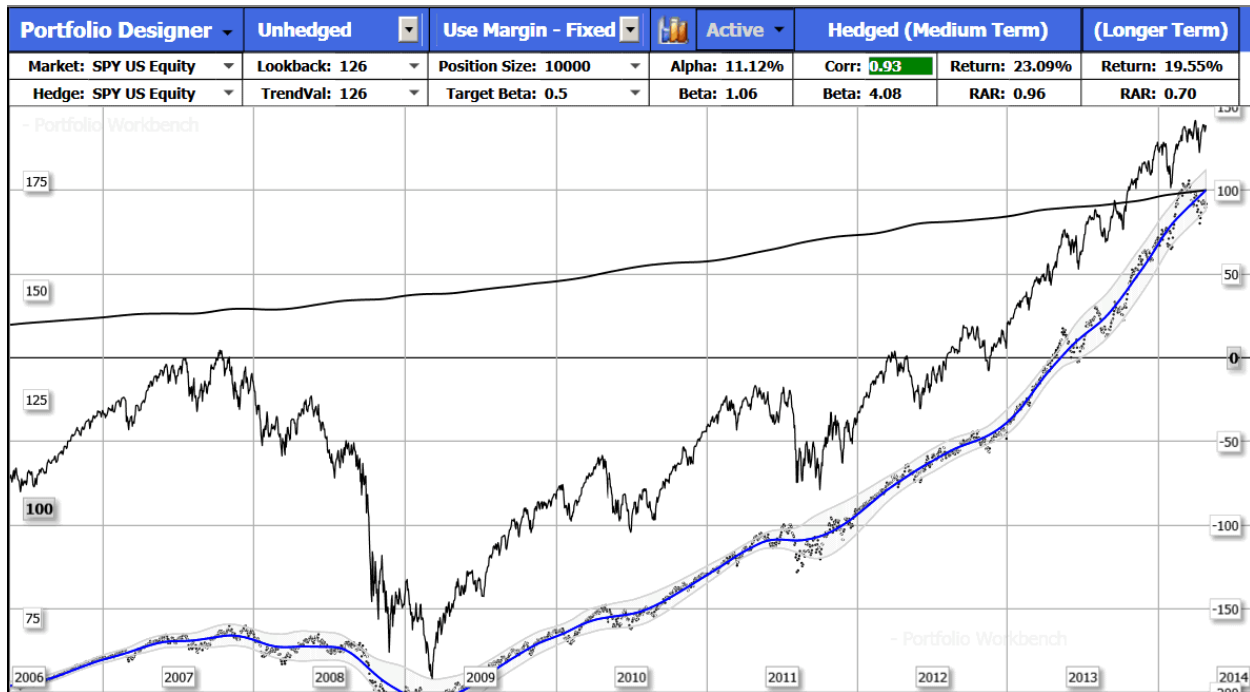




This figure summarizes the results of these settings. For the market conditions existing for these charts (trending up), the Risk-Adjusted Return (similar to Sharpe Ratio) peaked with a Target Beta setting of +0.5. The Return moved up as Target Beta was increased, as we would have expected. The Correlation of the portfolio to the market was near zero for a Target Beta = 0.0 (market neutral) as increased as the portfolio beta was increased.



For comparison, the figure below shows the same portfolio unhedged.



This chart shows the same portfolio with the hedging mode set for Minimum Risk. This is the hedging that minimizes the standard deviation of portfolio returns, resulting in the smoothest curve.

