

Barra PortfolioManager Portfolio Construction User Guide

November 2015

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Chapter 1. Rebalance Walkthrough

This chapter introduces you to the Barra PortfolioManager portfolio construction features and functions, including portfolio optimization and rebalancing.

Introduction

The Barra PortfolioManager portfolio construction features are designed to simplify the recurring tasks of portfolio managers and quantitative support staff that build and rebalance portfolios as part of managing an equity investment process. These portfolio construction features are seamlessly integrated into the Barra PortfolioManager workspace. The process recognizes that the portfolio management workflow begins with an assessment of the initial portfolio and ends with a recommended trade list that managers can submit to the market. During this process, the portfolio manager creates and compares multiple rebalance scenarios in order to build the best portfolio that balances risk and return, and reflects tactical insights while meeting strategic mandates. Barra PortfolioManager is designed to support Front Office investment teams who manage the investment process with the following key features:

- Easily share strategy settings, data and results with your investment team without copying files
- Run ad hoc risk attribution and exposure analysis on your pre-trade portfolios
- Access settings and results to resume where you left off as well as to re-use settings across rebalance cycles
- Manage multiple accounts by sharing common settings across accounts and define account specific settings
- Monitor the efficiency of the investment process by comparing the accounting portfolio, optimal portfolio, and pre-trade portfolio over time
- Create a customized workspace that is re-usable across date, portfolio, and strategy
- Run your rebalances on MSCI servers to alleviate the burden on your local desktop

The portfolio construction tools in Barra PortfolioManager are available by subscription and sample portfolios are provided. While all users can view the sample portfolios, only subscribers can actively use the rebalancing tools.

Goals of Rebalancing

The goal of the rebalancing process is to create an optimized portfolio that maximizes utility while taking into account any constraints you specify. You can use the Rebalance Tool to rebalance a single portfolio and the Rebalance Assistant to rebalance a large number of portfolios in a single batch rebalance cycle:

The Rebalance Tool enables you to:

- Run optimization jobs on any date, portfolio, and rebalance profile
- Quickly revise and run a previous optimization run to refine your strategy and build alternative proposals
- Compare and graph summary statistics across the iterations of the optimizer you generate during a typical rebalance cycle

- Review the tactical overrides you have defined within the rebalance profile as compared against your base rebalance profile
- Keep your rebalance history and optimal portfolios for audit purposes
- Clean up non-essential, intermediate results at the end of each rebalance cycle.

The Rebalance Assistant enables you to:

- Set up a rebalance job, which defines the required settings to run a multiple-portfolio optimization on an unplanned or scheduled basis.
- Schedule to run the rebalance jobs daily or weekly. You can also schedule the rebalance job for overnight processing and specify retry rules when a job fails.
- View and monitor the status and progress of rebalance jobs.
- View the details of a single job, which enables you to launch the Rebalance Tool and the standard single portfolio reports. The iterations generated by the Rebalance Assistant are independent from the iterations generated by the Rebalance Tool.
- Selectively re-run the portfolios in the batch that failed based on the common settings.
- Specify the format of the aggregate trade list.

The Rebalance Tool and Rebalance Assistant enable you to access the power of the MSCI Optimizer where you can:

- Maximize expected returns
- Minimize total risk or risk relative to a benchmark
- Minimize transaction costs, tax costs, and penalties while meeting any specified constraints, such as the upper or lower bounds on the weights of assets, industry constraints, cash contributions or withdrawals, or transaction type limitations
- Test different investment scenarios; examine the effects that trades might have on your portfolio's risk characteristics. View the assets you could buy or sell to improve the portfolio's risk profile
- Generate multiple proposals using frontier optimization, or a sensitivity job, to generate a range of cases that vary along a single dimension
- Customize your utility function
- Run dual-risk model optimization

The Rebalance Cycle

The portfolio construction features in Barra PortfolioManager are designed to provide a complete user experience that follows the steps to run your portfolio through a typical, recurring, rebalance cycle. You can customize the workspace to be reusable from one rebalance cycle to the next.

A rebalance cycle typically incorporates the follow sequence of activities:

- Upload your latest holdings and asset data
- Analyze your initial portfolio to understand how much it has drifted from the benchmark
- Run an initial rebalance by optimizing with your base rebalance profile
- Revise the profile and optimize further to account for changing market conditions and your tactical investment decisions
- Iterate with the optimizer to generate a range of proposals for comparison
- Select the desired optimal portfolio and confirm that it is within your tolerances relative to the benchmark
- Revise the optimal portfolio for better trade execution or to adhere to compliance rules
- Confirm and submit the final trade list to the market
- Archive results and save profile changes to carry forward to the next cycle

Walkthrough Steps

You can use this summary as a quick reference tool to walk through the steps of the portfolio rebalancing process. Subsequent chapters in the guide provide details about the steps listed in this walkthrough. Each step in this walkthrough includes a link that will direct you to the relevant details.

Click any of the steps below to see a summary of the step.

Creating a New Rebalance Profile

1. [Create a New Profile](#)
2. [Select an Optimization Method](#)
3. [Select One or Two Risk Models](#)
4. [Start the Profile Manager](#)
5. [Enter the Profile Settings](#)
6. [Review the Profile Settings](#)
7. [Save the Profile](#)

Rebalancing Your Portfolio

8. [Access the Rebalance Tool](#)
9. [Run the Rebalance Tool](#)
10. [Create Iterations](#)
11. [Compare Your Iterations](#)

12. Revise Profile and Run
13. Compare Default Profile to Edited Profile

Working with Rebalance Results

14. Manage Your Picklist
15. View Optimization Reports
16. View the Optimization Summary Report
17. View Optimal Portfolios
18. View the Rebalance Reports
19. Create the Trade List
20. Customize and Export the Trade List
21. Archive and Clean Up

Advanced Features

- Dynamic Grouping Schemes
- Creating/Customizing a Reusable Workspace
- Sharing Iterations and Historical Iterations
- Sharing Rebalance Profiles
- Using Portfolio Attributes Across Accounts
- Using Rebalance Assistant for Multi-Portfolio Optimization
- Troubleshooting Optimization

Creating a New Rebalance Profile

To begin the process of rebalancing, you need to create a rebalance profile that sets the parameters for your rebalance. The rebalancing process uses portfolios that you previously created. The following steps introduce you to the Profile Manager that is used to setup the rebalance profile.

For more information about any of the topics in this section, see Chapter 2. [Creating a New Rebalance Profile](#).

1. Create a New Profile

Go to the Profiles Picklist and create a new profile.

Barra PortfolioManager lets you create multiple rebalance profiles that can be stored and recalled as picklist objects. Each rebalance profile stores the user-selected settings that determine the rules used to rebalance your portfolio. The Rebalance Profile picklist serves as a list of frequently used rebalance profiles that are stored in the Barra PortfolioManager platform. As with other picklist objects, you can store, recall, and reuse rebalance profiles across multiple portfolios and dates all saved within a single workspace. For more information, see [Create a New Profile](#).

You can also create a new rebalance profile directly from the Rebalance Assistant for multiple-portfolio optimization use. For more information, see [Selecting Profiles in Rebalance Assistant](#).

2. Select an Optimization Method

When you create a new profile, you need to first select an optimization method, either single optimization, sensitivity optimization, or frontier optimization. You will also need to select the associated risk model(s). Note that these properties are permanently linked to the profile and cannot be changed within this profile. If you want to change the rebalance method or risk model, you need to create another rebalance profile. For more information, see [Select Optimization Method](#).

Note that when you create a new profile from the Rebalance Assistant, only single optimization method is available. In addition, you can copy the optimization settings from another profile.

3. Select One or Two Risk Models

Barra PortfolioManager allows you to select two risk models when rebalancing portfolios. You can use a primary risk model to maximize utility in the objective function and place additional constraints on the secondary risk model. Also, you can use a second risk model to customize the utility function with multiple risk terms. For more information, see [Using Dual Risk Models](#).

4. Start the Profile Manager

The Profile Manager enables you to add and edit settings to your profile, and then run a rebalancing of your portfolio from those settings. You can rebalance a portfolio once, save those settings, then change the settings and rebalance again until you find the optimal profile for your purposes.

The Profile Manager runs on the MSCI Optimizer. When you select an optimization type and method (in section 2 above), Barra PortfolioManager opens the Profile Manager with the settings required for that optimization type, with default values included. For more information, see [Edit Default Settings](#).

5. Enter the Profile Settings

Beyond the default settings that come with your selected optimization method and type, there are over 60 optional settings you can add to rebalance your portfolio. You click the **Add** button in the upper left corner of the Profile Manager to display the available settings. When you select a setting, the right pane of the Add Settings box displays a general definition of what the selected setting does and how you enter values. For more information, see [Enter Profile Settings](#). To see details on the available settings, see [Appendix 3](#).

6. Review the Profile Settings

After entering settings, you can review the settings using the Settings Summary. The Settings Summary allows you to review a comprehensive summary of the rebalance settings, and provides a searchable list of the settings for your active profile. The Summary provides a flexible method for adding, searching, filtering, viewing settings conflicts, and enabling or disabling settings, among other things. You can search by keyword for a particular setting, and you can also export the complete list of settings to Excel. For more information, see [Review Profile Manager Settings](#).

7. Save the Profile

After entering the desired settings, you can Save and Close, which saves the active profile to the platform so that it can be used as the default profile for the next rebalance period. Each profile can

subsequently be named and saved to the platform as a permanent profile, or revised with edits that can then be saved to the platform as optimization reports ("iterations") that will allow you to see the impact of your changes on the rebalancing process. For more information, see [Save the Profile](#).

Now that you have created your profile, you are ready to begin rebalancing.

Rebalancing Your Portfolio

The Rebalance Tool lets you apply the profile you created to a portfolio and generate a range of optimal portfolios. These optimal portfolios reflect the results of rebalancing as well as any immediate revisions, or overrides, you choose to make to the profile. The Rebalance Tool organizes and tracks these revisions and iterations and their corresponding results. You can:

- Run multiple optimization jobs (iterations) and evaluate different proposals during a single rebalance cycle. Each rebalance cycle can begin with a strategic default profile, which can then be modified with tactical (override) decisions.
- Track the value of your investment process by comparing many intermediate and reference portfolios (point in time and over time) that let you see the trade-off between alpha (opportunity) and risk control (diversification).
- Work with the optimizer in a highly interactive process that allows for trial and error with complex cases.

For more information about any of the topics in this section, see Chapter 3. [Rebalancing Your Portfolio](#).

8. Access the Rebalance Tool

To access the Rebalance Tool, go to **Tools > Barra > Portfolio Construction > Rebalance Tool** and select the following:

- an initial portfolio
- a date (data/analysis date)
- a profile to rebalance

9. Run the Rebalance Tool

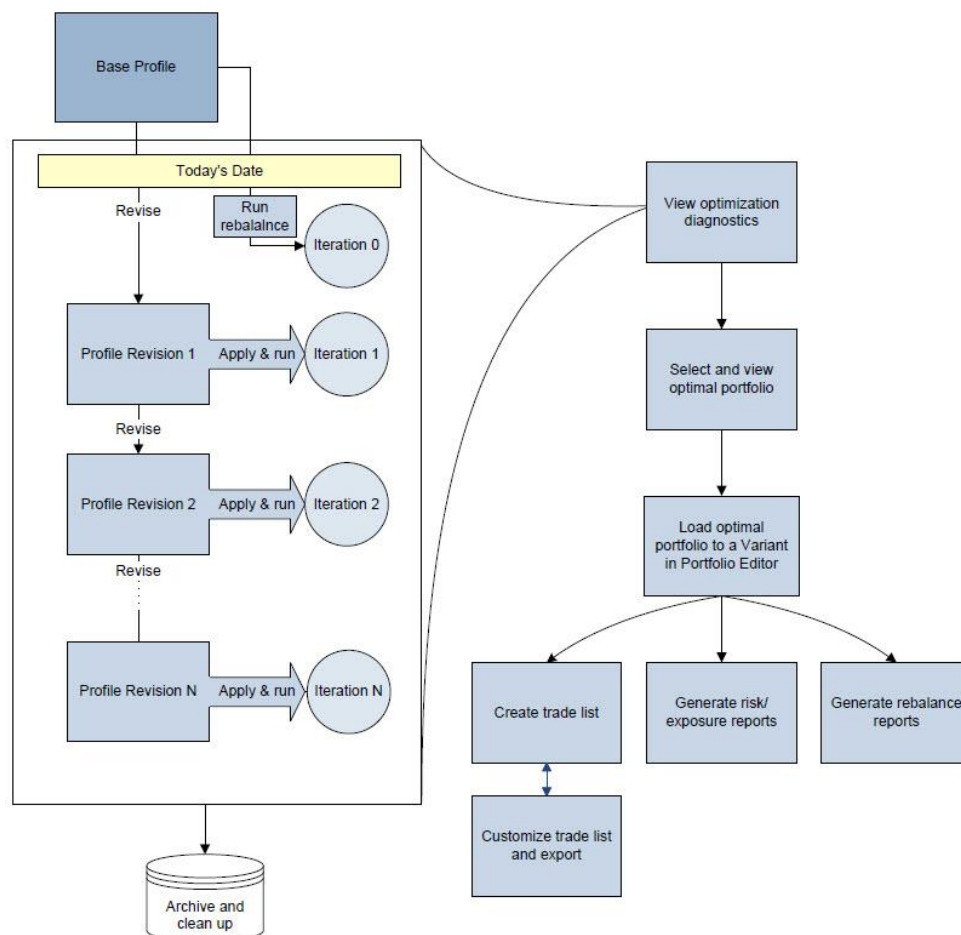
Create the first iteration for the given parameters by clicking the **Run** icon. After this first iteration is created, you can create numerous versions of this portfolio by right-clicking on the desired iteration statistics and selecting **Revise and Run**. This re-opens the Profile Manager and allows you to make changes to the settings of the stored profile. You can then select **Apply and Run** to rerun the optimizer with the new settings and store the new iteration. For more information, see [Running the Rebalance Tool](#).

10. Create Iterations

After each iteration you run, you are returned to the Rebalance Tool, where you can create another iteration of the same profile, or select a new profile to rebalance. The revised iterations are temporary overrides to the saved profile; the Rebalance Tool organizes and tracks these revisions with their corresponding results. When the next rebalance period occurs, you can use any of your stored

iterations, or make changes to a stored iteration, to reflect a new investment situation or test a new approach. For more information, see [Creating Iterations](#).

Portfolio Rebalancing Daily Work Flow
Barra Portfolio Manager



11. Compare Your Iterations

The iteration tables provide summary statistics along a customizable set of columns. You can select columns to include in the chart and you can also customize the chart tabs. Any customization will be saved as part of the workspace.

For more information, see [Comparing Iterations](#).

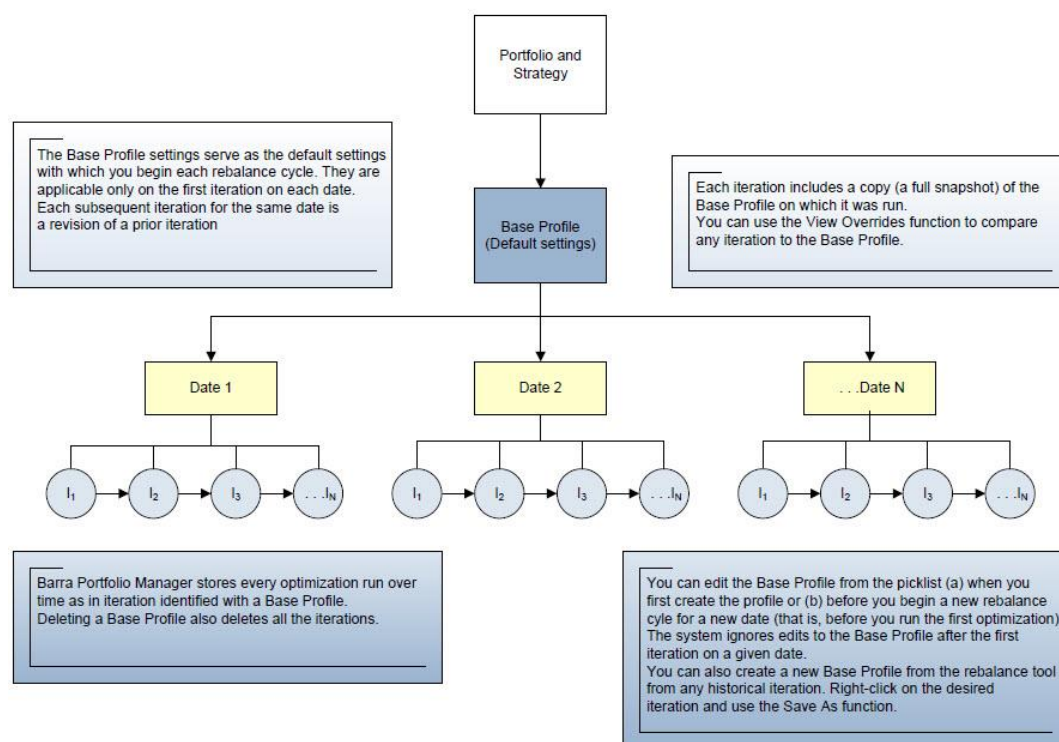
12. Revise Profile and Run

Each iteration stores the Base Profile and any overrides you apply. When you revise and run an iteration, you are making revisions to the previous iteration and the settings used in that Base Profile. So for example, Iteration 3 is making revisions to iteration 2, which in turn is making revisions to the first rebalance (iteration 1) created using the Base Profile. All iterations are revisions of the previous iteration and all iterations are stored for the selected date. If you want to make changes to an existing Base Profile for a particular date, make these changes before you generate iterations.

If you like a particular iteration, you can permanently save the iteration using **Save Profile As**. When you use Save Profile As, you are taking an iteration and using it to make a new Base Profile. This new Base Profile, for instance Base Profile 2, will have different settings from Base Profile 1 because it contains the changes made in the various iterations. All iterations for that date will now be linked to the new Base Profile 2.

To make changes to a Base Profile for future iterations, select the Base Profile from the Picklist, open the Profile in the Profile Manager, and make the necessary changes. Note that only the profile owner or system administrator can make edits to a profile that is saved to the platform. For more information, see [Revise Profile and Run](#).

Using Base Profiles in Rebalance Cycles Barra Portfolio Manager



13. Compare Default Profile to Edited Profile

If you are editing an existing profile, you can compare the default profile saved to the platform against the current profile being modified using the View Overrides function. For more information, see [Comparing Default Profile to Edited Profile](#).

Working with Rebalance Results

When you have finished your rebalancing process, you are ready to work with the results.

For more information about any of the topics in this section, see Chapter 4. [Working with Rebalance Results](#).

14. Manage Your Picklist

After analyzing and running iterations, you can view all your iterations and the iteration details by selecting them from the Iteration picklist. All iterations generated in the active workspace are added in the picklist and grouped by portfolio; they are permanently saved on the platform until you delete them. You can manage your iteration picklist and specify iteration settings that allow you to:

- specify the number of iterations you want to display (the stack is limited to 25, in chronological order)
- add iterations from the platform (from other users or historical iterations)
- add an alias for your iterations and add the alias to the Toolbar
- add a dynamic alias, which links an alias to the latest iteration

For these options, go to the Iterations Picklist and click **Settings**. For more information, see [View Iteration Reports](#).

15. View Optimization Reports

Iteration reports use the stored results of the optimization as their data. There are two pre-optimization reports that are used as diagnostic tools to analyze the profile and the profile settings that were passed to the optimizer. This allows you to evaluate your optimization results and judge the effectiveness of the optimization settings you selected.

To view these reports, go to **Reports > Barra > Rebalance** and select these reports from the menu:

- Optimization Settings Review Report
- Optimization Asset Detail Review Report

For more information, see [View Optimization Reports](#).

16. View the Optimization Summary Report

The Optimization Summary Report is a post-optimization diagnostic report that helps you analyze the impact of the optimization on portfolio-level values. The report displays a summary of the profile settings and input values and compares the portfolio-level values for the initial portfolio and the optimal portfolio.

To view this report, go to **Reports > Barra > Rebalance** and select **Optimization Summary**.

For more information, see [View Optimization Summary Report](#).

17. View Optimal Portfolios

When you have an iteration that you like, right-click on the iteration and select **View Optimal**, which allows you to view and load the optimal iteration as a variant of the initial portfolio. When you select View Optimal, you open a dialog box that lets you either link your iteration to an existing variant, or

create a new variant by entering a variant name and the analysis settings for the new variant. After selecting or creating the variant, you will automatically open the Portfolio Editor, if the Portfolio Editor is not already open. Note that you need to have an open Portfolio Editor with an active variant to view exposure or risk reports. In the Portfolio Editor, you can make manual edits to your portfolio, view or edit the trade list, and export the trade list to Excel.

For more information, see [View Optimal Portfolios](#).

18. View the Rebalance Reports

You can evaluate the effectiveness of your strategies by viewing the rebalance reports. These reports provide point-in-time data as a snapshot of rebalance activity on a single date.

To view these reports, go to **Reports > Barra > Rebalance**, and select from the following reports:

- Transaction Summary
- Rebalance Portfolio Risk Summary
- Rebalance Risk Attribution
- Rebalance Factor Exposure

For more information, see [View Rebalance Reports](#).


19. Create the Trade List

The Trade List captures the trades needed to convert the initial Portfolio to the Optimal Portfolio proposed by the Optimizer. The Trade List contains information such as the number of shares required to be traded (based on the suggested optimal portfolio), the type and value of the trade, the initial and final holdings, the final value, and the transaction costs of these trades. You can manually edit trades and/or final holdings before submitting the trade list to the market.

To access the Trade List, open the Portfolio Editor (**Tools > Barra > Portfolio Editor**), and select the **Trade List** tab.

For more information, see [Create the Trade List](#).

20. Customize and Export the Trade List

When you are satisfied with your final trade list, you can customize the format of the list before exporting. To do this, click the  icon and select **Custom Export**.

You can:

- Customize the Trade Type codes, so that the trade codes are compatible with your trade execution system.
- Choose to include or exclude the Asset ID column, in case you have added your own explicit ID Type using the Descriptive Data Attributes.
- Select the method for exporting the list, including email, a mail attachment, or Excel.
- Select the output type (CSV, Excel, Delimited, etc.) and the format associated with that type.

For more information, see [Customize and Export the Final Trade List](#).

21. Archive and Clean Up

To complete the rebalance process, you can archive a specific iteration of the optimal portfolio and delete other iterations that you no longer want. Archiving allows you to save the output portfolios to the platform.

You can also save the profile associated with an iteration to use as a base profile in the next rebalance cycle. To do this, right-click the iteration and select **Save As**.

For more information, see [Archive and Clean Up](#).

Advanced Features

These are features you can use as part of the portfolio construction process.

For more information about any of the topics in this section, see Chapter 5. [Advanced Features for Rebalancing](#).

Dynamic Grouping Schemes

A grouping scheme allows you to define how you will group your assets for reporting and portfolio construction. There are two types of grouping schemes you can create:

- Static grouping schemes allow you to define fixed ranges (or breakpoints) for each group.
- Dynamic grouping schemes allow you to group assets based on their ranking in a defined group; this ranking changes by date, according to the relative value of the asset attribute and universe. As the daily values of your asset attribute and universe change, the system automatically changes the assets contained in the group.

Dynamic grouping can be a useful tool for portfolio construction. When rebalancing, you can create dynamic grouping schemes with asset level holdings, constraints or penalties. Then you can define asset-level bounds by group, instead of individually by asset.

To create both dynamic and static grouping schemes, go to **Tools > Barra > User Data Tools > Setup Asset Grouping Scheme**.

For more information, see [Dynamic Grouping Schemes](#).

Creating/Customizing a Reusable Workspace

There are many ways to customize your workspace to make your routine tasks quick and easy. All customization will be saved as part of your workspace.

For more information, see [Creating or Customizing a Reusable Workspace](#).

Sharing Iterations and Historical Iterations

Barra PortfolioManager allows you to see the rebalance results of other users within your workgroup or client ID, depending on your workgroup permission settings. Using the Rebalance Tool, you can select other users that have generated results using the same key inputs --Portfolio, Date, and Profile. This allows you to compare your own results to the results and research of others in your production account.

For more information, see [Sharing Iterations and Historical Iterations](#).

Sharing Rebalance Profiles

You can share your rebalance profiles with other users just as you would share portfolios; in the Rebalance Profile picklist, use the **Add From Platform** button to search through existing picklists and add them to your own.

For more information, see [Sharing Rebalance Profiles](#).

Using Portfolio Attributes Across Accounts

Portfolio attributes are descriptive properties about the data in a portfolio. They point to specific data such as the benchmark, universe, currency, or cash flow. In the Profile Manager, portfolio attributes enable you to set up a rebalance profile that you can apply across multiple accounts.

For more information, see [Portfolio Attributes](#).

Using Rebalance Assistant for Multi-Portfolio Optimization

The Rebalance Assistant enables you to rebalance and optimize a large number of portfolios in a single batch rebalance cycle for a specific analysis date. You can use a single rebalance profile to rebalance all the portfolios or you can use a distinct rebalance profile for each portfolio.

For more information about the Rebalance Assistant, see [Using the Rebalance Assistant](#).

Troubleshooting Optimization

Barra PortfolioManager allows you to save as a report the iteration information from a failed optimization. This unformatted report displays the inputs submitted to the optimizer in the failed iteration. This information can then be downloaded and saved as a file that can be sent to your MSCI consultant for troubleshooting and help with the debugging process.

If you see a failed optimization in the Rebalance Tool iteration list, you can right-click the failed iteration, select **Revise and Run**, and then select the **Save Debug Info** option in the Profile Manager. When you click **Apply and Run**, the system will generate the Debug information, and save it for the next seven days before it is automatically deleted. For more information, see [Troubleshooting Optimization](#).

Chapter 2. Creating a New Rebalance Profile

Overview

A rebalance profile establishes the settings and options required to run an optimization and portfolio rebalance. The Optimizer can:

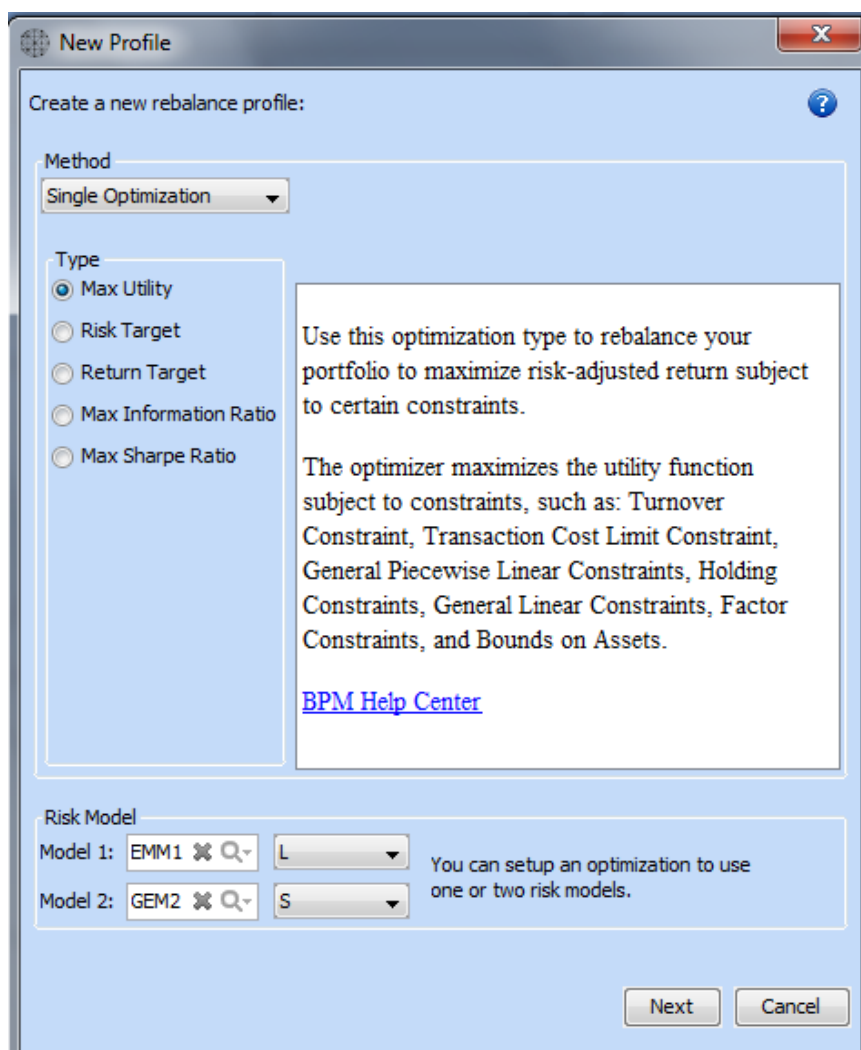
- construct a passive portfolio to track an index or benchmark
- optimally weight your universe by incorporating estimates of relative attractiveness
- implement tilts toward factors that you expect to do well by assigning expected returns to industries, risk indices, and specific assets
- optimally weight a set of managed portfolios of varying styles to track an aggregate benchmark

Optimization creates an optimal portfolio by trading assets found in the initial portfolio (the portfolio you want to optimize) and the universe portfolio (the list of all assets eligible for consideration for inclusion in a portfolio). The goal is to maximize utility while taking into account any user-specified optimization settings. Beyond the default settings that come with your selected optimization method and type, there are over 60 optional settings you can add to rebalance your portfolio. These combined settings, both default and user-selected, are called a Rebalance Profile. For an overview of the complete rebalancing process in Barra PortfolioManager, which includes optimization, see [Rebalance Walkthrough](#).

Create a New Profile

To create a new profile, you need to define an optimization method and select [one or two risk models](#) that will be linked to the profile. Your choice of optimization method will determine the range and type of settings available as you continue setting up the optimization.

To begin creating a new rebalance profile, go to the **Profiles** picklist and select **Add New Item**. The New Profile box appears.



Remember that the optimization method and the risk model are linked specifically to the profile and cannot be changed within the profile. To change these two profile options you need to create a new profile with new options.

Notes:

- You can create a new rebalance profile for batch optimization use directly from the Rebalance Assistant, from scratch or copy the optimization settings from an existing rebalance profile. For more information, see [Create a new profile using Rebalance Assistant](#).
- You can create a new backtest profile directly from the Backtest Tool, from scratch or copy the optimization settings from an existing rebalance profile. For more information, see [Creating Backtest Profiles](#).

Select an Optimization Method

Select a method from the drop-down menu. The method you select determines the types that are available.

Type of Optimization	Description	Supported By
Maximum Utility	Use this optimization type to rebalance your portfolio to maximize risk-adjusted return subject to certain constraints. The optimizer maximizes the utility function subject to constraints, such as: Turnover Constraint, Transaction Cost Limit Constraint, General Piecewise Linear Constraints, Holding Constraints, General Linear Constraints, Factor Constraints, and Bounds on Assets.	<ul style="list-style-type: none"> Rebalance Tool Rebalance Assistant Backtest Tool
Risk Target	Use this optimization to achieve a portfolio that represents the optimal tradeoff between a target level of risk and the maximum level of return available at that level of risk.	<ul style="list-style-type: none"> Rebalance Tool Rebalance Assistant Backtest Tool
Return Target	Use this optimization to achieve a portfolio that reflects the level of return you specified along with the minimum level of risk attainable at that level of return.	<ul style="list-style-type: none"> Rebalance Tool Rebalance Assistant Backtest Tool
Maximum Sharpe Ratio	As an alternative to mean-variance optimization, use this objective function to maximize the Sharpe Ratio (SR), which is defined as the excess return of a portfolio divided by its total risk. Only standard constraints are supported with this type of objective function. No penalty terms are allowed in the objective. For more information, see the research paper Maximizing the Sharpe Ratio and Information Ratio in Barra Optimizer.	<ul style="list-style-type: none"> Rebalance Tool Rebalance Assistant Backtest Tool
Maximum Information Ratio	As an alternative to mean-variance optimization, use this objective function to maximize the information ratio (IR), which is defined as the active return of a portfolio divided by its tracking error. Only standard constraints are supported with this type of objective function. No penalty terms are allowed in the objective. For more information, see the research paper Maximizing the Sharpe Ratio and Information Ratio in Barra Optimizer.	<ul style="list-style-type: none"> Rebalance Tool Rebalance Assistant Backtest Tool
Sensitivity	Use method to determine the sensitivity of your portfolio to a single parameter such as risk. You can generate multiple single optimization jobs by varying the parameter in the rebalance profile along a range of values. You can specify the range of parameter values using incremental steps or distinct points. You can copy your range of values from Excel, and you can copy settings from an existing portfolio.	<ul style="list-style-type: none"> Rebalance Tool Backtest Tool
Utility-Turnover	A frontier optimization delivers a set of optimal portfolios for varying parameters.	<ul style="list-style-type: none"> Rebalance Tool Backtest Tool

Type of Optimization	Description	Supported By
Risk-Return Frontier: Vary Risk	The Utility-Turnover Frontier charts the path to the frontier from the initial portfolio as a function of increasing turnover. Each portfolio on the frontier represents the optimal tradeoff of risk and return implied by your risk aversion and return expectations, with turnover constrained at various levels along the frontier. You might use a utility-turnover frontier when it seems costly to make the initial portfolio efficient, and you want to determine if a portfolio with higher or lower turnover is substantially better in terms of risk and expected return.	Rebalance Tool
	A frontier optimization delivers a set of optimal portfolios for varying parameters. The Risk-Return Frontier is a set of optimal portfolios at differing levels of return and risk. Each portfolio on the frontier offers the highest possible expected return at its level of risk. In the Vary Risk Frontier, you select varying levels of risk.	
Risk-Return Frontier: Vary Return	A frontier optimization delivers a set of optimal portfolios for varying parameters. The Risk-Return Frontier is a set of optimal portfolios at differing levels of return and risk. Each portfolio on the frontier offers the lowest possible risk at its level of expected return. In the Vary Return Frontier, you select varying levels of return.	Rebalance Tool
Multiple-Period Optimization - Max Utility	Multiple-Period Optimization enables you to set up portfolios for future rebalances and the corresponding alpha and transaction cost forecasts. Use Multiple-Period Optimization to optimally schedule your trading to minimize transaction cost and risk over discrete periods in the trading period.	<ul style="list-style-type: none"> • Rebalance Tool • Backtest Tool

Select Risk Model(s)

At the bottom of the New Profile box, select one or two risk models to use in your rebalance profile.

- You can select either one or two risk models.
- You can select the same risk model with different horizons (long or short)

Using Dual Risk Models

Barra PortfolioManager allows you to select two risk models when rebalancing portfolios. You can benefit from this feature in two ways.

You can use a primary risk model to maximize utility in the objective function and place additional constraints on the secondary risk model. For example, the secondary model could be a constraint such as an external mandate. You apply risk constraints, but you set risk aversion to zero in the utility function for the secondary model.

Also, you can use a second risk model to customize the utility function with multiple risk terms. You can specify factor or risk constraints such as:

- active risk relative to policy risk model/total risk relative to secondary risk model
- long horizon/short horizon
- normal risk environment model/extreme risk environment model

With the new Custom Factor Attribution tool, you can set up a custom model with your preferred factor structure, and then use it as a secondary model in your rebalance profile. For more information about creating custom models, see [Using the Custom Factor Attribution Tool](#) in the Barra PortfolioManager Help Center.

Edit Default Settings

After you complete the New Profile screen and click **Next**, the Profile Manager opens.

The Profile Manager consists of a Settings Summary at the top and a detail pane below. Click any setting in the summary to see its details below.

The Profile Manager displays the minimum required settings for the selected optimization type, including default values for some of the settings. This gives you a shell in which you can build your rebalance profile. Some of the settings may be mandatory. The mandatory settings are marked with a red exclamation point, and appear in red type if you skip them.

The default settings included for all optimization types are:

- Reference > Reference Properties
- Optimization > Optimization Settings

In addition, depending on the optimization method and type you selected, the Profile Manager may contain other default settings. For more information about the other default settings for each optimization type, see [Optimization Type Settings](#).


Reference Properties

You can use the Reference Properties settings to specify the following:

- primary and secondary benchmark
- market
- universe
- names for saving optimal and final portfolio
- currency (mandatory)
- base value

Set Primary and Secondary Benchmarks

The Profile Manager opens with the default primary benchmark as cash. If you want to set a different benchmark, do the following:

1. In the Settings Summary, under Reference Properties, click **Primary Benchmark**.
2. Click the  icon and select **Portfolio** or **Portfolio Attribute**.
3. Double-click in the blank box to select a portfolio or portfolio attribute or click **New** to create a new portfolio or portfolio attribute.
4. To set a secondary benchmark, follow steps 2-3 on the Secondary Benchmark field.

If you want to set additional benchmarks, see [Reference Settings](#) in Appendix 3.

Set Market and Universe

You can set your market to cash, a portfolio, or a portfolio attribute. You can define your universe using a portfolio or a portfolio attribute.

1. In the Market field, click the arrow icon to set your input type.
2. Double-click in the blank box to select a portfolio or portfolio attribute or click **New** to create a new portfolio or portfolio attribute.
3. In the Universe field, click the arrow icon to set your input type.

4. Double-click in the blank box to select a portfolio or portfolio attribute or click **New** to create a new portfolio or portfolio attribute.

Specify Optimal and Final Portfolio Names

You can select one of the following options for the Optimal Portfolio Archive setting:

- Auto-naming (default): Barra PortfolioManager automatically archives the optimal portfolio with the name format: *archive-<initial portfolio name>-<rebalance profile name>-<username>*.
- Portfolio: Specify an archive portfolio to which the optimal portfolio will be appended on successful rebalancing.
- Portfolio Attribute: If you are creating a rebalance profile for a Rebalance Assistant job, you can select a portfolio attribute that maps portfolios in the job to distinct archive portfolios.

Similarly, you can select a portfolio or a portfolio attribute to set the Final Portfolio Archive name.

Set Currency

1. In the Reference Properties detail box, scroll down to the Currency drop-down list.
2. Click the arrow, and then click the three-letter code for the portfolio's primary currency.

Optimization Settings

Optimization Settings for each type of optimization are automatically added to the Profile Manager. Some of these settings are the fundamental characteristics of the optimization type and method you selected and therefore cannot be edited. They must remain unchanged as you perform rebalances and generate associated results over time. In addition, there might be required settings that you need to specify.

The following sections describe the default settings included for each optimization type.

Max Utility

When you select this optimization type, the Profile Manager includes the Custom Utility > Primary Risk Terms setting by default. You can use this to add a primary risk term to your custom utility. For more information, see [Custom Utility Settings](#). The Primary Risk Term setting is available as an optional setting for other optimization types.

Risk Target

When you select this optimization type, the Profile Manager includes the Risk Target (%) setting by default. Enter a risk target if you want your optimized portfolio to represent the optimal tradeoff between a specified target level of risk and the maximum return available at that level of risk. The number you enter represents a percentage, e.g. 2 = 2 percent. If you have specified a benchmark portfolio in the Reference Settings, this number represents active risk; if not, it is total risk. During optimization, the optimizer may find that the risk target you entered is not feasible within your specified universe and constraints. If so, Barra PortfolioManager tells you what the closest attainable risk is.

Return Target

When you select this optimization type, the Profile Manager includes the Return Target (%) setting by default. Enter a return target if you want your optimized portfolio to represent an optimal tradeoff between a specified target level of return and the minimum level of risk attainable at that level of return. The number you enter represents a percentage, e.g. 2 = 2 percent.

During optimization, the optimizer may find that the return target you entered is not feasible within your specified universe and constraints. If so, Barra PortfolioManager tells you what the closest attainable risk is.

Max Sharpe Ratio

When you select this optimization type, the Profile Manager includes the Custom Utility > Expected Return setting by default. You can use this to add a primary risk term to your custom utility. For more information, see [Custom Utility Settings](#). The Expected Return setting is available as an optional setting for other optimization types.

Max Information Ratio

When you select this optimization type, the Profile Manager includes the Custom Utility > Expected Return setting by default. You can use this to add a primary risk term to your custom utility. For more information, see [Custom Utility Settings](#). The Expected Return setting is available as an optional setting for other optimization types.

Sensitivity

When you select this optimization type, the Profile Manager includes the following additional default settings:

- Optimization > Sensitivity
- Custom Utility > [Primary Risk Terms](#)

Sensitivity Settings

You must first add the parameter you want to vary as a setting/constraint to your rebalance profile. The range of parameters you can vary depends on what you have added to the rebalance profile.

- Varying Node: The drop-down list displays the settings/constraints that you have added to the profile.
- Vary Parameter: Depending on the node that you select, the drop-down list displays the parameters that you can vary.
- Method: Select either a linear or distinct method of variation. Select **Linear** to use incremental steps or select **Distinct** to use distinct points.
 - Linear settings - For this method, you can use only numeric values.
 - Start Value: Specify the start value of your varying parameter.
 - Step Value: Specify the incremental value for your varying parameter.
 - Max # of points: Specify the number of increments you wish to apply. For instance, if you want to start with 2 and end with 6, and your step value is 1, your maximum number of points is 5.
 - Distinct settings - For this method, you can enter multiple data types, such as absolute numeric values, portfolio attributes, or asset attributes depending on the metadata of the target parameter. For more information on the allowable syntax, see [Rules for Entering Relative Constraints](#).

- Value: Specify the values for varying your parameter. You can enter multiple values by pressing the Enter key.

Utility Turnover

When you select this optimization type, the Profile Manager includes the following additional default settings:

- Optimization > Frontier Utility
- Custom Utility > Primary Risk Terms and Expected Return (see [Custom Utility Settings](#))

Frontier Utility Settings

- Vary Parameter: This is set to **Turnover** and cannot be edited.
- From (%): Specify the starting value for varying your turnover. For example, if you want to start at 12%, enter 12.
- To (%): Specify the maximum value for varying your turnover. For example, if you want to stop at 16%, enter 16.
- Max # of points: Specify the number of levels at which you want to constraint the turnover. For example if you enter 3, the turnover will be constrained at 12%, 14%, and 16%.

RRF Vary Risk

When you select this optimization type, the Profile Manager includes the following additional default settings:

- Optimization > Frontier Risk
- Custom Utility > [Expected Return](#)

Frontier Risk Settings

- Vary Parameter: This is set to **Risk** and cannot be edited.
- From (%): Specify the starting value for varying your risk. For example, if you want to start at 1%, enter 1.
- To (%): Specify the maximum value for varying your risk. For example, if you want to stop at 3%, enter 3.
- Max # of points: Specify the number of levels of risk for which you want to generate portfolios. For example if you enter 3, the optimization will use three levels of risk - 1%, 2% and 3%.

RRF Vary Return

When you select this optimization type, the Profile Manager includes the following additional default settings:

- Optimization > Frontier Return
- Custom Utility > Primary Risk Terms and Expected Return (see [Custom Utility Settings](#))

Frontier Return Settings

- Vary Parameter: This is set to **Return** and cannot be edited.
- From (%): Specify the starting value for varying your return. For example, if you want to start at 4%, enter 4.
- To (%): Specify the maximum value for varying your return. For example, if you want to stop at 8%, enter 8.
- Max # of points: Specify the number of levels of return for which you want to generate portfolios. For example if you enter 3, the optimization will use three levels of return- 4%, 6%, and 8%.

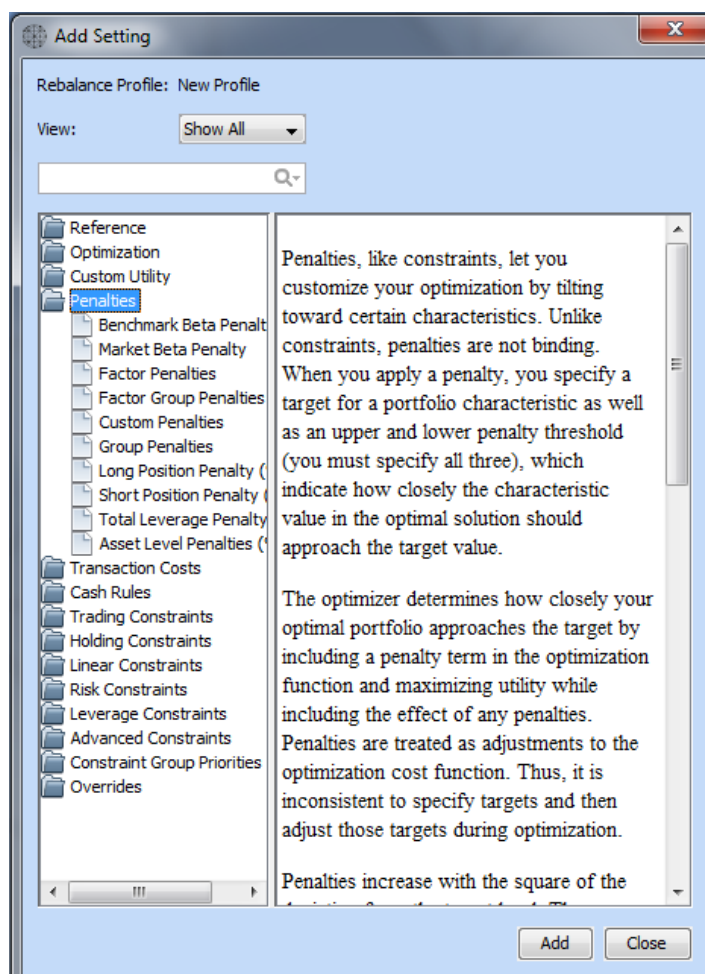
Enter Optional Profile Settings

Beyond the default settings that come with your selected optimization method and type, there are over 60 optional settings you can add to rebalance your portfolio. These optional settings are categorized in the following groups:

- Reference
- Optimization
- Custom utility
- Penalties
- Transaction costs
- Cash rules
- Trading constraints
- Holding constraints
- Linear constraints
- Risk constraints
- Leverage constraints
- Advanced constraints and Constraint Group Priorities
- Overrides

To see the detailed descriptions of all the available optional settings, see [Appendix 3](#).

To find and select a setting, click **Add** in the upper left corner of the Profile Manager. The categories listed above appear as folders in the left pane of the Add Setting box. The right pane of the Add Setting box displays definitions of the categories and settings and how to use them.



You can use the View list to filter the categories to General, Utility Terms, or Constraints. If you want to search for a particular setting, you can enter it in the Search field. The left pane displays matches.

When you find the setting you want, click **Add**. If you have no more settings to add, click **Close** to close the Add Setting box and edit the setting in the Profile Manager.

The right pane of the Add Setting box describes each setting and indicates the rules for data entry. For many of the settings, you will need to have imported portfolio and asset attributes. All of the settings involve entering numbers that are either percentages or scalar values. To see a list of all these rules in one place, see [Appendix 4: Rules for Entering Relative Constraints](#).

Note: It is important to give due consideration to your selection of portfolio rebalance settings. Some are only compatible with certain optimization types. For instance, a short position penalty is not applicable to an optimization type that does not allow short positions. Also, it is important to consider what you actually need in your rebalancing. Some constraints can limit the chances that the optimizer will find the problem feasible and deliver an optimal portfolio.

Review the Profile Manager Settings

The Settings Summary allows you to review a comprehensive summary of the rebalance settings for your active profile. The Summary provides a flexible method for adding, searching, filtering, viewing settings conflicts, and enabling or disabling settings, among other things. You can search by keyword for a particular setting, and you can also export the complete list of settings to Excel.

To access the Summary, you can either:

- double-click on a profile in your picklist and open the Profile Manager
- open the Rebalance Tool, right-click on an iteration and select **Revise and Run**

The Rebalance Settings Summary is the top portion of the Profile Manager view.

The full list of options is provided in this table:

Feature	Description
Add a setting	Use the Add feature to create new settings for the profile. See the previous section called Adding Optional Settings for more information.
View profile categories	Use the Category drop-down box to selectively view settings: you can display all settings, general, utility terms, or constraints settings.
Filter profile settings	Use the Filter drop-down box to display disabled, enabled, or mandatory settings, as well as soft constraints and settings labeled as high, medium, and low importance.
Search	Use the Search box to enter a keyword and search the settings.
Status	View this column to see whether the setting is enabled or disabled for the specific iteration of the Optimizer.
Priority	View this column to see the constraint priority (including "soft") for the setting.
Enable/disable setting	Select a setting, right-click and select either Enable or Disable . When you enable a setting, the system automatically checks for conflicts and displays any conflicts in the Message column. You can <i>enable</i> an individual setting row within a node; however, if you <i>disable</i> a setting, the complete setting node is disabled. Note that you can only disable optional settings; if there are no optional settings to disable, the disable function is inactive. The Status column indicates whether the setting is enabled or disabled.
Disable related conflicts	Select a setting, right-click and select Disable Related Conflicts . The nodes that are in conflict are disabled, but the actively selected node remains active and part of the profile. If there are no related conflicts, the option is disabled.
Remove	Select a setting, right-click and select Remove . The highlighted setting row is removed.
Remove related conflicts	Select a setting, right-click and select Remove Related Conflicts . The nodes that are in conflict are removed, but the actively selected node remains active and part of the profile.

Save the Profile

When you have finished reviewing and changing your profile settings, you can save the active profile to the platform. The new profile is automatically added to the Profile Picklist, which lists all profiles from the active workspace. Other users will be able to view and access this profile, but only the profile owner or client administrator can save edits to the profile. If you want to make a copy of another user's profile, you can use **Save As** to rename the profile and make changes. All profiles saved in the picklist are also saved as part of the workspace.

Chapter 3. Rebalancing Your Portfolio

Introduction

The Rebalance Tool lets you apply the Rebalance Profile you created to a portfolio and generate a range of optimal portfolios. These optimal portfolios reflect the results of rebalancing as well as any immediate revisions, or overrides you choose to make to the portfolio. The Rebalance Tool organizes and tracks these revisions and iterations and their corresponding results. You can:

- Run multiple optimization jobs (iterations) and evaluate different proposals during a single rebalance period. Each rebalance period can begin with a strategic default profile, which can then be modified with tactical (override) decisions.
- Track the value of your investment process by comparing many intermediate and reference portfolios (point in time and over time) that let you see the trade-off between alpha (opportunity) and risk control (diversification).
- Work with the optimizer in a highly iterative process that allows for trial and error with complex cases.

Access the Rebalance Tool

To access the Rebalance Tool, go to **Tools > Barra > Portfolio Construction > Rebalance Tool** and select the following from the picklists:

- an initial portfolio
- a date (date/analysis date)
- a profile to rebalance

The information about the selected profile is displayed in the view, including the Rebalance Method, the Type, and the Risk Model(s).

Run the Rebalance Tool

To run the first rebalance for the selected profile, select the **Run** icon at the top of the view.



When the processing is complete, the rebalance data is displayed. Notice that an iteration is also created in the Iterations Picklist, using the same label as the iteration in the Rebalance Tool. This lets you easily access and run reports on this iteration at any time.

The Iteration list in the Rebalancing Tool displays summary statistics for the rebalancing process of each specific portfolio, date, and rebalance profile. This list serves as a job monitor as well as a way of viewing and managing the repository of rebalancing iterations. The iterations are displayed by Rebalance Method (Single Optimization, Frontier Results, or Sensitivity Results) and each row represents a single optimization run.

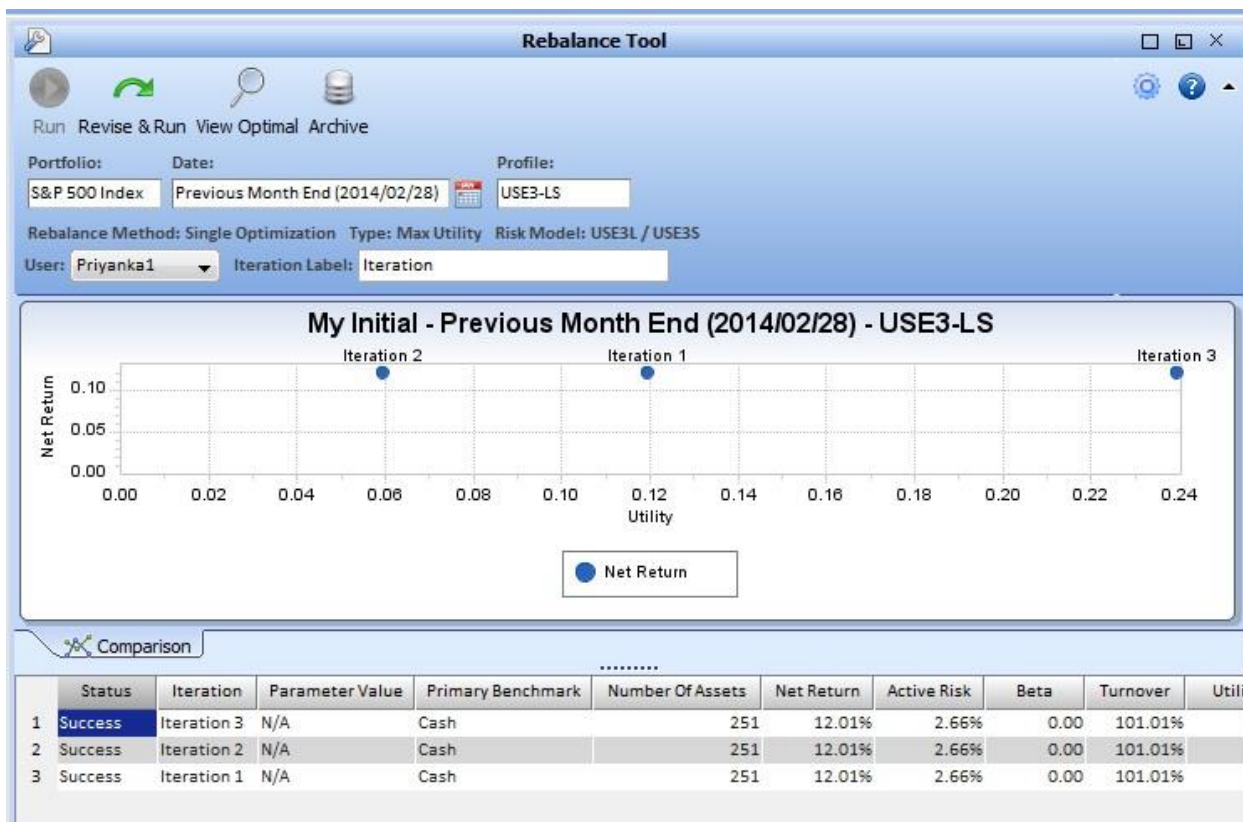
[View a graphic of the daily workflow for portfolio rebalancing.](#)

Create Iterations

After running the first rebalance for a specific profile, the **Run Rebalance** icon is disabled. To create subsequent rebalance iterations for this profile, click the **Revise & Run** icon. This opens the Profile Manager, where you can review your profile settings and make changes to the settings of the stored profile. This iterative process allows you to evaluate different proposals. You can also change the label for each iteration before running, so the label reflects the strategy of the iteration.


Note: You cannot revise the profile if you are viewing the iteration list of another user.

When you have made the desired revisions to your profile in the Profile Manager, click **Apply and Run** and the optimization process is performed with the new settings. The Rebalance Tool displays the new iteration, with sequential iteration numbering, and you can review the impact of these changes on your portfolio.



Each iteration you run is added to the iteration list in the Rebalance Tool and to the Iteration Picklist. You can mouse-over the picklist items to see the details of a particular iteration. Iterations are grouped by initial portfolio and stored in the picklist with the workspace so that you can resume where you left off, even after closing the workspace. Iterations are permanently saved on the platform, unless you delete the profile upon which the iteration is based. Only a specified number of the iterations (a maximum of the 25 most recent) are displayed in the picklist. To see an iteration that is not displayed in your picklist, or to see another user's iteration, use the Add From Platform option to add the iteration to your picklist. See [Iteration Settings](#) in Working with Rebalance Results.

Compare Iterations

After each iteration you run, you are returned to the Rebalance Tool, where you can create another iteration of the same profile, or select a new profile to rebalance. Click the  icon to add/remove columns, view the summary statistics in Excel, change the orientation of the graph and table, sort the iteration list, or delete unwanted iterations, among other things. The iteration comparison graph is automatically displayed and updated with each new iteration, and provides a customizable graph that can be exported to Excel.

Barra PortfolioManager also provides several diagnostic reports that allow you to evaluate the success or failure of the settings fed into the Optimizer for a specific iteration. These reports look at the initial data and settings with which the Optimizer created the specific iteration; the data displayed is the initial pre-optimized data, so you can clearly see the cause and effect relationship between the selected settings and the post-optimization results displayed in the iteration.

To view these diagnostic reports, go to **Reports > Barra > Rebalance**, and select one of the following reports:

- Optimization Setting Review
- Optimization Asset Detail Review
- Optimization Summary Report


In the selected report, double-click on the Iteration box to select the iteration for which you want to see the report.

Iteration:

☐ Show settings with messages

Initial Portfolio: ACME1 Date: 2011/06/30
 Rebalance profile: Active Strategy 1

	Setting	Input	Evaluate
1	General Messages		
2	Optimization terminated normally.		
3	Reference		
4	Reference Properties		
5	Primary Benchmark	My Benchmark	
6	Include Benchmark in Universe	true	
7	Currency	USD	
8	Base Value	Net	
9	Optimization		
10	Optimization Settings		
11	Method	Single Optimization	
12	Optimization Type	Max Utility	
13	Primary Risk Model	USE3-L	
14	Custom Utility		
15	Expected Return		
16	Multiplier	1	
17	Asset Level Return Source	ACME Alpha 3	
18	Primary Risk Terms		
19	Common Factor Risk Aversion	0.0075	

 Data

Updated 2011/11/07

For more information about Rebalance Reports, see [Working with Rebalance Results](#).

Revise Profile and Run

The iterations you create are overrides to the saved profile; the Rebalance Tool organizes and tracks these revisions with their corresponding results. You can continue creating and reviewing iterations until you are satisfied with the resulting portfolio. When you have created an iteration that you want to save, right-click on the iteration and select **Save Profile As**. This allows you to permanently save the iteration overrides as part of the base profile, using a name of your choice. This provides two benefits:

- You can use any of your saved iterations, or make changes to a saved iteration, when the next rebalance period occurs. This flexibility allows you to accommodate a new investment situation or test a new investment approach.
- You can save a copy of another user's iteration profile, so that a copy of that profile is listed under your own account. Because only the account owner can make changes to an iteration, it is useful to save the iteration as a profile under your own account name.

Remember that all iterations you create are linked to a base profile. If you delete a base profile, you are automatically deleting any iterations attached to the base profile. Therefore, if you are making changes to a base profile for strategic reasons, it is best to create a new copy of the base profile with a new name.

[View a graphic that explains the relationship between base profiles and iterations.](#)



Edit a Profile

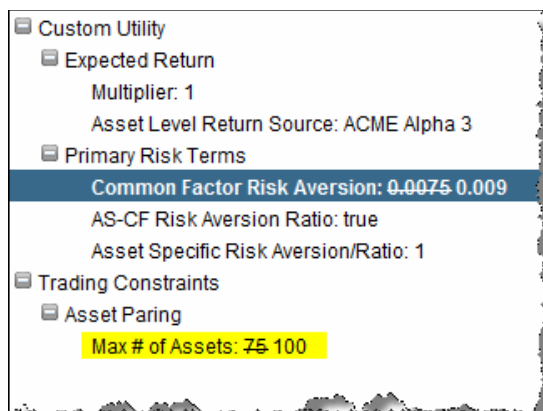
You can edit a saved profile at any time by opening the profile from the Profile picklist and making changes in the Profile Manager. It is recommended that you only edit a profile through the picklist before starting a new rebalance cycle because these edits will affect all future rebalance cycles. Note that only the profile owner or system administrator can make edits to a profile that is saved to the platform. However, you can open the profile in the Profile Manager and use **Save As** to create a copy of the profile under your own account name and make changes to that copy.

Compare Default Profile to Edited Profile

If you are editing an existing profile, you can compare the saved default profile against the profile you are currently editing by using the View Overrides function. This allows you to quickly review the differences between the saved profile and the profile iterations containing the changes you made.

To access this option, use one of these:

- Open a profile in the Profile Manager, click the  icon and select **View Overrides**, or:
- Open the Rebalance Tool, select the rebalance context (Profile, Date, Portfolio), and select an iteration to revise and run. In the Profile Manager, click the  icon and select **View Overrides**.



In the View Overrides screen, you will see:

Change	Description
Unchanged settings	Current settings are displayed. If the current and saved profiles are the same, the profile header indicates <i>Identical</i> .
Edited settings	Edited settings are displayed by striking out the old setting and showing the new values.
Added settings	Added settings are displayed using underlines.
All differences	All rows containing changed values are highlighted.
Disabled settings	Disabled settings are grayed out.

To save the changes you made to the profile, select either **Save As** or **Save & Close**.

Chapter 4. Working with Rebalance Results

View Iteration Reports

You can create an unlimited number of iterations for a specific profile using the [Rebalance Tool](#). Each iteration you create is added to the Iteration Picklist. All iterations generated in the active workspace are displayed in the picklist (up to the set limit) and the iterations are grouped by portfolio. Iteration reports rely on the iteration picklist for their contents, using the stored optimization results of the iterations as their data.

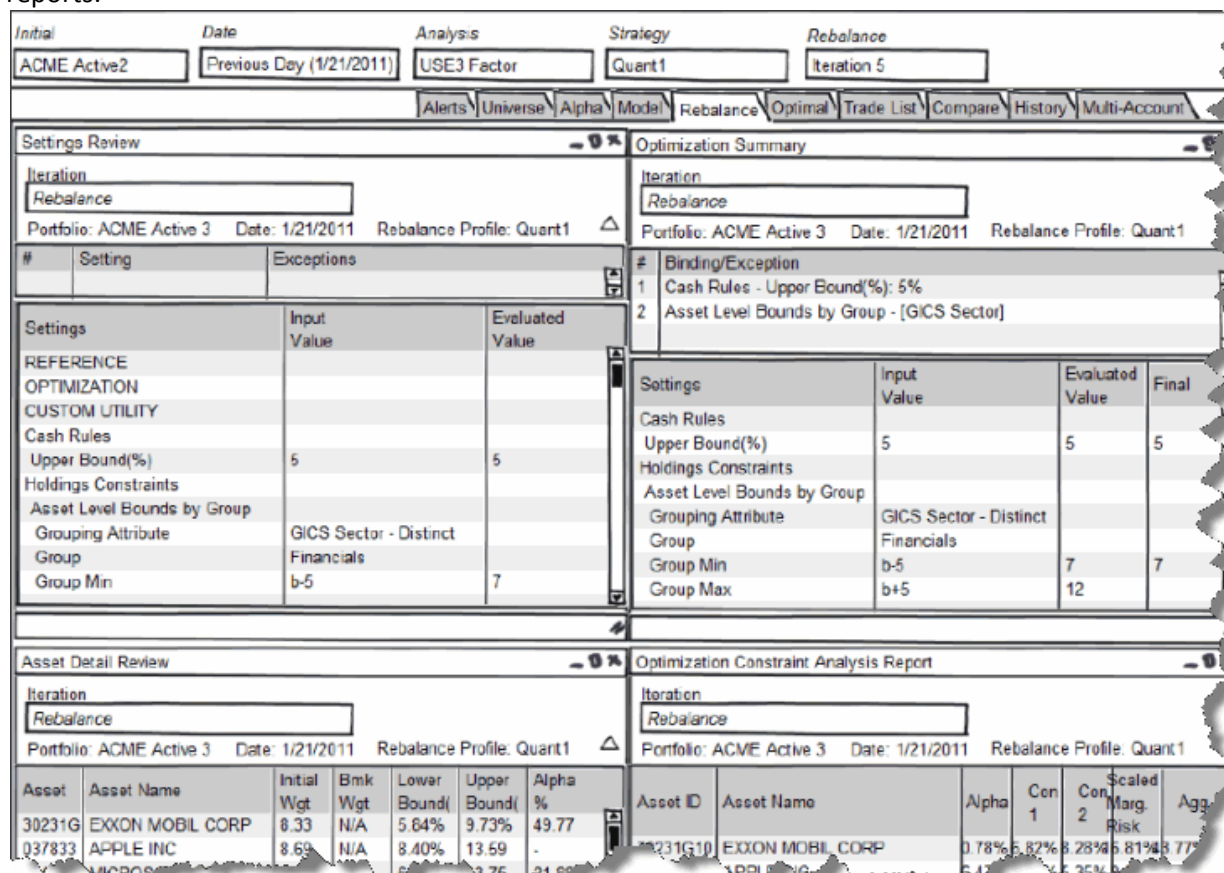
When you have finished rebalancing your portfolio, you are ready to view the reports that let you analyze your results. You can use the Iteration Picklist to view all your iterations and iteration details.

Creating and Using Iteration Settings

To manage your iterations picklist, you can specify iteration settings. To do this, go to the Iterations Picklist:

- You can add an alias for your iterations and add the alias to the Toolbar. The alias allows you to switch iterations globally, across all iteration-based reports.
- You can specify the number of iterations you want to display. Click **Settings** and enter the number of iterations (up to 25). Once the limit is reached, older iterations are replaced with newer iterations. Note that older iterations are saved on the platform and can always be retrieved.
- You can add a specific iteration from the platform. This iteration can be from another user or older iterations from a previous run date.
- You can add a *dynamic alias*, which links an alias to the *latest iteration* of the profile. This means that when you use the dynamic alias to run reports, the reports always reflect the latest rebalance run; all iteration-based reports using the dynamic alias are automatically updated to reflect the latest iteration. The latest iteration is defined as the most recent of either a completed optimization or the last iteration manually added to the picklist. For Sensitivity or Frontier optimizations, the iterations are added such that the last point on the optimization curve shows up last.

You can use the picklist to easily view a single rebalance run for your customized layout of workspace reports:



The screenshot displays the Barra Portfolio Manager interface for a Rebalance report. The top navigation bar includes tabs for Alerts, Universe, Alpha, Model, Rebalance, Optimal, Trade List, Compare, History, and Multi-Account. The main content area is divided into four panels:

- Settings Review:** Shows the iteration (Rebalance), portfolio (ACME Active 3), date (1/21/2011), and rebalance profile (Quant1). It includes a table of settings with input and evaluated values.
- Optimization Summary:** Shows the iteration (Rebalance), portfolio (ACME Active 3), date (1/21/2011), and rebalance profile (Quant1). It includes a table of binding/exceptions.
- Asset Detail Review:** Shows the iteration (Rebalance), portfolio (ACME Active 3), date (1/21/2011), and rebalance profile (Quant1). It includes a table of asset details.
- Optimization Constraint Analysis Report:** Shows the iteration (Rebalance), portfolio (ACME Active 3), date (1/21/2011), and rebalance profile (Quant1). It includes a table of optimization constraint analysis results.

Settings	Input Value	Evaluated Value
REFERENCE		
OPTIMIZATION		
CUSTOM UTILITY		
Cash Rules		
Upper Bound(%)	5	5
Holdings Constraints		
Asset Level Bounds by Group		
Grouping Attribute	GICS Sector - Distinct	
Group	Financials	
Group Min	b-5	7

Settings	Input Value	Evaluated Value	Final
Cash Rules			
Upper Bound(%)	5	5	5
Holdings Constraints			
Asset Level Bounds by Group			
Grouping Attribute	GICS Sector - Distinct		
Group	Financials		
Group Min	b-5	7	7
Group Max	b+5	12	

Asset	Asset Name	Initial Wgt	Bmk Wgt	Lower Bound(Upper Bound(Alpha %
30231G	EXXON MOBIL CORP	8.33	N/A	5.84%	9.73%	49.77
037833	APPLE INC	8.69	N/A	8.40%	13.69	-
MACRO						

Asset ID	Asset Name	Alpha	Con 1	Con 2	Scaled Marg. Risk	Agg
30231G10	EXXON MOBIL CORP	0.78%	5.82%	8.28%	5.81%	8.77%
03783310	APPLE INC	5.41%	4.41%	3.53%		

View Optimization Reports

There are two optimization reports that are used as diagnostic tools to analyze the profile and the profile settings that were passed to the optimizer. This allows you to evaluate your optimization results in light of the data entered.

To view these reports, go to **Reports > Barra > Rebalance** and select from the menu.

Optimization Settings Review Report

This diagnostic report allows you to:

- Review the settings values you entered and confirm the evaluated field value (how this value resolves to a number value).
- Confirm that any referenced profile settings (such as portfolio and asset attributes) and formulas are valid. Any invalid fields are highlighted.
- Confirm that any relative constraints are valid and that formula conditions and expressions evaluate properly.

- Review error messages that highlight field-level errors, node-level errors, or general high-level errors.

If any critical errors are detected, the iteration will be displayed with a status of "Settings Error" in the Rebalance Tool iteration list.

Optimization Asset Detail Review

This diagnostic report allows you to:

- Review asset-specific profile settings for the investible universe.
- Review the asset-level settings (the strictest bounds) that were actually passed to the Optimizer.
- Review the asset-level, country-specific, and general roundlot values passed to the Optimizer.
- Identify and review the specific holding-based rule that triggered the lower bound and upper bound source values for each asset.
- Review the optimal solution values, such as the constraint slack value, up impact to utility, and down impact to utility, for each asset after optimization.
- View individual asset status (binding or infeasible) or when a settings error occurs.
- Review total transaction costs for your assets.
- Review fixed transaction costs that include the cost of the trades in your rebalance.
- Review piece-wise linear costs that provide the optimizer with data on the indirect or implicit costs of trades.
- Review non-linear transaction costs in an optimization account for the market impact of your trades, for example, a change in stock price caused by your sale.

View Optimization Summary Report

This post-optimization diagnostic report helps you analyze the impact of the optimization on portfolio-level values. The report displays a summary of the profile settings and input values and compares the portfolio-level values for the initial portfolio and the optimal portfolio. If your optimization has failed for any reason, this report will help you understand and correct the settings that caused the failure and therefore need to be changed. The report also displays the status of the constraints applied to the portfolio, which can be any of these:

- Blank -- A blank field indicates the constraint is valid and the optimal portfolio satisfies the constraint
- Binding -- The Optimizer reached the constraint; the portfolio satisfies the constraint, but the constraint limit was reached.
- Relaxed -- The Optimizer could not find an optimized solution and the constraint was let go because the user allows the constraint to be relaxed.
- Infeasible -- The Optimizer cannot find an optimal solution that meets the constraint that must be enforced.

View Constraint Analysis

This diagnostic report helps you review the impact of constraints on your optimal portfolios. This report is also referred to as the Karush-Kuhn Tucker (KKT) report. It displays the KKT values for all assets defined in the investable optimization universe. Using this report, you can view the primary and secondary risk model penalties, all other penalties encountered during optimization, transaction costs, and other utility terms. The report also displays aggregated KKT values, such as the primary and secondary model factor constraints, miscellaneous linear constraints, turnover constraints, risk constraints, and leverage constraints. By default, this report is sorted by the alpha value. In case the alpha value is missing, the report is sorted using the optimal weight (%).

View Optimal Portfolios

When you have finished creating and reviewing iterations, you are ready to view your optimal portfolios and run the point-in time reports that analyze these optimal portfolios. To do this, you load the iterations to *variants*. A variant is a temporary snapshot of the initial portfolio that can be revised, either manually or through optimization. Using variants, you can link any number of reports to a specific iteration. You can also use the same variant to analyze and view reports for a different iteration. In this way, you can create many different snapshots of the same portfolio, and analyze and compare the effects of the changes you make.

Creating a Variant

1. Select an iteration, right-click and select **View Optimal**.
2. In the View Optimal screen, you can either select an existing variant, or create a new variant:
 - To create a new variant, enter the name for the new variant, select the **Analysis Settings** and click **View**. The Portfolio Editor opens and allows you to make additional manual changes to the variant. You can then use this variant to view reports.
 - To use an existing variant, first make sure you have an "active" variant—that is, a variant that is currently being used in either a standard risk report, or in the Portfolio Editor. This active variant must have the same portfolio + variant + date combination as the variant you want to use with the iteration. Select the existing variant from the drop-down box; only existing variants having the same portfolio and date are displayed for selection. If a compatible variant already exists, the results of the selected iteration will be loaded into this variant. If there is no compatible variant, you are prompted to create a new variant.

Note: Variants are temporary and not saved from session to session (unless saved as a portfolio). However, the system will not allow you to use a variant name that was previously used. To delete previously used variant names, go to **Tools > Barra > Portfolio Tools > Variant Manager** and delete the variant name.

3. Select the **Analysis Settings** and click **View**.

For information about viewing reports and creating a trade list, see [Working with Rebalance Results](#).

View the Rebalance Reports

The rebalance reports provide point-in-time data as a snapshot of rebalance activity on a single date. The reports include the following:

Report Name	Report Description
Transaction Summary	Displays a high-level summary of cumulative trades applied to the current portfolio.
Rebalance Portfolio Risk Summary	Displays high-level information of the initial and target portfolios and the change between the two.
Rebalance Risk Attribution	Displays the risk attribution of the initial and target portfolios and the difference between the two.
Rebalance Factor Exposure	Displays factor exposure information for the initial and target portfolios and the change between the two.

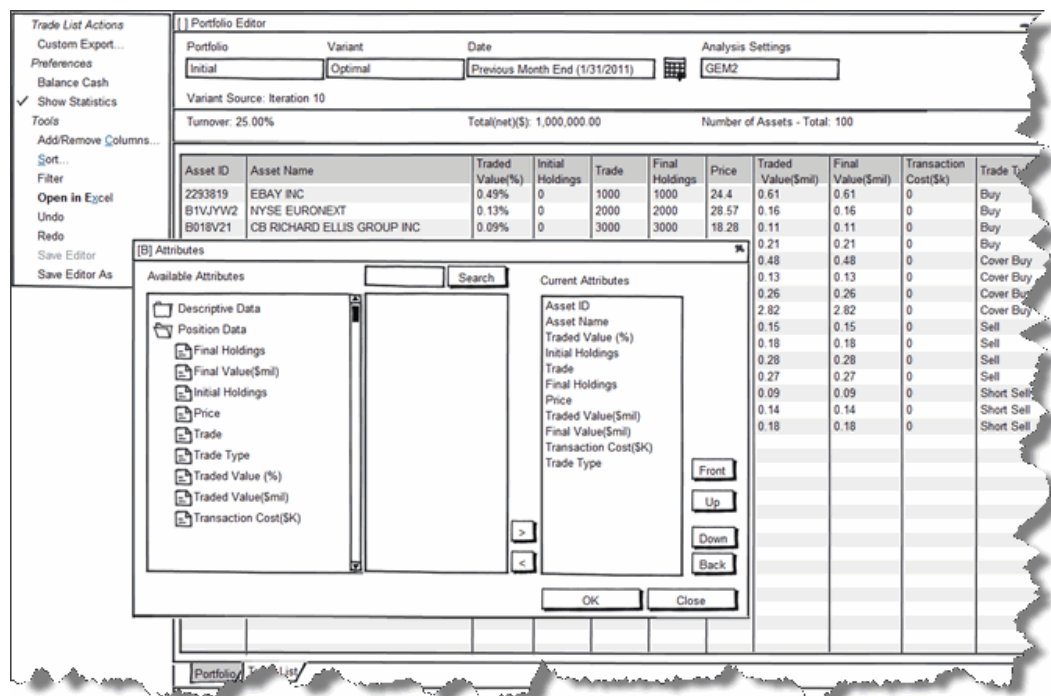
Create the Trade List

The Trade List captures the trades needed to convert the Initial Portfolio to the Optimal Portfolio proposed by the Optimizer. The initial portfolio is used to generate the trade list and the transaction cost analysis, which Barra PortfolioManager calculates as the cost of moving from the initial portfolio to the final portfolio. The report contains information such as the number of shares required to be traded (based on the suggested optimal portfolio), the type and value of the trade, the initial and final holdings, the final value, and the transaction costs of these trades. You can manually edit trades and/or final holdings before submitting the trade list to the market.

The Trade List allows you to customize the selection and order of the columns in the list; you can also sort and filter the list to reflect your specific trade execution process. When you have finished customizing the list, you can easily export the list and save it as either a file or an email.

Accessing the trade list

The Trade List is accessed through the Portfolio Editor. Once you have selected an iteration and created your Optimal portfolio in the Rebalance Tool, the Portfolio Editor is automatically opened. Select the **Trade List** tab to display the options.




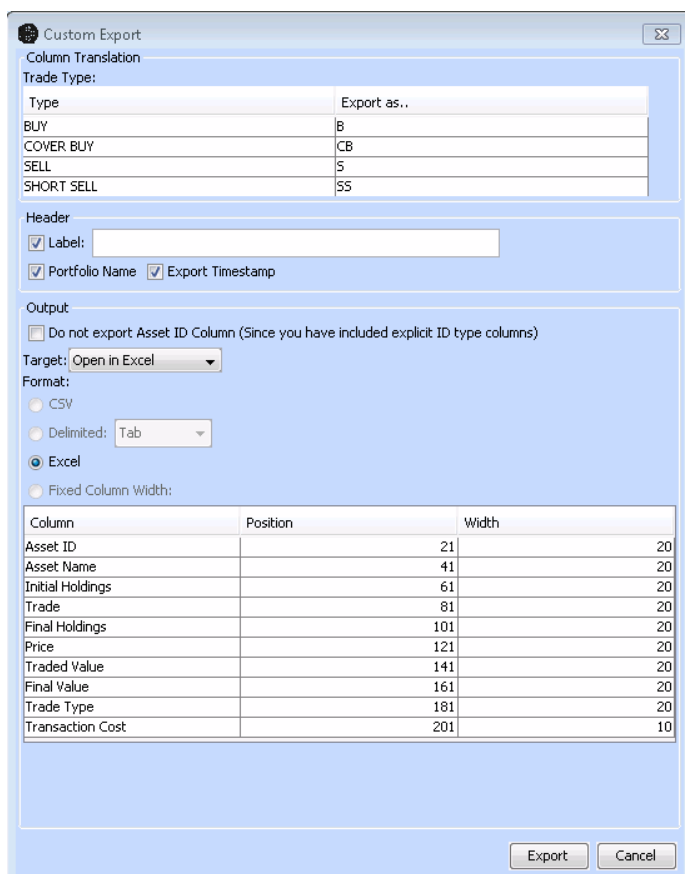
Using the Trade List

The Trade List lets you:

- Edit the Trade List interactively, making changes to the suggested trades or Final Holdings (suggested optimal holdings). The Trade column displays the number of trades required to convert initial holdings to final holdings. Any edits are immediately reflected in both the Trade List and the Portfolio Editor. In certain cases, the edits you make may result in a new transaction type for that particular asset. For example, if you sell more shares of an asset than you own, a new row will appear for that asset with a transaction type of Short Sell. Note that you cannot add or delete assets, only edit holdings.
- View the name of the variant source (the iteration linked to the variant using the Rebalance Tool).
- View Trade List statistics, including Turnover %, active risk, and predicted beta.
- View crossover trades and filter by Trade Type, such as Buy, Sell, Cover Buy or Short Sell.
- View the transaction cost for each trade.
- Add or remove columns, sort, filter, or select preferences (balance cash, or show statistics).

Customize and Export the Final Trade List

When you are satisfied with your final trade list, you can customize the format of the trade list before exporting. To do this, click the  icon and select **Custom Export**:



Custom Export

Column Translation

Trade Type:

Type	Export as..
BUY	B
COVER BUY	CB
SELL	S
SHORT SELL	SS

Header

☒ Label:

☒ Portfolio Name ☒ Export Timestamp

Output

☐ Do not export Asset ID Column (Since you have included explicit ID type columns)

Target:

Format:

☐ CSV

☐ Delimited:

☒ Excel

☐ Fixed Column Width:

Column	Position	Width
Asset ID	21	20
Asset Name	41	20
Initial Holdings	61	20
Trade	81	20
Final Holdings	101	20
Price	121	20
Traded Value	141	20
Final Value	161	20
Trade Type	181	20
Transaction Cost	201	10

You can:

- Customize the Trade Type codes, so that the trade codes are compatible with your trade execution system.
- Choose to include or exclude the Asset ID column, in case you have added your own explicit ID Type using the Descriptive Data Attributes.
- Select the method for exporting the list, including email, a mail attachment, or Excel.

Select the output type (CSV, Excel, Delimited, etc.) and the format associated with that type.

Archive and Clean up

After you finish the rebalance cycle, the archive function lets you save selected output portfolios and delete other selected output portfolios. You can save the various iterations of the portfolio, either as the Optimal Portfolio, or as a Final portfolio. You can also delete iterations that you no longer want.

This process allows you to clean-up the results of the completed rebalance cycle before starting the next rebalance cycle. It also allows you to save selected portfolios so that you can run iteration reports

at a later date, including pre-trade and post trade reports. These reports help you evaluate how well your trading strategy is executed.

Note: The archive function is currently available for Single Optimization profile types; Sensitivity and Frontier optimizations cannot currently be archived.

Accessing the archive function

To access the archive function:

1. Open the Rebalance Tool, and enter the desired Portfolio, Date, and Profile.
2. Select an iteration from the displayed list of iterations, right-click and select the **Archive** icon from the menu.

The Archive view lets you decide how you will save the holdings snapshot displayed in the iteration:

Action	Description
Save Optimal Portfolio	You can append the holdings snapshot (the iteration) to an existing portfolio and archive the portfolio as an optimal portfolio. The portfolio naming option displayed is the option used in the Rebalance Profile. If no portfolio name or option is displayed, return to the Rebalance Profile, enter and save a name for the Optimal Portfolio.
Save Final Portfolio	You can select the variant edits to save and archive as part of the final portfolio. You can select any variant associated with the single iteration. If no variants exist, the optimal portfolio is saved as the final portfolio. If no final portfolio name is displayed, return to the Rebalance Profile, enter and save a name for the final portfolio.
Clean up	You can choose to delete all other iterations displayed in the Rebalance Tool.

Chapter 5. Advanced Features for Rebalancing

Using Portfolio Attributes Across Accounts

Portfolio attributes are descriptive properties about the data in a portfolio. They point to specific data such as the benchmark, universe, currency, or cash flow. In the Profile Manager, portfolio attributes enable you to set up a rebalance profile that you can apply across multiple accounts. As long as the data for each of the portfolios is loaded according to the appropriate template, you can re-use one rebalance profile to find and change data across as many portfolios as needed. As you switch to a different portfolio, Barra PortfolioManager automatically finds and loads the matching attribute data. For more information, see [Set Up Attributes](#) in the Barra PortfolioManager Help Center.

Managing Multiple Accounts Using the Same Strategy

You can use portfolio attributes to leverage the same rebalance profile across multiple portfolios. This is useful when managing multiple accounts using the same strategy. Portfolio attributes can be used for account specific properties, so you don't have to create distinct rebalance profiles per portfolio. In your rebalance profile, selected settings can be redirected to named portfolio attributes instead of entering specific values. The portfolio attributes separately track the portfolio-specific settings values as key-value data (imported as user data).

We can illustrate this feature by using the benchmark property in the Rebalance Profile.

Instead of selecting a specific benchmark portfolio, you can choose to point to a portfolio attribute, let's say "Acme Benchmarks." The Acme Benchmark attribute will then store the key-value data that tracks each portfolio's idiosyncratic benchmark. For example, if we are managing three portfolios using the same Rebalance Profile, The Acme Benchmark portfolio attribute might store the following:

Profile Setting	Value
Primary Benchmark	Acme Benchmark

Acme Benchmark Key	Value
Acme1 Portfolio	MSCI EAFE
Acme2 Portfolio	MSCI World IMI
Acme3 Portfolio	MSCI USA

The benchmark reference will be resolved when you run the optimization. In the Rebalance Tool, the initial portfolio you choose determines which matching benchmark is selected, based on the associations stored in the portfolio attribute.

To create the portfolio attribute and load the portfolio-specific values, you must import this information as user data, using an Excel portfolio attribute import template. The template allows you to define the portfolio attribute and load the key-value data for portfolio attributes, such as:

- primary or secondary benchmark
- currency (numeraire)
- cash inflow/outflow
- assigned base value
- portfolio-level published return

Notes About Portfolio Attributes

- Only the owner of a portfolio attribute or the Client Administrator can delete, edit, or import data into a portfolio attribute.
- The imported portfolio attribute data is visible to all users within the client ID.
- To view attribute properties, go to Tools > Barra > User Data Tools > Setup Portfolio Attribute.
- To view the loaded portfolio attribute values, go to Tools > Barra > User Data Tools > View Portfolio Attribute.
- Portfolio attributes support aging rules that control the lifespan of the loaded data, where data can be:
 - <N> days (1 - 365)
 - Roll to next data point
 - None (never expires)

Dynamic Grouping Schemes

A grouping scheme allows you to define how you will group your assets for reporting and portfolio construction. There are two types of grouping schemes you can create:

- Static grouping schemes allow you to define fixed ranges (or breakpoints) for each group.
- Dynamic grouping schemes allow you to group assets based on their ranking in a defined group; this ranking changes by date, according to the relative value of the asset attribute and universe. As the daily values of your asset attribute and universe change, the system automatically changes the assets contained in the group.

Use dynamic grouping schemes to define custom fractiles (buckets) for grouping asset-level analytics or specifying group-level settings. Typical fractiles you can create include quintiles, quartiles, and deciles that rank and subdivide your asset universe. Barra PortfolioManager allows you to customize the number of groups as well as control the reference universe and weight scheme.

Dynamic grouping can be a useful tool for portfolio construction. When rebalancing, you can apply dynamic grouping schemes with asset level bounds, group constraints, or penalties. This allows you to specify asset-level settings by groups of assets, without providing settings values for every distinct asset in your universe.

To create both dynamic and static grouping schemes, go to **Tools > Barra > User Data Tools > [Setup Asset Grouping Scheme](#)**.

Creating or Customizing a Reusable Workspace

There are many ways to customize your workspace to make your routine tasks quick and easy. All customization will be saved as part of your workspace. Here are some things you can do:

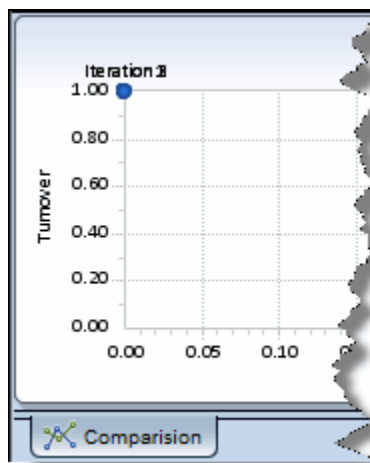
Create Custom Tabs on Worksheets

To create new worksheets, click **New** in the top right corner of the workspace. Each worksheet appears as a new tab. Double-click on a tab, type a name for the tab and press Enter. You can create various tabs that will help you organize and quickly access the views you need.

Customizing Worksheets with Reports and Tools

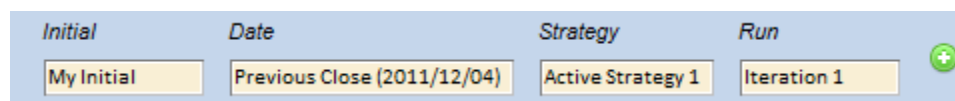
Select the Reports and Tools you need on each worksheet. You can customize the columns and cell formats within the tools and reports by right-clicking on the specific cell or column (see [Customizing Columns](#) in the Barra PortfolioManager Help Center). Charts can also be customized by clicking the Chart tab on the lower left side of a report (where available). To change any of the default characteristics of the chart, right-click in the upper right side of the chart and select **Toolbar**. The Toolbar provides easy access to the many graphic options. For more information, see [Charts](#) in the Barra PortfolioManager Help Center.

In the Rebalance Tool, all your iterations are automatically displayed in the Rebalance Tool graph. To change any of the settings on the graph, such as data attributes or the chart type, simply right-click on the **Comparison** tab at the bottom of the chart:



Linking Reports through Aliases

You can link the portfolio construction tools and reports using aliases. An alias is a global label that governs an input parameter. You can leverage a pre-defined set of tools and reports and use the alias to switch between portfolios, dates, strategies, and rebalance runs. When multiple views or tools use the same alias as an input, you can easily change the input value for all views or tools at the same time by changing the alias value. You can add aliases in the Toolbar and then double-click and select the appropriate alias value as you work:



Click the green button to select the alias that you want to display on your toolbar.

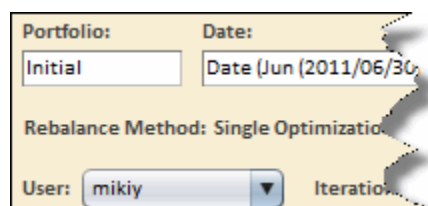
Using Variants for In-Depth Analysis

Variants are used to create temporary versions of an optimal portfolio that you use for in-depth attribution analysis. These temporary portfolios allow you to make manual edits on top of the optimal portfolio and immediately see the impact of those changes in risk and exposure reports. Like aliases, you can link one variant to many reports, so that when you change the variant, all the report values update automatically. You can also use multiple variants to perform side-by-side comparison of different optimal portfolios. Note that unless you save a variant as a final portfolio, the variant is deleted when you close your workspace.

You can create variants to conduct further in-depth analysis directly from the Rebalance Tool. Right-click on any iteration and select the **View Optimal** function to load the optimal holdings into the variant. The header in the Portfolio Editor tool indicates which iteration is loaded as a variant source.

Sharing Iterations and Historical Iterations

Barra PortfolioManager allows you to see the rebalance results of other users within your workgroup or client ID, depending on your workgroup permission settings. Using the Rebalance Tool, you can select other users that have generated results using the same key inputs—Portfolio, Date, and Rebalance Profile. This allows you to compare your own results to the results and research of others in your organization. This also allows you to segregate your production activity within a separate user account. To see other user's iterations, click the **User** drop-down menu in the Rebalance tool:

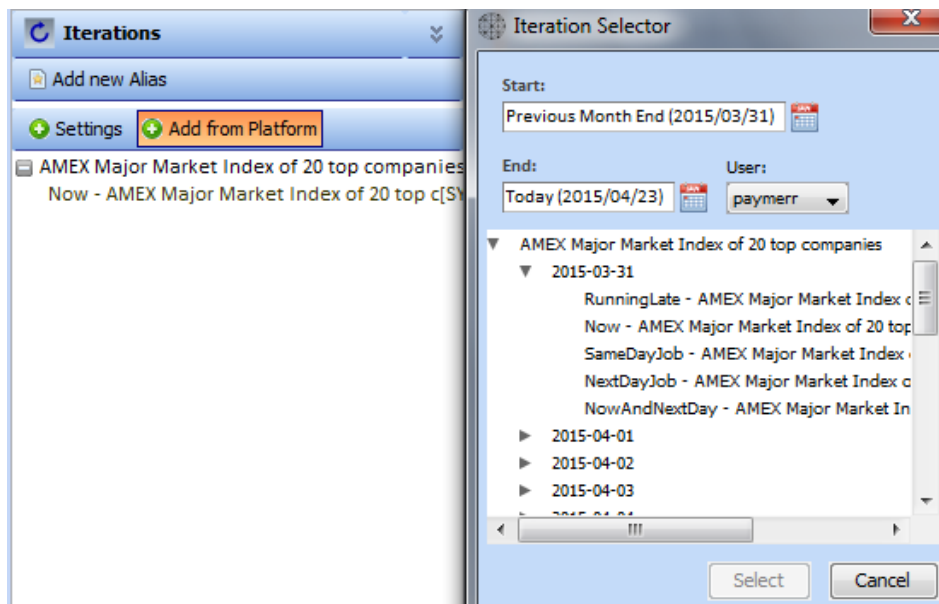


When viewing rebalance iterations that are not your own, you access the iterations as "read-only". Therefore, you cannot perform the following functions:

- run rebalance
- revise and run
- archive
- delete

Sharing Rebalance Results

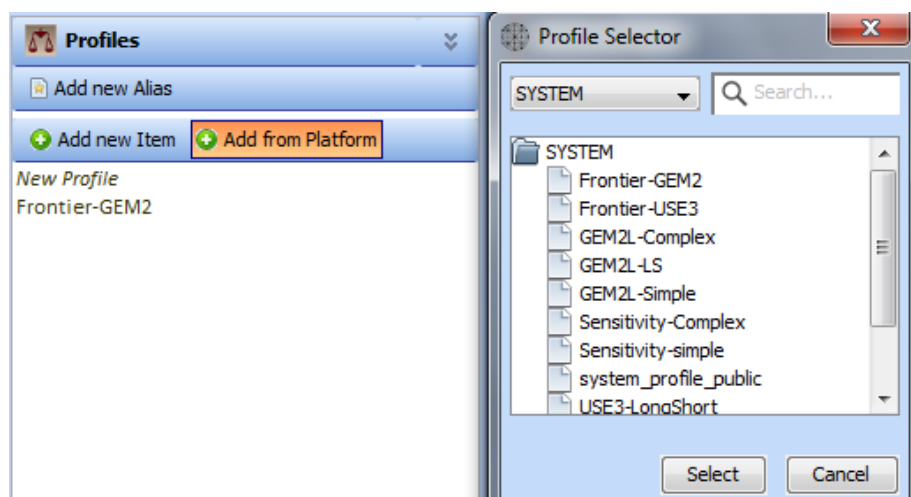
You can share your rebalance results (iterations) with other users to view optimization- related reports. In the Iteration picklist, use the **Add from Platform** button to search and add iterations from other users into your picklist. Barra PortfolioManager will search for available iterations based on the analysis date range and specific user you choose. The iterations are organized by portfolio, date, and name.



Note that when you delete a rebalance profile using the Platform Organizer, you are implicitly deleting the related iterations. Deleting iterations will orphan any picklist references that may exist in other user's picklists.

Sharing Rebalance Profiles

You can share your rebalance profiles with other users just as you would share portfolios; in the Rebalance Profile picklist, use the **Add From Platform** button to search through existing picklists and add them to your own. If you want to make changes to another user's profile, double-click the profile to open the Profile Manager and then use Save As to make your own copy of the profile.



Using the Rebalance Assistant for Optimizing Multiple Portfolios

The Rebalance Assistant enables you to efficiently rebalance multiple portfolios that share common settings in a single batch, thus allowing you to avoid the extensive process of performing the same activity for each portfolio with the Rebalance Tool.

To access the Rebalance Assistant, do one of the following:

- Click **Tools > Barra > Portfolio Construction > Rebalance Assistant**.
- In the **Reports/Tools** picklist in the toolbox, expand the **Barra** tools list and select **Rebalance Assistant**.

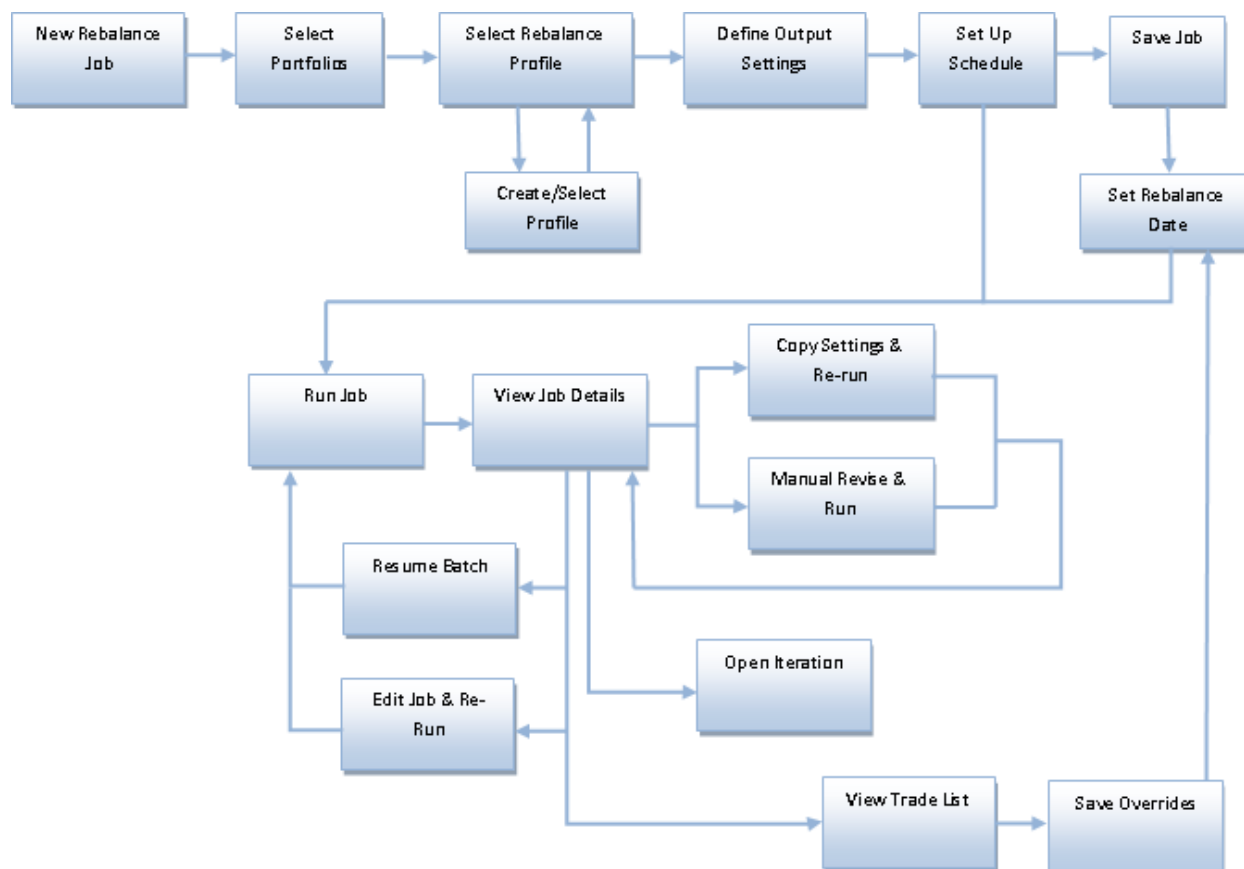
The following table lists and describes the components of the Rebalance Assistant.

Component	Description
Date	<p>Indicates the data date for which you want to rebalance. By default, it shows the current date (unless you have specified a default date in your Date picklist).</p> <p>You can select a specific date from the calendar or use the date picklist to set an alias, relative date, or explicit date. If you leave the date field empty, the Rebalance Assistant allows you to only create and edit jobs. All other actions on a job are disabled until a valid date is specified.</p>
Toolbar	<p>Provides the following options:</p> <ul style="list-style-type: none"> • New – Setup a new rebalance job • Run – Run or resume a single or multiple rebalance jobs • View – Drill down into the details of a single rebalance job
Sidebar	<p>Displays the list of recent jobs that you saved in the current session. You need to manually add the previously-saved jobs from the platform. You can type a partial search string to search for your jobs on the platform. Note that the recent jobs list displayed in the sidebar is reset with each instance of the Rebalance Assistant.</p> <p>Once you've added jobs to the list, you can do the following:</p>

Component	Description
	<ul style="list-style-type: none"> • Run a job • Edit a job • Remove a job from the Recent Jobs list • Delete a job from the platform
Job Monitor View	<p>Appears in the main display area when you select Recent Jobs in the sidebar. You can view the jobs from your Recent Jobs list that have been run or are in progress. You can view the job status, latest statistics, and rebalance cycle progress. You can also do the following:</p> <ul style="list-style-type: none"> • Run a job • Edit a job • View job details • View the trade list for a job • View log • Delete a job <p>For more information, see Job Monitor View.</p>
Job Details	<p>Appears in the main display area when you do one of the following:</p> <ul style="list-style-type: none"> • Select a job in the sidebar. • Click View in the toolbar. <p>You can view a comparison graph and create multiple graph tabs based on the information in the iteration list. The iteration list for the selected rebalance job displays its statistics. It displays the last iterations for all portfolios in the batch. It also displays the alert count, source, and profile.</p> <p>For more information, see Job Details View.</p>

Rebalance Assistant Workflow

The following diagram depicts the workflow of the Rebalance Assistant.



The procedure to rebalance a batch of portfolios typically comprises the following steps:

1. Set up a rebalance job

To set up a rebalance job you need to select the portfolios and select or create the rebalance profile. Additionally, you can define the output format and schedule the job to run daily or weekly. For more information, see [Setting Up a Rebalance Job](#).

2. Run the rebalance job

After setting up a rebalance job, you can run it or save it for running at a later time. There are several ways to run a rebalance job from the Rebalance Assistant. For more information, see [Running a Rebalance Job](#).

3. Revise the profile and re-run to handle exceptions or create more iterations

After an iteration, you can create another iteration by revising the rebalance profile you used, or select a new profile to rebalance the portfolios. You can also selectively revise and re-run portfolios from the batch. For more information, see [Copy Settings and Run](#).


4. Extract aggregate trade list

After rebalancing all your portfolios, you can view and export the aggregated trade list. The trade list includes trades for all successfully optimized portfolios. Note that in some cases the optimizer will return the best possible solution even though the optimization is flagged as infeasible. Such trades are excluded from the aggregate trade list. For more information, see [Aggregate Trade List](#).

Troubleshooting Optimization

As you construct a Rebalance Profile, the Profile Manager automatically performs checks to help you complete a successful optimization. These checks range from validation of settings values to ensure compatibility of constraints with the objective, to checking whether the optimizer can solve the selected combination of constraints. While many conditions can be validated up front, there are inevitably issues that can only be caught during the optimization process itself. The following tips will help you discern which situations may require corrections in your Rebalance Profile or escalation of your problem to MSCI.

Identifying Optimization Problems

1. In the Rebalance Tool, click the  icon and select **Add/Remove Columns**. Make sure you have added the Status and Status Message columns. These fields will indicate whether the optimization failed because:
 - the optimization was infeasible
 - the optimization encountered settings error
 - the optimization encountered an internal failure
2. In the optimization diagnostic reports, the General Messages section will indicate when there are problems. The General Messages section at the top of the report includes more detailed messages from the Optimizer.

Getting Support for an Optimization Problem

Barra PortfolioManager allows you to save additional diagnostic information from a failed optimization that you can send to MSCI client service or an MSCI consultant for further diagnosis. This debug information can be downloaded and saved as a zip file from a specific iteration.

Saving Your Debug Information

To save your debug info as a file:

1. Open the Rebalance Tool (**Tools > Barra > Portfolio Construction > Rebalance Tool**) and enter the Portfolio, Date, and Profile.
2. Select the "Failed" iteration you want to troubleshoot.
3. Right-click and select **Revise and Run**.
4. In the Portfolio Manager, select the **Save Debug Info** check box in the lower-left corner and click **Apply and Run**.

Note: The Save Debug Info box can only be activated when using Revise and Run to access the Profile Manager Tool.
5. In the Iteration list of the Rebalancing Tool, select the failed optimization iteration, right-click and select **Save Debug Info**. You can then download the file to a selected location.
 - For single optimization or sensitivity type optimization jobs, the debug information applies to the single, specified optimization point.

- For frontier optimization, the downloaded debug information applies to all points along the frontier.

Note: This debug information will be saved for seven days before being automatically deleted.

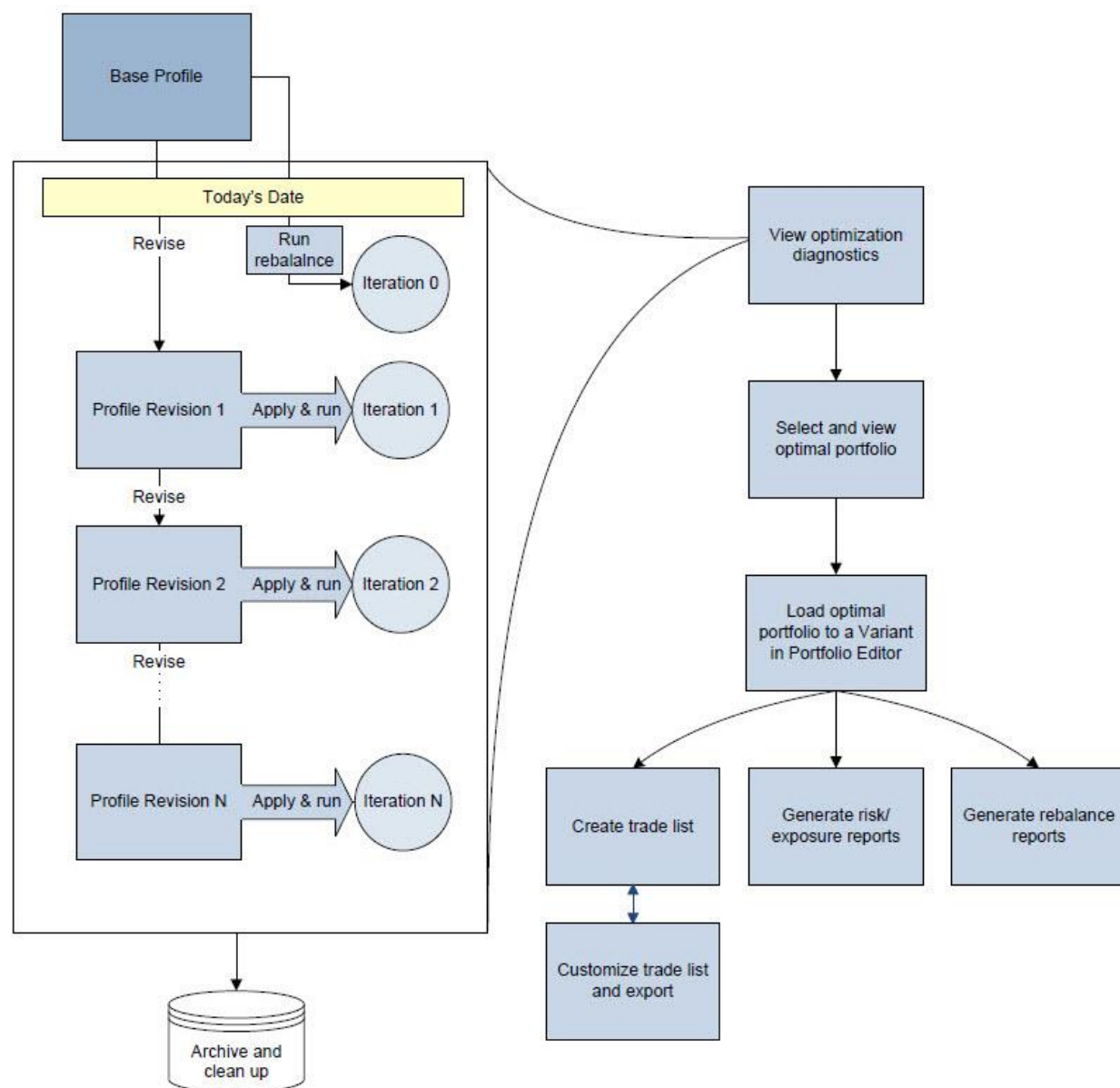
Using Rebalance Profiles Over Time

Rebalance profiles are designed to maintain your optimization settings over time, as you manage your strategy across rebalance cycles. Barra PortfolioManager provides the following features to help you manage rebalance profiles as part of an ongoing investment process:

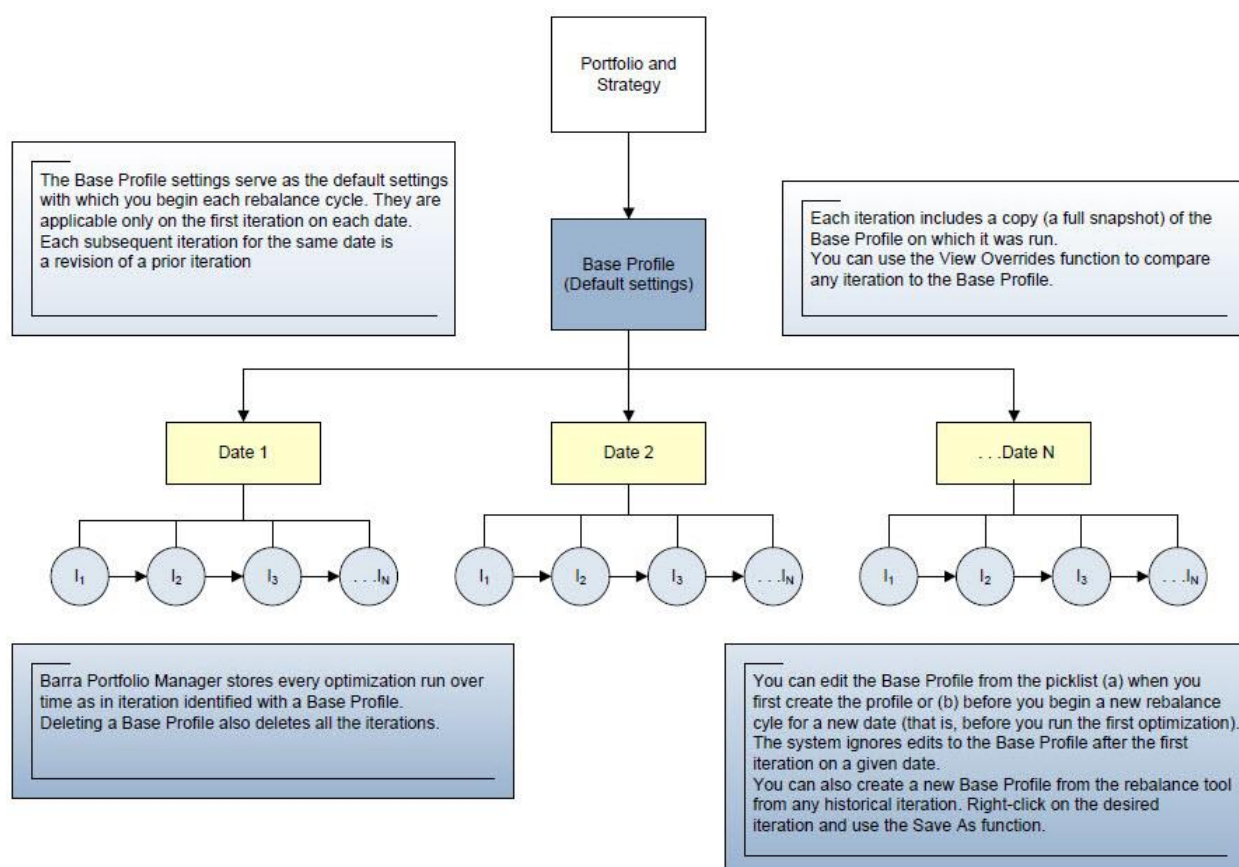
- Optimization results are automatically saved: Your optimization inputs and results are preserved so that you can always return to a previous date to review a rebalance.
- The Rebalance Profile you used is saved with each iteration (optimization run): Each iteration stores a snapshot of the Rebalance Profile, including the tactical overrides you may have added as your revise and run your optimizations.
- Base profile settings are rolled forward, but *not* overrides: Barra PortfolioManager starts every rebalance cycle by default with the settings stored in your base rebalance profile. Therefore, the base rebalance profile that defines your long-term strategy is rolled forward, but the overrides you have added that are date-specific or run-specific are *not* rolled forward to the next rebalance date.
- You can modify your base Rebalance Profile in two ways:
 - Save an iteration as your base profile: You can overwrite your base Rebalance Profile with a Rebalance Profile that includes your overrides. To do this, right-click on the specific iteration you want to use as your base profile going forward, and select **Save As**. You will overwrite the existing profile by saving the profile under the same name.
 - Edit the base Rebalance Profile directly: In the Rebalance Profile picklist, double-click the profile you want to edit, or use the right-click menu and select **Edit**. This launches the Profile Manager and allows you to edit the Rebalance Profile. When you have finished editing, click **Save and Close**. The modified profile now contains the default settings that will be used with future rebalance dates.
- Iteration results are linked to the Rebalance Profile name. You can use the Iteration Picklist and Platform Organizer to view or verify the Rebalance Profile used for any specific iteration. Iterations are organized by date and initial portfolio. Simply mouse-over any iteration to see the Rebalance Profile associated with the optimization run.

Note: When you delete a rebalance profile, you automatically delete all historical iterations generated using that rebalance profile.

Appendix 1. Portfolio Rebalancing Daily Workflow



Appendix 2. Using Base Profiles in Rebalance Cycles



Appendix 3. Optional Rebalance Settings

Category	Settings	Category	Settings
Reference	Roundlot Settings		Asset Level Bounds by Group
	Additional Benchmarks		Conditional Rule
	Monitor Exposures		Grandfather Rule
	Attribution Settings		Transaction Type
	Alerts		Trade Limits
	Solver Settings		Trade Limits by Side
	Portfolio Export	Linear Constraints	Benchmark Beta Constraint
Optimization	Allow Shorts		Benchmark Beta Constraint by Side
Custom Utility Settings	Expected Return		Market Beta Constraint
	Primary Risk Terms		Market Beta Constraint By Side
	Secondary Risk Terms		Factor Constraint—Primary Model
	Transaction Cost Terms		Factor Constraint—Secondary Model
	Penalty Terms		Factor Constraint—Primary Model by Side
	Penalize Residual Alpha		Factor Constraint—Secondary Model by Side
	Short Rebate		Factor Group Constraint—Primary Model
	Factor Weights – Primary Model		Factor Group Constraint—Primary Model by Side
	Factor Weights – Secondary Model		Factor Group Constraint—Secondary Model
	Fixed Holding Costs		Factor Group Constraint—Secondary Model by Side
Penalty Settings	Benchmark Beta Penalty		Custom Constraints
	Market Beta Penalty		Custom Constraints by Side
	Factor Penalties		Group Constraints
	Factor Group Penalties		Group Constraints by Side
	Custom Penalties		Matrix Constraints
	Group Penalties		Matrix Constraints by Side
	Long Position Penalty (%)	Risk Constraints	Total Risk Bounds—Primary Model

Category	Settings	Category	Settings
	Short Position Penalty (%)		Total Risk Bounds by Group –Primary Model
	Total Leverage Penalty (%)		Active Risk Bounds–Primary Model
	Asset Level Penalty (%)		Active Risk Bounds by Group–Primary Model
Transaction Cost Settings	Direct (Linear)		Risk Budgeting–Primary Model
	Indirect (Non-Linear)		Risk Budgeting by Group–Primary Model
	Direct (Fixed)		Risk Parity – Primary Model
	Indirect (Piece-Wise Linear Costs by Asset)		Total Risk Bounds–Secondary Model
	Indirect (Piece-Wise Linear Costs by Group)		Total Risk Bounds by Group–Secondary Model
Cash Rules Settings	Cash Settings		Active Risk Bounds–Secondary Model
Trading Constraints	Asset Paring		Active Risk Bounds by Group–Secondary Model
	Asset Paring by Side		Risk Budgeting–Secondary Model
	Asset Paring by Group		Risk Budgeting by Group–Secondary Model
	Trade Paring		Risk Parity – Secondary Model
	Trade Paring by Side	Leverage Constraints	Long Position (%)
	Trade Paring by Group		Short Position (%)
	Level Paring		Total Leverage (%)
	Level Paring by Side		Leverage Ratio (S/L)
	Level Paring by Group		Leverage Ratio (L-S)/(L+S)
	Turnover	Advanced Constraints	Portfolio Return
	Turnover by Side		Transaction Cost Constraint
	Crossovers	Constraint Group Priorities	Constraint Group Priorities
Holding Constraints	Restricted List	Overrides	Conditional Overrides
	Long/Short Universe		Portfolio Overrides
	Non-Cash Assets		Initial Overrides
	Asset Level Bounds		

Reference Settings

Reference settings describe the portfolio as a whole. You set up most of them in the Portfolio Manager Settings Summary: the benchmark, market, universe, currency, and base value. To set up the optimizer to trade in round lots, use Roundlot settings. Using the Monitor Exposures settings, you can specify a list of asset attributes for which you can monitor your portfolio-level exposures over time while defining or comparing backtests. The Attribution Settings enable you to automatically process the analysis settings and time-series settings as a part of your backtest profiles. You can add alerts to your profile to ensure that your data checks and policy checks are met as a part of the rebalance process.

Roundlot Settings

The trade list from an optimization problem can contain small or odd share numbers. You can choose to have the optimizer trade shares in round lots, which results in a more realistic trade list. Barra PortfolioManager can apply roundlotting as a part of the optimization process or after the optimization process, where the optimal trades are rounded off post-optimization.

Select the **Close out fractional positions** check box if you have fewer shares of an asset than the specified roundlot value. This enables Barra PortfolioManager to still sell the remaining shares (if it determines that it will increase utility to do so).

Barra PortfolioManager applies roundlot values beginning with the most specific level, as shown:

Priority	Level
1st	Asset: You can import roundlot values for individual assets into Barra PortfolioManager. These values take priority over any other roundlot value for the assets.
2nd	Country: In global models, you can set roundlot values by country. Barra PortfolioManager uses these values for any asset that does not have an asset-level roundlot specified.
3rd	General: You can specify the roundlot value to be applied to the entire portfolio. Barra PortfolioManager uses this value for any assets that do not have asset-level or country-level roundlots specified.

Note: You may not combine roundlot constraints with paring constraints. If you select optimal roundlotting, you may only select turnover, transaction cost, and crossover constraints. However, you can use post-optimization roundlotting with any optimization case.

If you perform an optimization with round lots and constraints specified, linear constraints are met according to a predetermined tolerance level. For example, if you specified a constraint for a particular industry, Min = 1% and Max = 2%, then this constraint is met if the exposure of the optimized portfolio is between 0.995% and 2.005%. This tolerance level allows the optimization algorithm to find a much larger set of solutions.

Additional Benchmarks

Reference settings include a primary benchmark portfolio (required) and a secondary benchmark (optional). If you want more flexibility in designing relative constraints, you can choose to add as many as three more benchmarks.

Click **Add > Reference > Additional Benchmarks > Add**. The Portfolio Manager displays three fields, marked b3, b4, and b5. This is the syntax you use to refer to the benchmarks in your constraints. Click the button to the right of each field and select a benchmark from the available portfolios. Note that you can select portfolios, not portfolio attributes.

If you decide to disable one of these benchmarks after you have built constraints based on it, those constraints will show error messages.

Monitor Exposures

The Monitor Exposure settings enable you to select asset attributes that you would like to monitor as part of a backtest job. Barra PortfolioManager will store the portfolio-level aggregate exposure to these attributes as part of the results.

Click **Add > Reference > Monitor Exposures > Add**. The Profile Manager displays a search box that enables you to select system or user-imported asset attributes. Select one or more attributes to build a list of attributes to monitor. You can also click **New** to set up a new asset attribute. For this new asset attribute, you will need to import asset data for the entire timespan using the upload tool.

Attribution Settings

The Attribution Settings enable you to set analysis and time-series settings as a part of your backtest profiles. These settings automatically trigger the performance attribution jobs as part of your backtest.

Click **Add > Reference > Attribution Settings > Add**. The Profile Manager displays search boxes that enable you to look up pre-defined analysis and time-series settings saved on the Barra PortfolioManager platform. Click **New** next to the Time-Series Settings and the Analysis Settings to define a new time-series setting or a new analysis setting, respectively. You can also edit the pre-defined conditions.

For more information about Analysis Settings, see [Defining Analysis Settings](#).

For more information about Time-Series Settings, see [Defining Time-Series Settings](#).

Alerts

The Alerts setting enables you to define your own pre-rebalance conditional checks on your portfolio to ensure that data checks or policy checks pass before proceeding. For example, you can define data alerts to check that input data, such as latest holdings, latest risk model data, latest prices, and latest user data is up-to-date in the system for a given rebalance date or to track policy violations, such as a tracking-error limit.

Click **Add > Reference > Alerts > Add**. The Profile Manager displays a search box that enables you to look up pre-defined conditions, which are expressed as formula-based portfolio attributes. Click **New** to launch the Formula Builder to define a new alert condition.

Note: When defining a new formula, make sure you select **Portfolio Level** as the Formula Type. You can also edit existing alerts using the Formula Builder. To add multiple alert conditions, clear the search box and find a new condition.

The selected condition names to be applied to the rebalance profile are displayed in the Alert list. The Alert Type column indicates whether you want the alert to fail the backtest or rebalance job, or simply issue a warning. The actual formula expression for the alert is displayed in the Value column of the Settings Summary table.

Solver Settings

Use this setting to set the maximum time limit for a given optimization run. You can select any value between 1 to 180 seconds.

Select the **Compatibility Mode** check box to allow the optimizer engine to run in backward-compatible mode. When you use the compatible mode, the Optimizer (currently version 8.1) uses the same or similar algorithms as version 2.1 that may contain bug fixes or enhancements under the code.

Therefore, the compatible mode would be more likely to find an optimal solution similar to the one that Optimizer 2.1 would find, but does not ensure to provide the exact same optimal solution.

Select the **Enable Small Positions Closeout** check box to allow selling assets with weights under the trade threshold. This allows the optimizer to avoid retaining assets with small positions in the optimal portfolio.

You can also specify an **Optimal Weight Tolerance** value for assets included in the optimal portfolio. This allows the optimizer to filter out assets that fall below the specified weight tolerance and thereby prevents the optimizer from producing an optimal portfolio that exceeds the maximum number of assets specified in the asset paring constraint. If no value is specified, the optimizer assumes no minimum weight tolerance.

Portfolio Export

The Portfolio Export settings enable you to download the underlying backtest portfolio as a zip file to your local directory for further evaluation.

Click **Add > Reference > Portfolio Export > Add**. In the Profile Manager, specify the file format type, ENUM, such as CSV or BPM Positions, and so on. CSV is selected by default. Click the **Search** button to browse and select the required asset ID types. Right-click the backtest in the Job Monitor View and click **Download** to start downloading the portfolio. The downloaded zip file contains files for each date the backtest job gets executed and is saved in the 'Portfolio Name_YYYYMMDD' format.

Note: You can use the download option only when the backtest job is in the final state or is successfully completed.

Optimization Settings

Required optimization settings were automatically added to the Profile Manager when you created your rebalance profile. These appear in the Profile Manager, but you cannot edit them because they are fundamental characteristics of the optimization type and method you selected. They must remain unchanged as you perform rebalances and generate associated results over time.

The Optimization settings category contains optional settings, for the optimization as a whole, which you can add to your rebalance profile. These can vary depending on the optimization method and type.

Allow Shorts

Add this setting if your initial portfolio includes short positions, or if you want the optimizer to take short positions as part of the optimal portfolio.

Use this setting to allow long/short portfolios in standard optimization or to apply leverage constraints as part of a long/short (hedge) optimization. To learn more about the heuristics used for hedge optimization see the research paper, [Practical Convex Quadratic Programming](#) in the Barra PortfolioManager Help Center.

If you select this option, the optimizer ignores group constraints other than those for weight and effective weight.

If you do not select this option, the optimizer cannot include short positions or take short positions as part of the optimal portfolio.

Custom Utility Settings

The Custom Utility settings determine the objective of the optimization. The selections you make in this section customize each term in the objective function.

The available settings in this section vary depending on the optimization method and type you select. You can customize the utility function by adding or removing terms and setting coefficients.

Expected Return

This setting adds an expected return term to your utility function. Use this setting to specify the source asset attribute for your user-supplied alphas (expected returns) and set a return multiplier.

You must first import your expected returns as an asset attribute. For instructions on how to do this, see [Importing Your Own Assets](#) in the Barra PortfolioManager Help Center.

- Use the Attribute Selector to find and select your expected returns attribute. For more information on selecting attributes, see [Selecting Attributes for Rebalancing](#).
- In the Multiplier field, enter a number to specify a scalar, e.g. 2 for 200 percent, which scales the expected return passed to the optimizer.

Primary Risk Terms

This setting adds a primary risk term to your utility function. Use this setting to set the risk aversion for common factor risk and specific risk. Maximum Utility optimizations include primary risk terms with default settings, but you may want to change these.

There is a check box to indicate whether you want to enter specific risk aversion directly or as a ratio to common factor risk.

- If you select the check box, you are choosing to specify your specific risk aversion as a % relative to the common factor risk aversion. For example, if the check box is selected and you specify the asset-specific risk aversion/ratio value as 1.5, then the specific risk aversion will be calculated as common factor risk aversion * 1.5. The check box is selected by default and the specific risk aversion is set to 1, which implies that both (asset-specific and common factor risk aversion) are equal.
- If you do not select the check box, you are choosing to enter your specific risk aversion as a separate lambda value, just like common factor risk aversion.

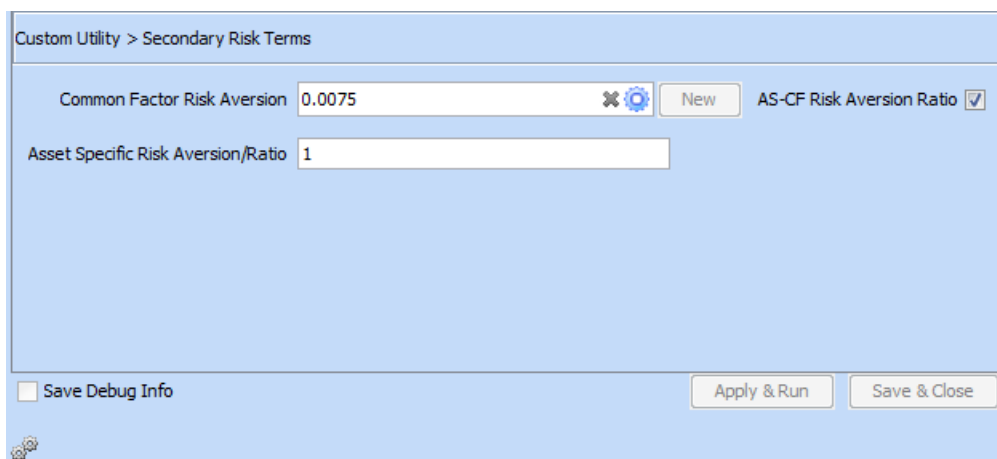
Using Dual Risk Models

You can use a primary risk model to maximize utility in the objective function and place additional constraints on the secondary risk model. The resulting optimal portfolio is constrained by the secondary risk model, thus preventing extreme solutions. For example, the secondary model could be a constraint such as an external mandate. You apply risk constraints, but you set risk aversion to zero in the utility function for the secondary model.

Secondary Risk Terms

This setting adds a secondary risk term to your utility function. Use this setting to set the secondary risk aversion for common factor risk and specific risk.

There is a check box to indicate that you want to enter specific risk aversion directly or as a ratio to common factor risk. If you select the check box, you enter the desired ratio of specific risk aversion relative to common factor risk aversion.



Transaction Cost Terms

This setting adds a transaction cost term to your utility function. This enables you to set up transaction costs themselves using the Transaction Costs settings below.

The transaction cost multiplier field enables you to control the relative importance of transaction costs in a portfolio rebalancing by multiplying the transaction cost portion of the utility calculation. You can change the multiplier value to try out various transaction cost scenarios and see the effect on your rebalance results. A higher multiplier gives transaction costs greater importance during rebalancing.

The holding period affects the amount of transaction cost considered when calculating the utility function. The longer the holding period, the smaller the effects of transaction cost, and vice versa.

- Enter a number in the Multiplier field to multiply the relative importance of transaction costs in the rebalance. (A multiplier of 1.00 means the utility calculation is not changed.)
- In the Holding Period field, you can enter a number to represent years (1 = 1 year).

Penalty Terms

This setting adds a penalty term to your utility function. Use it to set a multiplier that changes the relative importance of penalty terms in the rebalancing.

You set up the penalty terms themselves later, in the Penalties settings category.

In the Multiplier field, enter a number to multiply the relative importance of penalties in the rebalancing. (A multiplier of 1.00 means the utility calculation is not changed.)

Penalize Residual Alpha

This setting adds a penalty term to your utility function specifically for residual alpha. Use this setting to penalize residual alpha so that alpha and risk factors are better aligned in the rebalancing.

To use this penalty you must provide the theta parameter, which is similar to a risk aversion (lambda), and allows you to control the importance of the penalty term. You can also select an asset attribute to specify a weighting scheme for calculating the residual alpha. The weighting scheme is optional: if you leave this setting blank, Barra PortfolioManager defaults to using equal weighting.

For more information about this setting, see [Refining Portfolio Construction When Alphas and Risk Factors are Misaligned](#) in the Barra PortfolioManager Help Center.

For more information on selecting attributes, see [Selecting Attributes for Rebalancing](#).

Short Rebate

This setting adds a short rebate term to your utility function. If your optimal portfolio includes short positions, you may receive from the lender a rebate of the interest earned on the proceeds. Use this utility term to include the rebate in the rebalancing.

Enter the General Short Cost as a percentage, where 2 is 2 percent, then enter a multiplier.

For the features below, you must first import your costs and proceeds as asset attributes. For information on how to do this, see [Importing Asset Data](#) in the Barra PortfolioManager Help Center.

There is a Hard to Borrow Costs field and an Interest on Proceeds field. For both of these you can select an asset attribute.

For more information on selecting attributes, see [Using Portfolio Attributes](#) in the Barra PortfolioManager Help Center.

Factor Weights-Primary Model

This setting enables you to customize the weights of individual risk factors of your primary risk model in your utility function. For example, you can disregard a certain factor by setting its weight to zero.

You can set factor weights only for the following optimization types:

- Max Utility
- Sensitivity

Depending on the selected model, you can choose from Currency, Industry, Risk Indices, Country, and World Equity factor types. The factor list changes to display the factors for the selected factor type. You can add multiple factor types for your primary risk model.

You need to enter the factor weight in terms of percentage. The default weight is 100%. Note that the input values should be ≥ 0 or $\leq 10000(\%)$.

Factor Weights-Secondary Model

This setting enables you to customize the weights of individual risk factors of your secondary risk model in your utility function. For example, you can disregard a certain factor by setting its weight to zero.

You can set factor weights only for the following optimization types:

- Max Utility
- Sensitivity

Depending on the selected model, you can choose from Currency, Industry, Risk Indices, Country, and World Equity factor types. The factor list changes to display the factors for the selected factor type. You can add multiple factor types for your secondary risk model.

You need to enter the factor weight in terms of percentage. The default weight is 100%. Note that the input values should be ≥ 0 or $\leq 10000(\%)$.

Fixed Holding Costs

This setting enables you to define a fixed cost for each non-zero position or active position in the optimal portfolio. When the initial portfolio is cash only and the reference portfolio is the initial portfolio, fixed holding cost is the same as fixed transaction cost. You must provide the reference portfolio and the fixed cost for each asset (downside and upside separately).

The reference portfolio could be the initial or a benchmark portfolio, or even empty.

Penalty Settings

Penalties, like constraints, let you customize your optimization by tilting toward certain characteristics. Unlike constraints, penalties are not binding. When you apply a penalty, you specify a target for a portfolio characteristic as well as an upper and lower penalty threshold (you must specify all three), which indicate how closely the characteristic value in the optimal solution should approach the target value.

The optimizer determines how closely your optimal portfolio approaches the target by including a penalty term in the optimization function and maximizing utility while including the effect of any penalties. Penalties are treated as adjustments to the optimization cost function. Thus, it is inconsistent to specify targets and then adjust those targets during optimization.

Penalties increase with the square of the deviation from the target level. They are normalized using the minimum and maximum parameters. If the exposure is at the minimum or maximum level, the penalty is equivalent to a -1% return. In other words, applying penalties to your optimization applies a quadratic reduction to utility of a portfolio. If the optimizer attains the target level for the parameter to which the penalty is applied, there is no utility reduction. If the penalty parameter's level is at the min or max values, then there is a 1 utility point reduction in the portfolio's utility. The amount by which the optimizer penalizes the utility increases quadratically beyond these min and max values.

For percent fields, the constant you enter is directly interpreted as % for addition or subtraction, e.g. $b+3$ means the benchmark value in percent plus 3%. For multiplication, you achieve the percentage by scalar multiplication, e.g. $b*0.98$ means 98% of benchmark value.

For non-percent fields, enter the constant as a simple scalar value to be added or subtracted, e.g. $b+0.03$ means benchmark value plus 0.03.

For more information on entering values in these settings, see [Rules for Entering Relative Constraints](#).

Benchmark Beta Penalty

Add this setting to define a penalty on your portfolio-level predicted beta relative to the primary benchmark. You can enter a default target, plus a default minimum and maximum value, in percent.

Market Beta Penalty

Add this setting to define a penalty on your portfolio-level predicted beta relative to the market portfolio. You can enter a default target, plus a default minimum and maximum value, in percent.

Factor Penalties

Add this setting to define penalties on portfolio-level exposures to one or more factors in the primary risk model. After you select a factor type from the Factor Type list, the factors available for the selected type are displayed. You can enter a default target for the factor type as a whole, plus a default minimum and maximum value, in percent. You can also select the penalty type - Quadratic or Linear. This applies to all factors of this type.

For each individual factor to which you want to apply a penalty, you can enter a target, minimum and maximum values in percent, and specify the penalty type. These override the default values.

Note: You can use this penalty more than once to select multiple factor types.

Factor Group Penalties

Add this setting to define penalties on portfolio-level exposure to groups of primary risk model factors. The factor group exposure is the sum of the exposures to the underlying factors.

To use this penalty, you must create the factor grouping schemes you want to use. For more information, see [Set Up Factor Grouping Schemes](#).

After you select a factor type from the Factor Type list, the Factor Group Scheme list becomes active. This list contains all the grouping schemes related to your selected factor. You can enter a default penalty for all factor groups or specify distinct penalties for each group. You can also select the penalty type - Quadratic or Linear. Penalties defined per group always override the default. You can set a target value, maximum and minimum exposure values for each group plus specify the penalty type.

Note: You can use this penalty more than once to select multiple factor types.

Custom Penalties

Add this setting to define penalties on portfolio-level exposure to asset attributes. The portfolio-level exposure is based on the aggregation scheme defined in the attribute properties. You can select a penalty attribute from the available attributes or create a new attribute by clicking **New**. After selecting or creating an attribute, you can enter a portfolio target, minimum and maximum values, and the penalty type.

Note: You can use this penalty more than once to select multiple attributes.

For more information on selecting assets, see [Selecting Attributes for Rebalancing](#).

Group Penalties

Add this setting to define penalties on portfolio exposure to groups of assets for a specific asset attribute.

For more information on creating groups, see [Set Up Asset Grouping Schemes](#) in the Barra PortfolioManager Help Center.

To set up this penalty, you select a constraint attribute, such as weight or industry, against which you want to control exposure. Then you select the group attribute, which is the asset-level attribute used to define the grouping scheme. Then, you select a grouping scheme.

You can enter a default penalty for all asset groups or specify distinct penalties for each group. You can enter a target, minimum and maximum value, plus specify the penalty type. Penalties defined per group always override the default.

Note: You can use this penalty more than once to select multiple grouping schemes.

Settings Summary	Value	Status	Priority	Message
AS-CF Risk Aversion Ratio	true			
Asset Specific Risk Aversion/Ratio	1			
Secondary Risk Terms				
Common Factor Risk Aversion	0.0075			
AS-CF Risk Aversion Ratio	true			
Asset Specific Risk Aversion/Ratio	1			
Penalty Terms				
Multiplier	1			
Penalties				
Group Penalties				

Penalties > Group Penalties

Constraint Attribute

Group Attribute

Grouping Scheme

Long Position Penalty (%)

Add this setting to set a penalty on the percent of your portfolio that is long. You can set a target plus a maximum and minimum long position in percent. You can also specify the penalty type - Quadratic or Linear.

Short Position Penalty (%)

Add this setting to set a penalty on the percent of your portfolio that is short. You can set a target plus a maximum and minimum short position in percent. You can also specify the penalty type - Quadratic or Linear.

Total Leverage Penalty (%)

Add this setting to set a penalty on the percent of leverage of the portfolio. Leverage is defined as the amount of debt used to acquire additional assets. You can enter a target plus a maximum and minimum value in percent. You can also specify the penalty type - Quadratic or Linear.

Asset Level Penalty (%)

Add this setting to define a penalty on all the assets in the portfolio. You can set a target plus a maximum and minimum value in percent. You can also specify the penalty type - Quadratic or Linear.

Transaction Cost Settings

Transaction cost constraints enable you to include in your optimization the transaction costs incurred in achieving the optimal portfolio. These include settings for direct (linear) costs, which are measurable and explicit, such as the cost per share of a stock or the cost of the trade itself. There are also settings that allow you to include indirect (nonlinear) costs, the implicit costs you incur because of the effect the trade has on the market (for instance, the price of a stock goes down when you sell).

Note: To incorporate transaction costs into the optimization, you must also add the Transaction Terms setting in the Custom Utility section above.

You can enter costs by asset, by groups of assets, by country, or overall; as a percentage, or a cost per share, or a cost per sale. For percent fields, the constant you enter is directly interpreted as % for addition or subtraction, e.g. $b+3$ means the benchmark value in percent plus 3%. For multiplication, you achieve the percentage by scalar multiplication, e.g. $b*0.98$ means 98% of benchmark value.

For non-percent fields, enter the constant as a simple scalar value to be added or subtracted, e.g. $b+0.03$ means benchmark value plus 0.03.

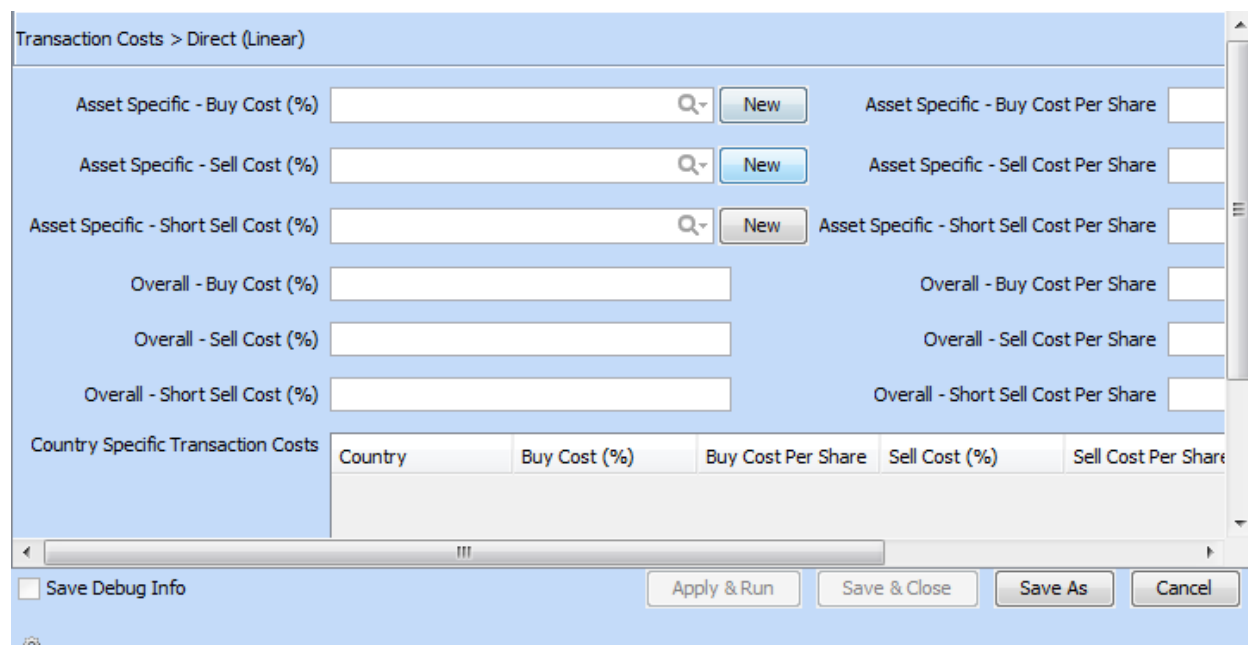
For more information on entering values in these settings, see [Rules for Entering Relative Constraints](#).

Direct (Linear)

You can use this setting to define how the optimizer calculates the direct transaction costs of achieving the optimal portfolio.

You can specify transaction costs based at various levels of specificity whether overall portfolio level, per country, or per asset. Barra PortfolioManager will prioritize these costs such that asset-level costs supersede country-level costs, which supersede overall costs.

Overall and country-specific transaction costs are entered directly as percentages or currency units. On the other hand, asset-specific costs require you to reference imported asset attribute data. For more information about importing asset attributes, see [Importing Asset Data](#) in the Barra PortfolioManager Help Center.



Transaction Costs > Direct (Linear)

Asset Specific - Buy Cost (%)	<input type="text"/>	<input type="button" value="Q"/>	<input type="button" value="New"/>	Asset Specific - Buy Cost Per Share	<input type="text"/>
Asset Specific - Sell Cost (%)	<input type="text"/>	<input type="button" value="Q"/>	<input type="button" value="New"/>	Asset Specific - Sell Cost Per Share	<input type="text"/>
Asset Specific - Short Sell Cost (%)	<input type="text"/>	<input type="button" value="Q"/>	<input type="button" value="New"/>	Asset Specific - Short Sell Cost Per Share	<input type="text"/>
Overall - Buy Cost (%)	<input type="text"/>			Overall - Buy Cost Per Share	<input type="text"/>
Overall - Sell Cost (%)	<input type="text"/>			Overall - Sell Cost Per Share	<input type="text"/>
Overall - Short Sell Cost (%)	<input type="text"/>			Overall - Short Sell Cost Per Share	<input type="text"/>

Country Specific Transaction Costs				
Country	Buy Cost (%)	Buy Cost Per Share	Sell Cost (%)	Sell Cost Per Share

☐ Save Debug Info

Indirect (Non-Linear)

Indirect or non-linear transaction costs in an optimization account for the market impact of your trades, e.g. a change in stock price caused by your sale. For this constraint, you enter an exponent and a trade multiplier and the system estimates the nonlinear transaction costs. The exponent determines the relationship between trade size and transaction costs. The larger the exponent, the more rapidly the

transaction costs increase as the trade becomes larger. The trade multiplier determines (in percent of portfolio value) the trade sizes to which the exponent applies. To estimate this multiplier, use the following formula:

$$\text{Trade multiplier} = (\text{typical cost value}) * \text{portfolio value}^{(\text{exponent}-1)} / (\text{typical trade size}^{\text{exponent}})$$

Direct (Fixed)

Direct or fixed transaction costs include the cost of specific trades in your rebalance. You can enter asset-specific costs, country-specific costs, and overall costs per buy or sell trade.

Enter transaction costs as decimals: an entry of ten percent should appear as 0.10 (not 10). Asset-specific costs and country-level costs supersede any overall costs you may indicate.

For asset-specific costs, you must first import your costs and proceeds as asset attributes. For information on how to do this, see [Importing Asset Data](#) in the Barra PortfolioManager Help Center.

- To enter **asset-specific costs**, select the field for buy or sell cost per trade, then use the button beside the field to select an asset. The cost per trade related to this asset is part of the data you uploaded to Barra PortfolioManager. For more information on selecting assets, see [Selecting Attributes for Rebalancing](#).
- To enter **overall transaction costs**, enter a buy or sell cost per trade in the appropriate field.
- To enter **country-level transaction costs**, scroll down to the table of countries. Select the country you want and enter amounts, in the currency of the country, for buy or sell costs per trade.

Indirect (Piece-Wise Linear Transaction Costs by Asset)

Piece-wise linear costs provide the optimizer with data on the indirect or implicit costs of trades. The "pieces" are components of a cost curve. The curve as a whole describes the indirect costs incurred by trading a particular asset as part of the optimization. For example, the fact that you buy or sell stock in a particular company may affect the price of that stock, and the affect may change with the amount of the stock you trade.

For piece-wise linear costs by asset, you must first import your curve as an asset attribute. For information on how to do this, see [Importing Asset Data](#).

To add the curve to your rebalance profile, use the button beside the **Asset Specific PLTC Source** field to display a list of asset attributes. Select the curve from the list. For more information on selecting assets, see [Selecting Attributes for Rebalancing](#).

Indirect (Piece-Wise Linear Transaction Costs by Group)

Piece-wise linear costs provide the optimizer with data on the indirect or implicit costs of trading groups of assets, based on a particular attribute such as Size or Average Daily Trading Volume. The "pieces" are components of a cost curve. The curve as a whole generally characterizes the indirect costs incurred by trading groups of assets as part of the optimization. You use this constraint to enter the curve in pieces.

Before you can use this setting, you must set up the grouping scheme you intend to use. In the example below, the grouping scheme divides the universe of stocks into quintiles based on Average Daily Trading Volume. For information on how to do this, see [Set Up Asset Grouping Scheme](#).

1. To create this setting, select an asset attribute from the drop-down list, in this case Average Daily Trading Volume, on which you want to enter piece-wise linear transaction costs.

2. Once you have selected the attribute, a list of possible grouping schemes appears below it. Select the scheme you created, in this case Aver. Daily Trading Volume, which you set up as quintiles of the universe.
A list of the groups in the scheme appears, as well as a table and a blank graph.
3. Select a group and enter a Buy curve and a Sell curve consisting of breakpoints and the slopes (in degrees) between them. The breakpoints must be in ascending order, and the last one must be plus or minus Infinity (+Inf.) The Sell slopes and breakpoints always convert to negative numbers.
4. You can build the curve for each group in Excel and paste it into the table. Insert the empty Buy and Sell cells you need, then copy the Excel table, right-click in the table, and click **Insert from Clipboard**.

Once you have entered at least two breakpoints, the curve appears on the graph.

Cash Rules Settings

Use cash rules to control the cash position in the optimal portfolio.

Cash Settings

You can select a portfolio attribute which references a portfolio-specific cash flow. To use this setting, you must first import portfolio attributes. For instructions on how to do this, see [Importing Asset Data](#) in the Barra PortfolioManager Help Center. There are two options for setting up cash flow in relation to the portfolio base value:

- In the Reference Properties, set up the Base Value as the Initial Portfolio and Cash as CashFlow. This option uses default settings for general asset bounds
- In the Reference Properties, set up the Base Value as the Initial Portfolio and then, under Cash Settings select an attribute for Cash In/Out. Then, enter the lower and upper bounds to scale appropriately.

There is also a check box that you can select to have the optimizer invest all cash produced in achieving the optimal portfolio.

Trading Constraints Settings

Use these settings to define trading requirements such as the maximum number of assets, the minimum holding size, or the minimum trade size. These are called paring constraints because the optimizer pares away (as with a knife) assets from the optimal portfolio until the constraints are satisfied. Introducing even one paring constraint prevents the optimizer from finding the optimal portfolio (settling instead for a very good approximation). Introducing multiple paring constraints increases the likelihood that the optimizer will find the problem to be infeasible. At the least, try a case without paring constraints (but using other constraints) and then compare that to a case with paring constraints. If you can do without paring constraints, the optimizer is certain to return an optimal portfolio.

For percent fields, the constant you enter is directly interpreted as % for addition or subtraction, e.g. $b+3$ means the benchmark value in percent plus 3%. For multiplication, you achieve the percentage by scalar multiplication, e.g. $b*0.98$ means 98% of benchmark value.

For non-percent fields, enter the constant as a simple scalar value to be added or subtracted, e.g. $b+0.03$ means benchmark value plus 0.03.

For more information on entering values in these settings, see [Rules for Entering Relative Constraints](#).

Note: You may not combine paring constraints with round lot constraints. If you trade in round lots, you may only select turnover, transaction cost, and crossover constraints.

Asset Paring

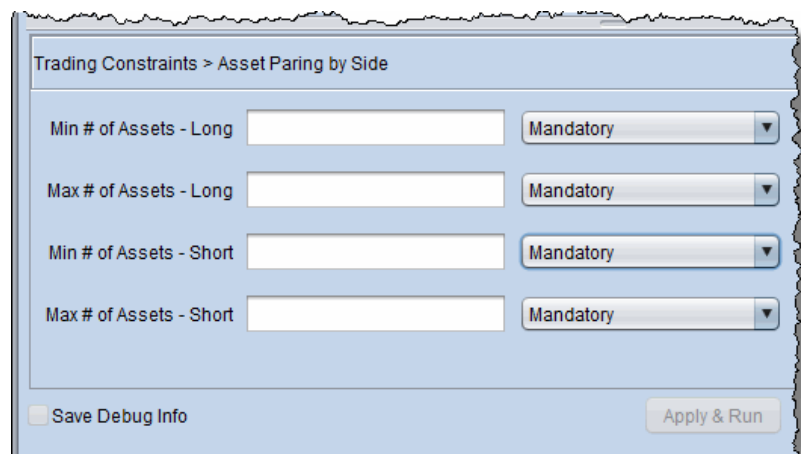
Use asset paring to specify an optimal portfolio consisting of a maximum and/or minimum number of assets. The constraint can be either mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Enter values for the minimum and maximum number of assets for the portfolio in the respective fields, then select from the dropdown list for each constraint whether it is mandatory or soft.

Asset Paring by Side

Use asset paring by side to specify an optimal portfolio consisting of a maximum and/or minimum number of long assets and short assets. The constraint can be either mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Enter values in the respective fields for the minimum and maximum number of assets on both the short and long sides of the portfolio. For each value, select from the dropdown list whether the constraint is mandatory or soft.



Asset Paring by Group

This constraint allows you to control the maximum and/or minimum number of assets per group. The constraint can be either mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible. When added, the Profile Manager displays a Grouping Attribute drop-down list. After you select an attribute, you select a grouping scheme from the drop-down list to display all the groups in that scheme. You can enter a default minimum and default maximum number of assets that applies to all groups.

In addition, you can enter the minimum and maximum number of assets for each individual group in the scheme. These override the default values. For each group, select from the Priority drop-down list whether the constraint is mandatory or soft.

Note: You can use this constraint more than once to simultaneously constrain the number of assets across multiple grouping schemes.

To use this constraint on user-defined asset groups, you may be required to import asset data as enumerated attributes first. For information on how to do this, see [Importing Asset Data](#).

For more information about creating groups, see [Setup Asset Grouping Scheme](#).

Trade Paring

Use trade paring to find an optimal portfolio by controlling the number of trades.

- Enter values in the respective fields for the minimum and maximum number of trades; the minimum and maximum number of buys; and the minimum and maximum number of sells for the portfolio.
- Select from the dropdown list for each field whether the constraint is mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Trade Paring by Side

Use trade paring by side to find an optimal portfolio by specifying a small, fixed number of trades, which can be different for long and short positions.

- Enter values in the respective fields for the minimum and maximum number of long trades and the minimum and maximum number of short trades for the portfolio.
- Select from the dropdown list for each field whether the constraint is mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Trade Paring by Group

This constraint allows you to define the maximum and/or minimum number of trades by asset group. The constraint can be either mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible. When added, the Profile Manager displays a Grouping Attribute drop-down list. After you select an attribute, you select a grouping scheme from the drop-down list to display all groups in that scheme. You can enter a default minimum and default maximum number of trades that applies to all groups.

In addition, you can enter the minimum and maximum number of trades for each individual group. These override the default values. For each group, select from the Priority drop-down list whether the constraint is mandatory or soft.

Note: You can use this constraint more than once to simultaneously constrain the number of trades across multiple grouping schemes.

To use this constraint on user-defined asset groups, you may be required to import asset data as enumerated attributes first. For information on how to do this, see [Importing Asset Data](#).

For more information about creating groups, see [Setup Asset Grouping Scheme](#).

Level Paring

Level paring has two possible objectives. You can use it to find an optimal portfolio through trades of no less than a given amount, e.g. 0.1% of the portfolio value, or, you can use it to find an optimal portfolio in which no asset weight is below a certain level, e.g. 0.5% of the portfolio value.

To achieve either of these objectives:

- Enter values in the respective fields for the minimum trade threshold, minimum trade threshold for buys and sells, or the minimum holding threshold for the portfolio in percent.

- Select from the dropdown list for each field whether the constraint is mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Level Paring by Side

Level paring by side has two possible objectives, both of which can have different values for the long and short side of the portfolio.

You can use it to find an optimal portfolio through trades of no less than a given amount, e.g. 0.1% of the portfolio value, or, you can use it to find an optimal portfolio in which no asset weight is below a certain level, e.g. 0.5% of the portfolio value.

To achieve either of these objectives:

- Enter values in the respective fields for the minimum trade thresholds, long and short, or the minimum holding thresholds, long and short, for the portfolio in percent.
- Select from the dropdown list for each field whether the constraint is mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Level Paring by Group

This constraint allows you to limit how much you hold or trade each asset. The limit is expressed as a function of an asset's weight in the portfolio. Instead of specifying limits for each asset, you can express limits by groups of assets. Thus all the assets in a group share the same limit.

For example, you can define constraint such as:

- No asset in Information Technology shall exceed 3% of the overall portfolio.
- No asset in the Bottom Quintile by Market Cap shall trade in excess of 1% of the portfolio value.

You can define asset groups based on attributes that are descriptive (e.g. enumerated attributes like GICS Sector) or attributes that are numeric values (e.g. bin ranges). To use this constraint on user-defined asset groups, you may be required to import asset data as enumerated attributes first. For instructions on how to do this, see [Importing Asset Data](#).

For more information about creating groups, see [Setup Asset Grouping Scheme](#).

Turnover

Use this constraint to set a maximum turnover level for your portfolio. It considers all transactions, including buys, sells, and short sells. Covered buys are measured as a percentage of initial portfolio value adjusted for any cash infusions or withdrawals you have specified.

- Enter a Maximum Turnover value for the portfolio in percent.
- Select the check box to specify that turnover be measured as a percentage of the portfolio's Base Value.
- Select from the dropdown list whether the constraint is mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Turnover by Side

Use this constraint to set maximum turnover levels that can be different for the long and short sides of your portfolio. It considers all transactions, including buys, sells, and short sells, and allows you to set a

different turnover level for short sells. Covered buys are measured as a percentage of initial portfolio value adjusted for any cash infusions or withdrawals you have specified.

- Enter Maximum Turnover - Long and Maximum Turnover - Short values in percent.
- Then, select from the drop-down list for each field whether the constraint is mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Crossovers

This constraint is for Long/Short optimizations and for Standard, Risk Target, or Efficient Frontier optimizations for which you allow short positions. If you want to allow assets to move from the short side of the portfolio to the long side during an optimization, use this constraint to determine if the move is counted as one trade or two.

Holdings Constraints Settings

Holdings constraints apply to the universe. Assets in the universe can be constrained at the level of rules, groups of assets, or individual assets.

The following table describes the hierarchy of how holdings constraints are resolved.

Upper Bound (Hierarchy)	Lower Bound (Hierarchy)
Non Cash Asset Upper Bound + Cash Bounds OR Long/Short Universe bound + Cash Bounds	Non Cash Asset Upper Bound + Cash Bounds OR Long/Short Universe bound + Cash Bounds
Asset-Level Lower Bound	Asset-Level Upper Bound
Grandfather Rule—Disregard lower bound	Grandfather Rule—Disregard upper bound
Most restrictive of: Trade Limit Asset-Level upper bound by Groups (across all the group instances) Conditional Rule Individual Upper Bound	Most restrictive of: Trade Limit Asset-Level upper bound by groups (across all the group instance)
Grandfather Rule (Disregard upper bound)	Grandfather rule (Disregard lower bound)
Restricted List	Restricted List
Allow Shorts	Allow Shorts
Invest All Cash	Invest All Cash
Transaction type (i.e., Buy from universe only)	Transaction Type (i.e., Sell None)

For percent fields, the constant you enter is directly interpreted as % for addition or subtraction, e.g. $b+3$ means the benchmark value in percent plus 3%. For multiplication, you achieve the percentage by scalar multiplication, e.g. $b*0.98$ means 98% of benchmark value.

For non-percent fields, enter the constant as a simple scalar value to be added or subtracted, e.g. $b+0.03$ means benchmark value plus 0.03.

For more information about entering values in these settings, see [Rules for Entering Relative Constraints](#).

Restricted List

This constraint allows you to designate a whole portfolio or portfolio attributes, as Do Not Hold or No Trade, either firm-wide or for a specific account. To use this constraint, you must first import portfolios. For instructions on how to do this, see [Importing Portfolios](#) in the Barra PortfolioManager Help Center.

- Select either the Firm-Wide or the Account-Specific fields, then use a drop-down list to designate whether the restriction applies to a portfolio or a portfolio attribute. For more information on selecting attributes, see [Selecting Attributes for Rebalancing](#).
- Once you have selected the portfolio or asset to which the restriction applies, select Do Not Hold or No Trade from the Restriction Type drop-down list at the bottom of the screen.

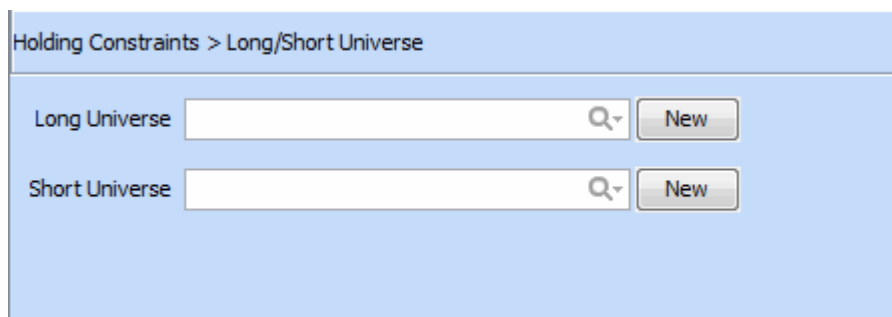
Note: If you use this form to designate both Firm-Wide and Account-Specific restrictions, the same Restriction Type applies to both.

Long/Short Universe

This constraint allows you to employ different screening criteria for long and short positions by specifying a long and short universe. You can select a portfolio or portfolio attribute for each universe. Note that these portfolios must be part of the universe defined in the [default settings](#).

To use this constraint, you must first import these universes as portfolios. For instructions on how to do this, see [Importing Your Own Data](#) in the Barra PortfolioManager Help Center.

Once created, you can select these portfolios directly or select a portfolio attribute. For more information on the selection process, see [Selecting Attributes for Rebalancing](#).



Non-Cash Assets

Use this constraint to specify a general holdings bound for non-cash assets in the universe. For example, you might be tracking a model portfolio and want to be sure you hold positions in all its assets.

You can specify upper and lower bounds for all non-cash assets in the optimal portfolio. If you set a lower bound greater than zero, the optimizer *must* include these assets and weights, or it will not produce an optimal portfolio. This lower bound can be in addition to or instead of setting a Min Holding

(%) for all assets. If the two values conflict, Barra PortfolioManager uses the more restrictive constraint (the higher minimum).

If you have imported asset bounds for specific assets, Barra PortfolioManager uses your imported bounds for those assets, regardless of other constraints you may set.

Note: If you want to include non-cash assets in the universe but allow the optimizer to add other assets as well, set the lower bound to a very small figure like .01%.

Asset Level Bounds

This constraint allows you to specify upper and lower bounds for specific assets in an optimal portfolio. To use this constraint, you must first import asset attributes. For instructions on how to do this, see [Importing Asset Data](#) in the Barra PortfolioManager Help Center. You can import asset bounds in absolute terms (percent values) or relative to a portfolio (initial, benchmark, or market).

Next to the Upper and Lower Bound fields, click the button and select the attribute from which you want to load asset bounds. For more information on selecting asset attributes, see [Selecting Attributes for Rebalancing](#).

If you set a lower bound, the optimal portfolio must include this asset at the given weight. This can be a way to ensure that you do not sell particular assets. You can also force a sell on an asset during optimization by setting an upper bound of zero.

You can set this constraint in addition to, or instead of, cash and non-cash holdings bounds and the Minimum Holding % for all assets. If any constraints conflict for particular assets, Barra PortfolioManager uses your imported bounds for those assets, regardless of other constraint settings.

Asset Level Bounds by Group

This constraint allows you to specify upper and lower bounds for groups of assets in the universe.

- Select an attribute from the Grouping Attribute drop-down list.
A table appears that allows you to select a grouping scheme and then displays all the available attributes in that scheme.
- For the grouping scheme as a whole, enter a default minimum and default maximum value in percent. This applies to all groups.
- For each individual group to which you want to apply a constraint, enter a minimum and maximum value in percent. These override the default values.

If you set a lower bound, the optimal portfolio must include all assets within a group at the given weight. This can be a way to ensure that you do not sell particular assets. You can also force a sell on an asset during rebalance by setting an upper bound of zero.

Note: You can use this constraint more than once to select multiple grouping schemes.

To use this constraint, you may be required to import asset attributes first. For instructions on how to do this, see [Importing Asset Data](#) in the Barra PortfolioManager Help Center.

For more information about creating groups, see [Set Up Asset Grouping Scheme](#) in the Barra PortfolioManager Help Center.

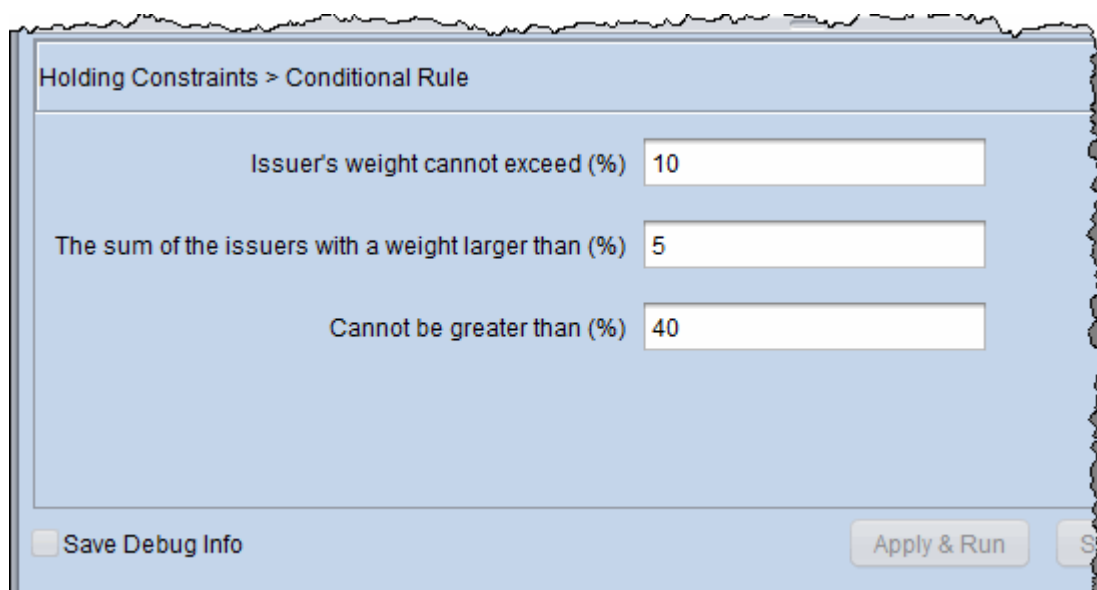
Conditional Rule

The conditional rule, a.k.a. the 5-10-40 rule, requires that a balanced portfolio satisfy the following conditions:

- The maximum weight of securities of a single asset cannot exceed 10% of the portfolio value, and
- The sum of the weights of all assets representing more than 5% of the portfolio value cannot exceed 40%.

Barra PortfolioManager supports a more general definition, which allows you to select the percentages used in the conditional rule.

- Enter a value in percent, where 2 = 2%, representing the maximum percentage of the portfolio to come from a single issuer. The default is 10%.
- Enter a value in percent that an Issuer's weight must exceed in order to be considered in #3. The default is 5%.
- Enter a value in percent that is the allowable portfolio weight of the sum of the issuers in #2. The default is 40%.



Holding Constraints > Conditional Rule

Issuer's weight cannot exceed (%) 10

The sum of the issuers with a weight larger than (%) 5

Cannot be greater than (%) 40

☐ Save Debug Info Apply & Run Cancel

Grandfather Rule

Use this constraint to disregard asset bounds for assets held in the initial portfolio. Those assets are thus "grandfathered in."

Select the check box to Disregard Lower Bound and/or Disregard Upper Bound for assets known by the system to be held in the initial portfolio.

Transaction Type

This constraint allows you to specify global trading rules. These govern which transactions the optimizer may make and whether transactions may be made outside the designated universe.

From the drop-down list, select one of the following rules:

- Allow All
- Buy from Universe Only

- Buy None
- Sell None
- Sell None, Buy from Universe Only
- Buy or Short from Universe only
- Disallow Buys and Shorts
- Disallow Sells and Covers

Trade Limits

Trade Limits allow you to define individual holdings bounds as a function of the value traded. This setting supports two methods:

- Method 1: Limit every asset in the universe such that no individual asset trade exceeds X% of the overall portfolio.
- Method 2: Limit every asset in the universes to trade within X% of their trading volume.

Trade Limits by Side

This constraint sets a limit on the amount you can trade any asset, as a percentage of the long leg or short leg of the optimized portfolio.

Enter the values in percent for the maximum trade on the long and/or short sides.

Linear Constraints Settings

Simple linear constraints define an optimal portfolio by setting limits on portfolio-level attribute exposure and factor exposures from the equity model(s). Complex linear constraints allow you to select portfolio attributes, including data you have imported, or groups of attributes you have already created, to constrain the optimization. Matrix constraints enable you to create a matrix of attributes and constrain a portfolio characteristic along two dimensions simultaneously. All of these constraints are called “linear” because of the mathematical procedures used to create them.

- For **percent** fields, the constant you enter is directly interpreted as % for addition or subtraction, e.g. if you want to specify benchmark plus 3%, enter b+3. For multiplication, you achieve the percentage by scalar multiplication, e.g. b*0.98 means 98% of benchmark value.
- For **non-percent** fields, enter the constant as a simple scalar value to be added or subtracted, e.g. if you want to specify benchmark plus 3%, enter b+0.03.

For more information on entering values in these settings, see [Rules for Entering Relative Constraints](#).

Benchmark Beta Constraint

Use this constraint to specify the minimum and maximum beta level (market exposure) in the optimized portfolio with respect your primary benchmark.

1. Enter the values as a decimal for the maximum (net) and minimum (net) beta.
2. Use the drop-down list to set the constraint as Mandatory, High, Medium, or Low priority.

Benchmark Beta Constraint by Side

Use this constraint to specify the minimum and maximum beta level of long and short positions in the optimized portfolio with respect to your specified benchmark portfolio.

1. Enter the values as a decimal for the maximum (net) and minimum (net) beta of long and short positions.
2. Use the drop-down list to set the constraint as Mandatory, High, Medium, or Low priority.

Market Beta Constraint

Use this constraint to specify the minimum and maximum portfolio-level predicted beta relative to the market portfolio.

1. Enter the values for the minimum (net) and maximum (net) market beta. Note that you must specify the market in the Reference Properties before you set these values.
2. Use the drop-down list to set the constraint as Mandatory, High, Medium, or Low priority.

Market Beta Constraint by Side

Use this constraint to specify the minimum and maximum predicted beta relative to the market portfolio for long and short legs of the optimal portfolio.

1. Enter the values for the maximum (net) and minimum (net) predicted beta. Note that you must specify the market in the Reference Properties before you set these values.
2. Use the drop-down list to set the constraint as Mandatory, High, Medium, or Low priority.

Factor Constraint, Primary Model

These constraints allow you to specify minimum and maximum values for specific factors from your primary equity model.

1. Select a factor type from the Factor Type drop-down list. A table displaying all the available factors for the type you selected appears.
2. For the factor block as a whole, you can enter a default minimum and default maximum value. Depending on the factor type, these values can be entered as a percentage or as a decimal.

Factor Type	Units	Example (To enter benchmark plus 1%)
Country	Decimal	b+0.01
Currency	Percentage	b+1
Industry	Percentage	b+1
Risk Index	Decimal	b+0.01
World	Decimal	b+0.01

3. Use the drop-down list to set the constraint as Mandatory, High, Medium, or Low priority.
4. For each individual factor to which you want to apply a constraint, you can enter a minimum and maximum value. These override the default values.
5. Use the drop-down list to set the constraint as Mandatory, High, Medium, or Low priority.

Note: You can use this constraint more than once in order to select multiple factor types.

Using Dual Risk Models

Barra PortfolioManager allows you to select two risk models when rebalancing portfolios.

You can use a primary risk model to maximize utility in the objective function and place additional constraints on the secondary risk model. The resulting optimal portfolio is constrained by the secondary risk model, thus preventing extreme solutions. For example, the secondary model could be a constraint such as an external mandate. You apply risk constraints, but you set risk aversion to zero in the utility function for the secondary model.

Also, you can use a second risk model to customize the utility function with multiple risk terms. You can specify factor or risk constraints such as:

- active risk relative to policy risk model/total risk relative to secondary risk model
- long horizon/short horizon
- normal risk environment model/extreme risk environment model

Factor Constraint, Secondary Model

These constraints allow you to specify minimum and maximum values for specific factors from your secondary equity model.

1. Select a factor type from the Factor Type drop-down list. A table displaying all the available factors for the type you selected appears.
2. For the factor block as a whole, you can enter a default minimum and default maximum value. Depending on the factor type, these values can be entered as a percentage or as a decimal.

Factor Type	Units	Example (To enter benchmark plus 1%)
Country	Decimal	b+0.01
Currency	Percentage	b+1
Industry	Percentage	b+1
Risk Index	Decimal	b+0.01
World	Decimal	b+0.01

3. Use the drop-down list to set the constraint as Mandatory, High, Medium, or Low priority.
4. For each individual factor to which you want to apply a constraint, you can enter a minimum and maximum value. These override the default values.
5. Use the drop-down list to set the constraint as Mandatory, High, Medium, or Low priority.

Note: You can use this constraint more than once in order to select multiple factor types.

Factor Constraint, Primary Model by Side

These constraints allow you to specify minimum and maximum values, which can be different for long and short positions, for specific factors from your primary equity model.

1. From the Factor Type drop-down list, select a factor type. A table appears that displays all the available factors for the type you selected.
2. For the factor block as a whole, you can enter a default minimum and default maximum value. You can also enter a default minimum and a default maximum total leverage value (Long + |Short|). The Long and Short fields enable you to use different values for the two sides of the portfolio. The value you enter applies to all factors of this type. Depending on the factor type, these values can be entered as a percentage or as a decimal.

Factor Type	Units	Example (To enter benchmark plus 1%)
Country	Decimal	b+0.01
Currency	Percentage	b+1
Industry	Percentage	b+1
Risk Index	Decimal	b+0.01
World	Decimal	b+0.01

3. For each individual factor to which you want to apply a constraint, enter a minimum and maximum value. The Long and Short fields enable you to use different values for the two sides of the portfolio. Individual factor constraints override the default values.

- The Weighted Total Leverage constraint provides you the flexibility to enter the total leverage in absolute terms for the selected factor type. You can enter a minimum and a maximum total leverage value (Long + |Short|) in the fields provided.

Note: You can use this constraint more than once in order to select multiple factor types.

Factor Constraint, Secondary Model by Side

These constraints allow you to specify minimum and maximum values, which can be different for long and short positions, for specific factors from your secondary equity model.

- From the Factor Type drop-down list, select a factor type. A table appears that displays all the available factors for the type you selected.
- For the factor block as a whole, you can enter a default minimum and default maximum value. You can also enter a default minimum and a default maximum total leverage value (Long + |Short|). The Long and Short fields enable you to use different values for the two sides of the portfolio. The value you enter applies to all factors of this type. Depending on the factor type, these values can be entered as a percentage or as a decimal.

Factor Type	Units	Example (To enter benchmark plus 1%)
Country	Decimal	b+0.01
Currency	Percentage	b+1
Industry	Percentage	b+1
Risk Index	Decimal	b+0.01
World	Decimal	b+0.01

- For each individual factor to which you want to apply a constraint, enter a minimum and maximum value. The Long and Short fields enable you to use different values for the two sides of the portfolio. Individual factor constraints override the default values.
- The Weighted Total Leverage constraint provides you the flexibility to enter the total leverage in absolute terms for the selected factor type. You can enter a minimum and a maximum total leverage value (Long + |Short|) in the fields provided.

Note: You can use this constraint more than once in order to select multiple factor types.

Factor Group Constraint, Primary Model

These constraints allow you to specify minimum and maximum values for group-level factor exposures from your primary equity model. You must define a factor group before you can select it. For more information on creating groups, see [Set Up Asset Grouping Scheme](#).

- Select a factor type against which you want to control exposure from the Factor type drop-down list.
- Select a factor grouping scheme for that type from the next drop-down list. A table displaying all the factor groups pertaining to the grouping scheme you selected appears.
- For all of the factor groups as a whole, you can enter a default minimum and default maximum value. Depending on the factor type, these values can be entered as a percentage or as a decimal.

Factor Type	Units	Example (To enter benchmark plus 1%)
Country	Decimal	b+0.01
Currency	Percentage	b+1
Industry	Percentage	b+1
Risk Index	Decimal	b+0.01
World	Decimal	b+0.01

- For each individual factor to which you want to apply a constraint, you can enter a minimum and maximum value. These override the default values.

Note: You can use this constraint more than once in order to select multiple factor groups.

Factor Group Constraint, Primary Model by Side

These constraints allow you to specify minimum and maximum values for group-level factor exposures from your primary equity model, for the long and short sides of the optimal portfolio. You must define a factor group before you can select it. For more information on creating groups, see [Set Up Asset Grouping Scheme](#).

- Select a factor type, against which you want to control exposure, from the Factor Type drop-down list.
- Select a factor grouping scheme for that type from the next drop-down list. A table displaying all the factor groups pertaining to the grouping scheme you selected appears.
- For all of the factor groups as a whole, you can enter a default minimum and default maximum value for the long and short sides. You can also enter a default minimum and a default maximum total leverage value (Long + |Short|). This applies to all factors in the groups. Depending on the factor type, these values can be entered as a percentage or as a decimal.

Factor Type	Units	Example (To enter benchmark plus 1%)
Country	Decimal	b+0.01
Currency	Percentage	b+1
Industry	Percentage	b+1
Risk Index	Decimal	b+0.01
World	Decimal	b+0.01

- For each individual factor to which you want to apply a constraint, you can enter a minimum and maximum value for the long and short sides. These override the default values.
- The Weighted Total Leverage constraint provides you the flexibility to enter the total leverage in absolute terms for the selected factor type. You can enter a minimum and a maximum total leverage value (Long + |Short|) in the fields provided.

Note: You can use this constraint more than once in order to select multiple factor groups.

Factor Group Constraint, Secondary Model

These constraints allow you to specify minimum and maximum values for group-level factor exposures from your secondary equity model. You must define a factor group before you can select it. For more information on creating groups, see [Set Up Asset Grouping Scheme](#).

1. Select a factor type, against which you want to control exposure, from the Factor type drop-down list.
2. Select a factor grouping scheme for that type from the next drop-down list. A table displaying all the factor groups pertaining to the grouping scheme you selected appears.
3. For all of the factor groups as a whole, you can enter a default minimum and default maximum value. Depending on the factor type, these values can be entered as a percentage or as a decimal.

Factor Type	Units	Example (To enter benchmark plus 1%)
Country	Decimal	b+0.01
Currency	Percentage	b+1
Industry	Percentage	b+1
Risk Index	Decimal	b+0.01
World	Decimal	b+0.01

4. For each individual factor to which you want to apply a constraint, you can enter a minimum and maximum value. These override the default values.

Note: You can use this constraint more than once in order to select multiple factor groups.

Factor Group Constraint, Secondary Model by Side

These constraints allow you to specify minimum and maximum values for group-level factor exposures from your secondary equity model, for the long and short sides of the optimal portfolio. You must define a factor group before you can select it. For more information on creating groups, see [Set Up Asset Grouping Scheme](#).

1. Select a factor type, against which you want to control exposure, from the Factor Type drop-down list.
2. Select a factor grouping scheme for that type from the next drop-down list. A table displaying all the factor groups pertaining to the grouping scheme you selected appears.
3. For all of the factor groups as a whole, you can enter a default minimum and default maximum value for the long and short sides. You can also enter a default minimum and a default maximum total leverage value (Long + |Short|). This applies to all factors in the groups. Depending on the factor type, these values can be entered as a percentage or as a decimal.

Factor Type	Units	Example (To enter benchmark plus 1%)
Country	Decimal	b+0.01
Currency	Percentage	b+1
Industry	Percentage	b+1
Risk Index	Decimal	b+0.01
World	Decimal	b+0.01

4. For each individual factor to which you want to apply a constraint, you can enter a minimum and maximum value for the long and short sides. These override the default values.
5. The Weighted Total Leverage constraint provides you the flexibility to enter the total leverage in absolute terms for the selected factor type. You can enter a minimum and a maximum total leverage value (Long + |Short|) in the fields provided.

Note: You can use this constraint more than once in order to select multiple factor groups.

Custom Constraints

Custom constraints allow you to define an optimal portfolio by setting minimum and maximum values for portfolio-level exposure to asset attributes. For custom constraints, you must first import your asset attributes. For information on how to do this, see [Importing Asset Data](#) in the Barra PortfolioManager Help Center.

1. From the Constraint Attribute drop-down list, select an asset attribute.
2. Enter the minimum (net) and maximum (net) for the constraint.
3. Use the drop-down list to set the constraint as Mandatory, High, Medium, or Low priority.

Note: You can use custom constraints more than once to select multiple attributes.

Custom Constraints by Side

Use this constraint to set minimum and maximum values on the portfolio exposure to asset attributes for the long and/or short side of the optimal portfolio. The Weighted Total Leverage constraint provides you the flexibility to enter the total leverage in absolute terms for the constraint attributes.

For custom constraints, you must first import your asset attributes. For information on how to do this, see Importing [Asset Data](#) in the Barra PortfolioManager Help Center.

1. The screen displays a Constraint Attribute field. You can browse to select an asset attribute from the list.
2. Enter the minimum (net) and maximum (net) for the constraint, for long and short positions.
3. Enter a minimum and maximum total leverage value (Long + |Short|).
4. Use the drop-down list to set the constraint as Mandatory, High, Medium, or Low priority.

Note: You can use custom constraints by side more than once in order to select multiple attributes.

Group Constraints

Group constraints enable you to set minimum and maximum values for group-level exposures. You can define groups along the following categories:

- Alpha- numeric grouping schemes (GICS, user-defined industry groups)
- Static-numeric grouping schemes (P/E or some asset-attribute-based groups)
- Dynamic grouping schemes (formula-based grouping schemes)

For more information on creating groups, see [Set Up Asset Grouping Scheme](#) in the Barra PortfolioManager Help Center. To set up the group constraint:

1. Select a constraint attribute, such as weight or industry, against which you want to control exposure.
2. Select a group attribute, which is the asset-level attribute used to define the grouping scheme.
3. Select a grouping scheme. A table displaying all the available groups in the scheme you selected appears. For the grouping scheme as a whole, you can enter a minimum and maximum value. This applies to all groups in this scheme.

- You can also select an individual group in the scheme and enter a minimum and maximum value. This overrides the default values.

Note: You can use the group constraint more than once in order to select multiple grouping schemes.

Linear Constraints > Group Constraints > Constraint Attribute: Industry2 Exposure (%) - Group Attribute: GICS Industry Group - Group

Constraint Attribute: Industry2 Exposure (%)

Group Attribute: GICS Industry Group

Grouping Scheme: distinct Hide Empty Rows ☐

	Default Min (Net)	Default Max (Net)	Priority
Default	1	10	High
	Min (Net)	Max (Net)	Priority
Semiconductors & Semiconductor E...			
Software & Services			
Technology Hardware & Equipment			
Telecommunication Services	3	6	Mandatory
Transportation			
Utilities			

☐ Save Debug Info

Group Constraints by Side

Group constraints enable you to set minimum and maximum values for group-level exposures for the long and short sides of the optimal portfolio. You can define groups along the following categories:

- Alpha- numeric grouping schemes (GICS, user-defined industry groups)
- Static-numeric grouping schemes (P/E or some asset-attribute-based groups)
- Dynamic grouping schemes (formula-based grouping schemes)

For more information about creating groups, see [Set Up Asset Grouping Scheme](#) in the Barra PortfolioManager Help Center. To set up the group constraint:

- Select a constraint attribute, such as weight or industry, against which you want to control exposure.
- Select a group attribute, which is the asset-level attribute used to define the grouping scheme.
- Select a grouping scheme. A table displaying all the available groups in the scheme you selected appears. For the grouping scheme as a whole, you can enter a minimum and maximum value. You can also enter a default minimum and a default maximum total leverage value (Long + |Short|). This applies to all groups in this scheme.
- You can also select an individual group in the scheme and enter a minimum and maximum value. This overrides the default values.
- The Weighted Total Leverage constraint provides you the flexibility to enter the total leverage in absolute terms for the selected factor type. You can enter a minimum and a maximum total leverage value (Long + |Short|) in the fields provided.

Note: You can use the group constraint more than once in order to select multiple grouping schemes.

Matrix Constraints

Matrix constraints enable you to use a matrix to control exposure to groups of assets. This means you can constrain a portfolio characteristic along two dimensions simultaneously. For example, you could set up a “sector by country” matrix and define minimum and maximum weights for sector and country groups.

Note: You can use matrix constraints more than once in order to select multiple attributes. For details about matrix constraints, see [Creating and Using Matrix Constraints](#) in the Barra PortfolioManager Help Center.

You use lists to select the portfolio attributes and grouping schemes that produce the rows and columns of the matrix. Once the matrix is complete, the Edit tab opens. You enter minimum (net) and maximum (net) in percent for the default row and for each cell in the matrix. Values entered in the individual cells override your default values.

Matrix Constraints by Side

Matrix constraints by side enable you to control exposure to groups of assets, and to do so with different values for long and short sides of the optimal portfolio. This means you can constrain a portfolio characteristic along two dimensions simultaneously. For example, you could set up a “sector by country” matrix and define minimum and maximum weights for long and short holdings for sector/country groups.

Note: You can use matrix constraints by side more than once in order to select multiple attributes.

For more information about matrix constraints by side, see [Creating and Using Matrix Constraints](#) in the Barra PortfolioManager Help Center.

You use lists to select the portfolio attributes and grouping schemes that produce the rows and columns of the matrix.

Once the matrix is complete, the Edit tab opens. You enter minimum (net) and maximum (net) in percent for the default row and for each cell in the matrix. You also enter a default minimum and a default maximum total leverage value ($\text{Long} + |\text{Short}|$). Values entered in the individual cells override your default values.

Risk Constraints Settings

Risk constraints provide methods for controlling the level of risk in your optimal portfolio. You can apply bounds for total risk, active risk, and risk budgeting to individual assets and groups of assets. If you are using two risk models, you can constrain total risk, active risk, and risk budgeting for individual assets and groups of assets in the second model.

Using Dual Risk Models

Barra PortfolioManager allows you to select two risk models when rebalancing portfolios.

You can use a primary risk model to maximize utility in the objective function and place additional constraints on the secondary risk model. The resulting optimal portfolio is constrained by the secondary risk model, thus preventing extreme solutions. For example, the secondary model could be a constraint such as an external mandate. You apply risk constraints, but you set risk aversion to zero in the utility function for the secondary model.

Also, you can use a second risk model to customize the utility function with multiple risk terms. You can specify factor or risk constraints such as:

- active risk relative to policy risk model/total risk relative to secondary risk model
- long horizon/short horizon
- normal risk environment model/extreme risk environment model

Entering Values

For percent fields, the constant you enter is directly interpreted as % for addition or subtraction, e.g. if you want to specify benchmark plus 3 %, enter b+3. For multiplication, you achieve the percentage by scalar multiplication, e.g. $b \times 0.98$ means 98% of benchmark value.

For non-percent fields, enter the constant as a simple scalar value to be added or subtracted, e.g. if you want to specify benchmark plus 3%, enter b+0.03.

For more information about entering values in these settings, see Rules for Entering Relative Constraints in Portfolio Rebalancing.

Total Risk Bounds, Primary Model

Use this constraint to enter the upper bound of total risk for your primary equity model. You can make the bounds either mandatory or soft using a drop-down list. A soft constraint can be relaxed if the problem is otherwise infeasible.

Total Risk Bounds by Group, Primary Model

Use this constraint to enter the upper bound of total risk for groups of assets in your primary equity model.

To use this constraint, you may be required to import portfolio attributes first. For instructions on how to do this, see [Set Up Portfolio Attributes](#) in the Barra PortfolioManager Help Center. You must also create the grouping schemes you want to use. For more information, see [Set Up Asset Grouping Scheme](#) in the Barra PortfolioManager Help Center.

The screen displays an Attribute drop-down list. After you select an attribute, the Grouping Scheme list becomes active. This list contains all the grouping schemes related to your selected attribute. When you select a grouping scheme, the screen displays a table with the default upper bound and also the upper bound for each group in the scheme.

For the grouping scheme as a whole, you can enter a default upper bound in percent. This applies to all groups. You can make the bound either mandatory or soft using a drop-down list. A soft bound can be relaxed if the problem is otherwise infeasible.

For each individual group to which you want to apply a constraint, you can enter an upper bound in percent. This overrides the default value. You can force a sell on an asset during a rebalance by setting an upper bound of zero.

Note: You can use this constraint more than once in order to select multiple groups.

Active Risk Bounds, Primary Model

Use this constraint to enter the upper bound of active risk for your primary equity model. You can make the bound either mandatory or soft using a drop-down list. A soft constraint can be relaxed if the problem is otherwise infeasible.

Active Risk Bounds by Group, Primary Model

Use this constraint to enter the upper bound of active risk for groups of assets in your primary equity model.

To use this constraint, you may be required to import portfolio attributes first. For instructions on how to do this, see [Set Up Portfolio Attributes](#) in the Barra PortfolioManager Help Center. You must also create the grouping schemes you want to use. For more information, see [Set Up Asset Grouping Scheme](#) in the Barra PortfolioManager Help Center.

The screen displays an Attribute drop-down list. After you select an attribute, the Grouping Scheme list becomes active. This list contains all the grouping schemes related to your selected attribute. When you select a grouping scheme, the screen displays a table with default upper bound and also the upper bound for each group in the scheme.

For the grouping scheme as a whole, you can enter a default upper bound in percent. This applies to all groups. You can make the bound either mandatory or soft using a drop-down list. A soft bound can be relaxed if the problem is otherwise infeasible.

For each individual group to which you want to apply a constraint, you can enter an upper bound in percent. This overrides the default value.

Note: You can use this constraint more than once in order to select multiple groups.

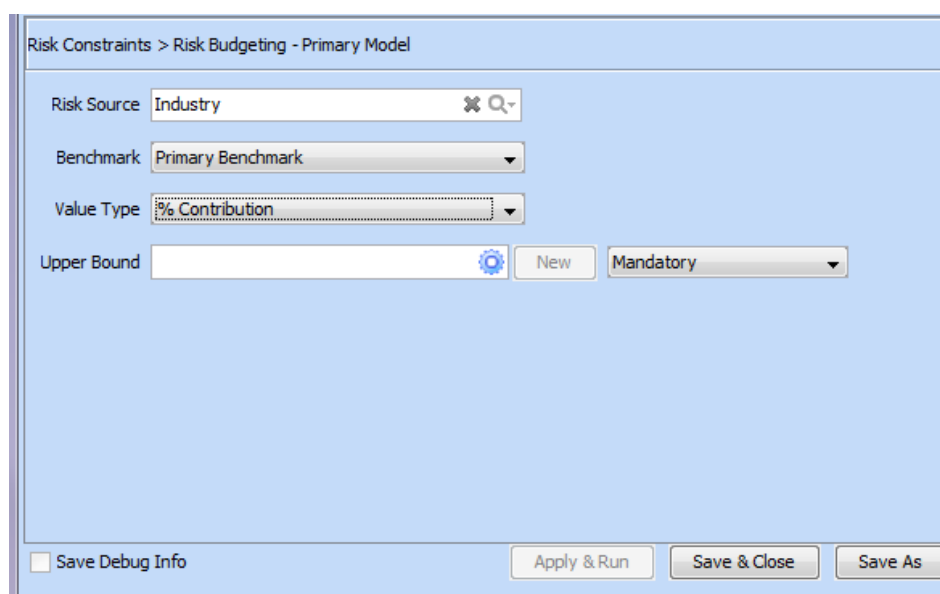
Risk Budgeting, Primary Model

Use this constraint to limit the contribution of particular risk sources in the primary equity model to the portfolio's total risk.

You set this up by selecting a risk source from the primary model. Then you select a value type for the constraint: % Contribution, % Standard Deviation, or Ratio [Std Dev(Source)/Std Dev(Total)]. You enter an upper bound for this source and value type, and specify the constraint as either mandatory or soft. A soft bound can be relaxed if the problem is otherwise infeasible.

You can also use a drop-down list to specify if the constraint is relative to the primary or secondary benchmark.

You can use risk budgeting more than once in order to select multiple risk sources.



Note: Risk budgeting constraints are nonconvex problems that are difficult to solve and expose you to the following challenges.

- When a feasible solution exists, there is no guarantee that the optimizer will find it.
- When the optimizer declares the problem infeasible, this is not always true. There are cases where a feasible problem can be declared infeasible.
- If the optimizer finds a solution, it is not guaranteed to be globally optimal or even locally optimal; in fact, its distance from the optimum is generally unknown.
- Since the algorithm's outcome is path-dependent, you cannot rely on any of the usual sanity checks for convex problems. For instance, relaxing a constraint (and not necessarily a nonconvex one) might result in a worse solution, or failure to find a solution at all.
- When the same problem is solved by different versions of the software, or by the same version on different platforms, the software may produce different solutions. The solutions may exhibit large objective function differences.
- Since the nonlinear solver is generally much slower than other solvers, running times can be exceedingly high. This is especially true when multiple nonconvex features are present and they are combined with discrete features.

Risk Budgeting by Group, Primary Model

Use this constraint to limit the contribution of particular groups of risk sources in the primary equity model to the portfolio's total risk.

To use this constraint, you may be required to import portfolio attributes first. For instructions on how to do this, see [Set Up Portfolio Attributes](#) in the Barra PortfolioManager Help Center. You must also create the grouping schemes you want to use. For more information, see [Set Up Asset Grouping Scheme](#) in the Barra PortfolioManager Help Center.

The screen starts with an Attribute drop-down list. After you select an attribute, the Grouping Scheme list becomes active. This list contains all the grouping schemes related to your selected attribute. After selecting a grouping scheme, you select a risk source from the primary model. Then you select a value type for the constraint: % Contribution, % Standard Deviation, or Ratio [Std Dev(Source)/Std Dev(Total)]. You can also use a drop-down list to specify if the constraint is relative to the primary or secondary benchmark.

The screen displays a table where you can enter the default upper bound for the whole scheme and also the upper bound for each group in the scheme, which overrides the default value. The contribution of any group can be either mandatory or soft. A soft constraint can be relaxed if the problem is otherwise infeasible.

You can use risk budgeting more than once in order to select multiple risk sources.

Note: Risk budgeting constraints are nonconvex problems that are difficult to solve and expose you to the [challenges](#) above.

Risk Parity, Primary Model

Use this constraint as a step in a multi-stage portfolio construction process. This constraint allows you to use the portfolio formed so far as a benchmark for further construction and is useful if additional portfolio rules or constraints need to be satisfied.

Once you add the setting, the risk parity for primary model is set to 'true' by default.

Notes:

- As the risk parity condition is very restrictive, you are discouraged from imposing additional unnecessary constraints or objective function terms in the risk parity portfolio construction problem.
- This setting can have conflicts with the Risk Parity Secondary constraint setting, Allow Shorts constraint settings, Conditional Rule constraint settings, Constraint Group Priorities constraint settings, other Risk Constraints settings, and any other settings set to soft priority.

Total Risk Bounds, Secondary Model

Use this constraint to enter the upper bound of total risk for your secondary equity model. You can make the bound either mandatory or soft using a drop-down list. A soft constraint can be relaxed if the problem is otherwise infeasible.

Total Risk Bounds by Group, Secondary Model

Use this constraint to enter the upper bound of total risk for groups of assets in your secondary equity model.

To use this constraint, you may be required to import portfolio attributes first. For instructions on how to do this, see [Set Up Portfolio Attributes](#) in the Barra PortfolioManager Help Center. You must also create the grouping schemes you want to use. For more information, see [Set Up Asset Grouping Scheme](#) in the Barra PortfolioManager Help Center.

The screen displays an Attribute drop-down list. After you select an attribute, the Grouping Scheme list becomes active. This list contains all the grouping schemes related to your selected attribute. When you select a grouping scheme, the screen displays a table with the default upper bound and also the upper bound for each group in the scheme.

For the grouping scheme as a whole, you can enter a default upper bound in percent. This applies to all groups. You can make the bounds either mandatory or soft using a drop-down list. A soft bound can be relaxed if the problem is otherwise infeasible.

For each individual group to which you want to apply a constraint, you can enter an upper bound in percent. This overrides the default value. You can force a sell on an asset during a rebalance by setting an upper bound of zero.

Note: You can use this constraint more than once in order to select multiple groups.

Active Risk Bounds, Secondary Model

Use this constraint to enter the upper bound of active risk for your secondary equity model. You can make the bounds either mandatory or soft using a drop-down list. A soft constraint can be relaxed if the problem is otherwise infeasible.

Active Risk Bounds by Group, Secondary Model

Use this constraint to enter the upper bound of active risk for groups of assets in your secondary equity model.

To use this constraint, you may be required to import portfolio attributes first. For instructions on how to do this, refer to the help on importing asset data. You must also create the grouping schemes you want to use. For more information, see the help on setting up an asset grouping scheme.

The screen displays an Attribute drop-down list. After you select an attribute, the Grouping Scheme list becomes active. This list contains all the grouping schemes related to your selected attribute. When you

select a grouping scheme, the screen displays a table with the default upper bound and also the upper bound for each group in the scheme.

For the grouping scheme as a whole, you can enter a default upper bound in percent. This applies to all groups. You can make the bound either mandatory or soft using a drop-down list. A soft bound can be relaxed if the problem is otherwise infeasible.

For each individual group to which you want to apply a constraint, you can enter an upper bound in percent. This overrides the default value.

Note: You can use this constraint more than once in order to select multiple groups.

Risk Budgeting, Secondary Model

Use this constraint to limit the contribution of particular risk sources in the primary equity model to the portfolio's total risk.

You set this up by selecting a risk source from the primary model. Then you select a value type for the constraint: % Contribution, % Standard Deviation, or Ratio [Std Dev(Source)/Std Dev(Total)]. You enter an upper bound for this source and value type, and specify the constraint as either mandatory or soft. A soft bound can be relaxed if the problem is otherwise infeasible.

You can also use a drop-down list to specify if the constraint is relative to the primary or secondary benchmark.

You can use risk budgeting more than once in order to select multiple risk sources.

Note: Risk budgeting constraints are nonconvex problems that are difficult to solve and expose you to the [challenges](#) above.

Risk Budgeting by Group, Secondary Model

Use this constraint to limit the contribution of particular groups of risk sources in the primary equity model to the portfolio's total risk.

To use this constraint, you may be required to import portfolio attributes first. For instructions on how to do this, see [Set Up Portfolio Attributes](#) in the Barra PortfolioManager Help Center. You must also create the grouping schemes you want to use. For more information, see [Set Up Asset Grouping Scheme](#) in the Barra PortfolioManager Help Center.

The screen starts with an Attribute drop-down list. After you select an attribute, the Grouping Scheme list becomes active. This list contains all the grouping schemes related to your selected attribute. After selecting a grouping scheme, you select a risk source from the primary model. Then you select a value type for the constraint: % Contribution, % Standard Deviation, or Ratio [Std Dev(Source)/Std Dev(Total)]. You can also use a drop-down list to specify if the constraint is relative to the primary or secondary benchmark.

The screen displays a table where you can enter the default upper bound for the whole scheme and also the upper bound for each group in the scheme, which overrides the default value. The contribution of any group can be either mandatory or soft. A soft constraint can be relaxed if the problem is otherwise infeasible.

You can use risk budgeting more than once in order to select multiple risk sources.

Note: Risk budgeting constraints are nonconvex problems that are difficult to solve and expose you to the [challenges](#) above.

Risk Parity, Secondary Model

Use this constraint as a step in a multi-stage portfolio construction process. This constraint allows you to use the portfolio formed so far as a benchmark for further construction and is useful if additional portfolio rules or constraints need to be satisfied.

Once you add the setting, the risk parity for secondary model is set to 'true' by default.

Notes:

- As the risk parity condition is very restrictive, you are discouraged from imposing additional unnecessary constraints or objective function terms in the risk parity portfolio construction problem.
- This setting can have conflicts with the Risk Parity Secondary constraint setting, Allow Shorts constraint settings, Conditional Rule constraint settings, Constraint Group Priorities constraint settings, other Risk Constraints settings, and any other settings set to soft priority.

Leverage Constraints Settings

Leverage Constraints are for long-short rebalances. They allow you to limit the amount of debt used to acquire additional assets. You can constrain the use of leverage on the long side, the short side, the total portfolio, and two ratios between short and long sides. The leverage ratios do not include cash.

For percent fields, the constant you enter is directly interpreted as % for addition or subtraction, e.g. $b+3$ means the benchmark value in percent plus 3%. For multiplication, you achieve the percentage by scalar multiplication, e.g. $b*0.98$ means 98% of benchmark value.

For non-percent fields, enter the constant as a simple scalar value to be added or subtracted, e.g. $b+0.03$ means benchmark value plus 0.03.

For more information on entering values in these settings, see [Rules for Entering Relative Constraints](#).

Long Position (%)

This constraint lets you specify the minimum and maximum weights, in percent, of leverage for the long side of the optimal portfolio.

You enter leverage constraints as absolute values (positive numbers) and specify the constraint as mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Short Position (%)

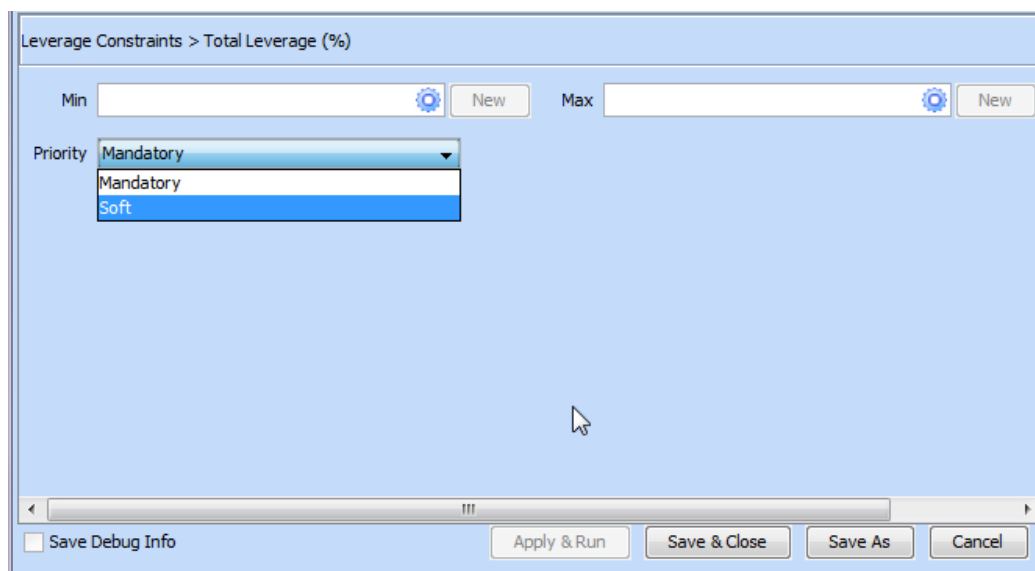
This constraint lets you specify the minimum and maximum weights, in percent, of leverage for the short side of the optimal portfolio.

You enter leverage constraints as absolute values (positive numbers) and specify the constraint as mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Total Leverage (%)

This constraint lets you specify minimum and maximum weights, in percent, of leverage for the portfolio as a whole. If you set leverage constraints for long or short sides of the portfolio, these supersede total leverage constraint.

You enter leverage constraints as absolute values (positive numbers) and specify the constraint as mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.



Leverage Ratio (S/L)

Use this constraint to specify a ratio of leverage in short and long positions in your optimal portfolio.

You enter leverage constraints as absolute values (positive numbers). For example, for the short side a minimum 2 percent corresponds to minus 2 percent in the optimal portfolio.

You can also specify a constraint as mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Leverage Ratio (L-S)/(L+S)

Use this constraint to specify the ratio of net leverage to total leverage.

You enter leverage constraints as absolute values (positive numbers). For example, for the short side a minimum 2 percent corresponds to minus 2 percent in the optimal portfolio.

You can also specify the constraint as mandatory or soft. Soft constraints can be relaxed if the problem is otherwise infeasible.

Advanced Constraints Settings and Constraint Group Priorities

For percent fields, the constant you enter is directly interpreted as % for addition or subtraction, e.g. $b+3$ means the benchmark value in percent plus 3%. For multiplication, you achieve the percentage by scalar multiplication, e.g. $b*0.98$ means 98% of benchmark value.

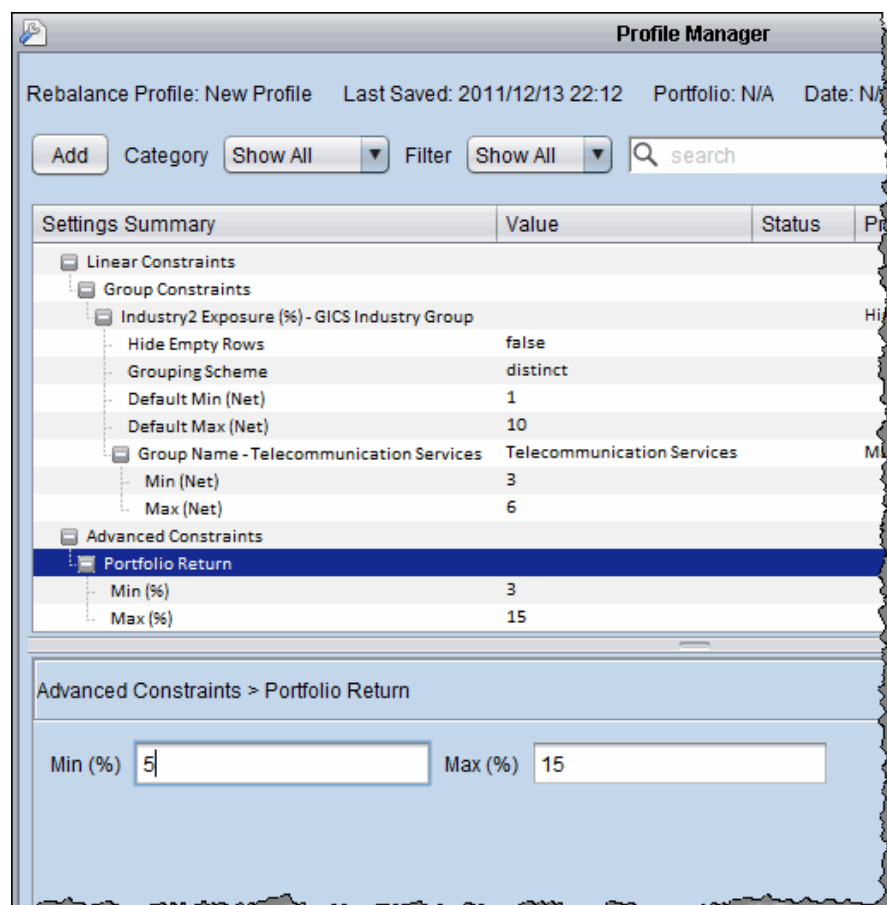
For non-percent fields, enter the constant as a simple scalar value to be added or subtracted, e.g. $b+0.03$ means benchmark value plus 0.03.

For more information on entering values in these settings, see [Rules for Entering Relative Constraints](#).

Portfolio Return

Use this constraint to specify the minimum and/or maximum return that the optimal portfolio should achieve.

You enter a maximum and minimum constraint in percent.



Profile Manager

Rebalance Profile: New Profile Last Saved: 2011/12/13 22:12 Portfolio: N/A Date: N/A

Add Category Show All Filter Show All search

Settings Summary	Value	Status	Pr
Linear Constraints			
Group Constraints			
Industry2 Exposure (%) - GICS Industry Group			Hi
Hide Empty Rows	false		
Grouping Scheme	distinct		
Default Min (Net)	1		
Default Max (Net)	10		
Group Name - Telecommunication Services	Telecommunication Services		ML
Min (Net)	3		
Max (Net)	6		
Advanced Constraints			
Portfolio Return			
Min (%)	3		
Max (%)	15		

Advanced Constraints > Portfolio Return

Min (%) Max (%)

Transaction Cost Constraint

Use this constraint to specify a maximum transaction cost for the optimal portfolio.

You enter a maximum transaction cost in percent.

Constraint Group Priorities

This setting allows you to set priorities in your optimal portfolio for 11 groups of constraints: Linear Constraints, Trading, Leverage, Turnover, Roundlotting, Risk Constraints, Minimum/Maximum Assets, Minimum/Maximum Trades, Minimum Trade Threshold, Minimum Holding Threshold, and Transaction Cost.

For each constraint group, you select a priority from the drop-down list: Mandatory, High, Medium, or Low.

Overrides

Use Overrides to overrule certain optimization settings defined in your backtest or rebalance profile.

The Initial Overrides setting enables you to define override rules only for the initial rebalance date. The Conditional Overrides setting enables you to overrule the base profile settings defined in your backtest or rebalance profile. Conditional Overrides can be typically used when you want to simulate your jobs to adapt them to market conditions, portfolio characteristics, or different business cycles. The Portfolio Overrides setting enables you to overrule the base profile settings defined in your rebalance profile.

Conditional Overrides

The Conditional Overrides settings enable you to overrule the base profile settings defined in your backtest or rebalance profile. Conditional Overrides can be used when you want to adjust your backtest to changing market conditions, portfolio characteristics, or different business cycles.

Click **Add > Overrides > Conditional Overrides > Add**. The Profile Manager displays a search box that enables you to look up pre-defined conditions expressed as formula-based portfolio attributes.

1. Click **New** to launch the Formula Builder to define a new override condition.
2. You can also edit the pre-defined conditions using the Formula Builder.
3. To add multiple conditions, clear the search box and find a new condition. The order of the conditions can be changed by using the up, down, to the top, or to the down controls. Barra PortfolioManager will evaluate the conditions in the order you specify.

Once you add an override condition, it will appear in the Profile list in the Profile Manager along with the Base Profile. You can switch between various profile snapshots to view the settings passed to the optimizer.

To customize the optimization settings associated with an override, select the corresponding profile snapshot from the Profile list and make necessary edits. The edited settings are incremental changes applied on top of the base profile settings.

Portfolio Overrides

The Portfolio Overrides setting enables you to overrule the base profile settings for specific portfolios and simultaneously define common settings to be shared across multiple portfolios and portfolio-specific (account-specific) settings all within a single profile.

Typically, the base profile settings are strategy settings that remain static over time. On the other hand, portfolio overrides are the tactical adjustments you make from date to date and by portfolio. Click **Add > Overrides > Portfolio Overrides > Add**. Use the search box to select recently used portfolios or portfolios from the platform.

Once you define the portfolio overrides, you can view a snapshot of the defined settings for each portfolio by selecting the portfolio from the Profile list.

Initial Overrides

The Initial Overrides setting enables you to ignore specific constraints for the initial rebalance date. If your backtest starts with a cash position, holdings constraints may assume that your initial portfolio contains equity positions and cause an infeasible situation. To avoid such situations, you can mark such constraints to be ignored for the initial rebalance on the start date.

Click **Add > Overrides > Initial Overrides > Add**. Once you add an override condition, it gets listed in the Profile list in the Profile Manager along with the Base Profile. Using initial overrides, you can only override any of the optional settings defined in the base profile.

To customize the condition for an initial override, select **Initial Overrides** from the Profile list and make necessary changes to the optimization settings.

Appendix 4. Rules for Entering Relative Constraints

Relative constraints are those you enter relative to the portfolio, the primary or secondary benchmark, or a market portfolio. For example, the number you enter in the Level Paring constraint represents a percentage of portfolio value or asset weight.

If you enter a decimal number, it is an absolute constraint. For example, in the Asset Paring constraint, the number you enter represents a maximum or minimum number of assets.

There are two distinct uses of relative constraints. Although the syntax looks similar between these two uses, they are interpreted differently.

- You can use relative constraints for portfolio-level constraints, where you are specifying a desired range for a portfolio-level characteristic such as exposure, relative to a reference portfolio.
- You can use relative constraints for holdings constraints where you are specifying a desired asset level bound (weight range) for one asset, a group of assets, or a universe of assets, relative to the weight of the corresponding asset in a reference portfolio.

Prefixes supported for relative constraints

p: Portfolio
b: Primary Benchmark
b2: Secondary Benchmark
m: Market Portfolio

Algebra supported for relative constraints

Add: Relative prefix + constant
Subtract: Relative prefix - constant
Multiply: Relative prefix * constant

Examples

Minimum = p-1 (portfolio minus 1%), Maximum = p+1 (portfolio plus 1%)
Minimum=m*.09 (market portfolio times .09, or 9%), Maximum = M*1.1 (market portfolio times 1.1, or 110%).

General Rules

For percent fields, the constant you enter is directly interpreted as % for addition or subtraction, e.g. b+3 means the benchmark value in percent plus 3%. For multiplication, you achieve the percentage by scalar multiplication, e.g. b*0.98 means 98% of benchmark value.

For non-percent fields, enter the constant as a simple scalar value to be added or subtracted, e.g. b+0.03 means benchmark value plus 0.03.

Factor Constraint Rules

For addition, subtraction, and multiplication relative constraints in Risk Indices + World or Country equity factor for USE4, treat constants as scalar values. For example, b+1 means benchmark value plus 1 and b*0.02 means benchmark value times 0.02.

For Industry and Currency blocks, the constant you enter is directly interpreted as percent for addition and subtraction, e.g. $b+3$ means benchmark value in percent plus 3%. For multiplication, you achieve the percentage by scalar multiplication, e.g. $b*0.98$ means 98% of benchmark value.

Asset Bound Rules Loaded via Asset Attributes Only (Weight %)

The constant you enter is directly interpreted as decimal percent for addition or subtraction, e.g. $b+0.03$ means benchmark value in percent plus 3%. For multiplication, you achieve the percentage by scalar multiplication, e.g. $b*0.98$ means 98% of benchmark value. (Note that this behavior is due to backward compatibility from the BarraOne platform.)

Asset Bound Rules by Group (Min. (%) & Max. (%))

The constant you enter is directly interpreted as percent for addition or subtraction, e.g. $b+3$ means benchmark value in percent plus 3%. For multiplication, you achieve the percentage by scalar multiplication, e.g. $b*0.98$ means 98% of benchmark value.

User Data Rules

For data imported by the user, addition, subtraction, and multiplication relative constraints treat constants as scalar values. For example $b+1$ means benchmark value plus 1 and $b*0.02$ means benchmark value times 0.02).

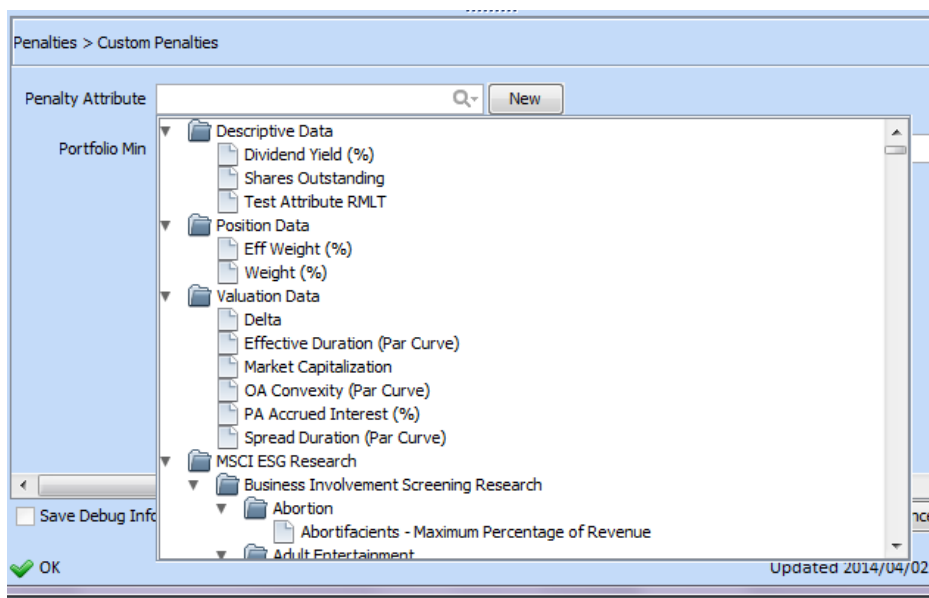
Appendix 5. Selecting Attributes for Rebalancing

Some of the settings in a rebalance profile involve applying penalties or constraints to specific aspects of portfolios. These can be portfolio attributes such as a benchmark, or factors of the risk model(s) in use, such as a country or industry, or data you have imported, such as an asset and price. In the context of setting up a rebalancing, all of these are called attributes. For settings that use attributes, the Profile Manager may display an Attribute Selector as part of the process.

Simple Setting

In the simpler form of this type of setting, the detail pane of the Profile Manager first displays a field for the attribute with a button next to it.

1. Double-click in the field to display the available list of attributes. In this example, a custom penalty, the Profile Manager displays the list of attributes which are appropriate for the penalty. Double-click an attribute to select it.



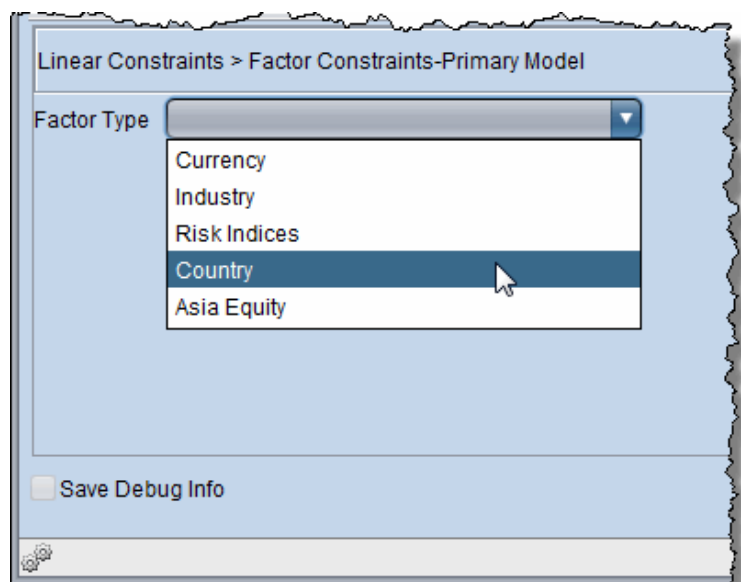
Otherwise:

2. If you know exactly what you are looking for, type the search string in the field and matching attributes will appear in the list. Double-click an attribute to select it.
3. Enter the setting for the attribute in the other fields in the detail pane. In this example, a factor penalty on active beta, you enter a target for the portfolio and the minimum and maximum values at which the penalty is -1%.

Complex Setting

In settings where you make more than one selection, the lists are displayed in the detail pane. You may start by selecting from a list of types, before you get to the individual attributes. In the example below, a

linear constraint on the Country factor from the primary model, you first select Country from a list of factor types.



After you select the factor type, you see a table with a list of all the available factors of that type, and fields in which you can enter the values for your setting. In the example below, you can enter a default minimum and maximum value to constrain the Country factor as a whole. You can also select the Japan Market factor and enter different minimum and maximum values for that. Depending on the factor type, you can enter the value as a percentage or as a decimal. The constraint on this individual factor overrides the default setting for the rest of the factors of this type.

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