

Barra Optimizer

An open software library that enables integration of the Barra optimization engine in investment platforms

Barra Optimizer delivers innovative optimization techniques in an open, flexible software library that can be easily integrated into most investment platforms. Barra Optimizer can be used to address a variety of optimization problems ranging from large-scale convex cases to more complex combinations of quadratic, nonlinear, or mixed-integer constraints.

Key Benefits

Quality of Research — Barra Optimizer incorporates proprietary solvers developed in-house by MSCI's optimization research team, which has actively focused on optimization topics for over ten years. The team continues to innovate as the investment landscape grows increasingly complex, and has published over 10 white papers on optimization to date.

Flexible Integration — An intuitive programming API, available in C++, Java™ and COM, provides easy integration with most investment platforms. Strategists can also use these same libraries within statistical tools such as MATLAB™ and SAS™. Documentation and working sample code are included to help accelerate integration time.

Fast, Scalable Performance — Barra Optimizer takes advantage of the special structure of multi-factor risk models employed by many portfolio managers, providing fast results to large scale problems. Users can refine their large-scale, convex strategies or manage day-to-day portfolio operations interactively.

Support for Advanced Mandates — Asset managers can leverage Barra Optimizer's heuristic algorithms to implement non-convex cases with a wide array of quadratic and mixed-integer constraints. Long/short portfolios with leverage bounds and risk targets, or passive benchmark replications with limited assets are just two of the many types of mandates that Barra Optimizer users can accept.

Industry Acceptance — The libraries that comprise the Barra Optimizer engine are the same as those that power the Barra Aegis, Barra Cosmos and BarraOne platforms, which are already used by a wide range of institutional investors.

New Features

- Penalizes Residual Alpha in optimization so alpha and risk factors can be better aligned
- Constrains Shortfall Betas with sample code that makes integration with Barra Extreme Risk (BXR) seamless

- Offers Trade Paring to limit number of trades/buys/sells
- Applies Fixed Transaction Costs per Trade in addition to piecewise linear and non-linear transaction costs.
- Provides soft bounds on more types of constraints, such as leverage, risk, or round lotting
- Creates a more flexible constraint hierarchy with the ability to set different priorities between factor constraints
- Enhances Long/Short Optimization with new leverage constraints, round lotting, additional paring, and non-convex risk constraints

Key Features

Dual Risk Models in Objective Function

- Dual risk models and multiple benchmarks
- Information Ratio and Sharpe Ratio maximization
- Unlimited number of risk constraints
- Fully parameterized mean-variance utility function

Advanced Constraints

- Bounds on total or active risk at portfolio or sub-group level
- Upper bounds on user-defined piecewise linear constraints
- Piecewise linear and power function transaction costs
- Constraints on maximum or minimum number of assets, trades and more

Hedge (Long/Short) Optimization

- Constraints on leverage and turnover that can be defined independently by side
- Penalties and targets on leverage
- Paring constraints on holding or transaction levels on long or short side
- Targets and/or constraints on risk
- Modeling of short rebate costs

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Tax Aware Optimization

- Bounds on long and short term gross gains or losses for tax arbitrage
- Tax lotting, with FIFO, LIFO and FIFO trading rules
- Multiple options for handling wash sales

Other Features

- Efficient frontiers
- Round lot constraints applied during, not after, optimization
- Soft bounds and constraint prioritization to increase likelihood of feasibility
- User control of optimality tolerance

Technical Highlights

- APIs are available in C++, Java™ and COM (allowing integration with Microsoft .Net and Excel® platforms)
- Library can be incorporated into the statistic packages MATLAB™, SAS™ and R, with documented examples included
- Available for Microsoft Windows® and Linux®
- Complete package includes programmers' references, tutorials and working sample code for all supported development languages
- Minimal baseline system requirements

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