

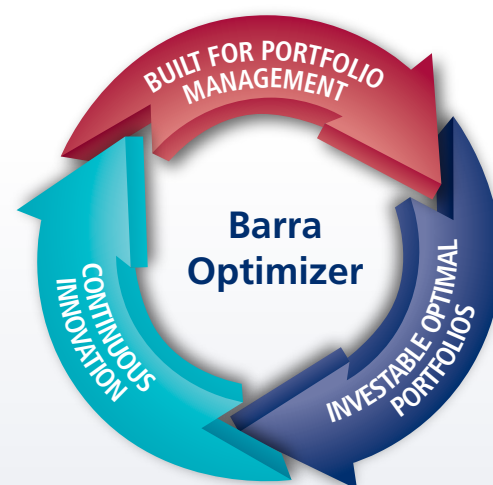
# Barra Optimizer on Factset

Barra's market-leading optimization tool delivered via FactSet's integrated portfolio management application. **Barra Optimizer** is an optimization software library designed to fit seamlessly into portfolio management workflows and support **improved investment decision making processes**. Without any additional investment in technology infrastructure, FactSet clients can access Barra Optimizer.

Barra Optimizer delivers innovative optimization techniques **using multiple optimization engines** and leverages MSCI's own algorithms to address index tracking, asset allocation, tax-aware optimization, and other challenges portfolio managers commonly encounter. Barra Optimizer's modern feature set, which includes constraint-aware roundlotting, gives portfolio managers economically meaningful results.

## Key Benefits

- » **Meta-solver for Portfolio Management** — The Barra Optimizer interface is designed specifically for portfolio managers and its algorithms are tuned for portfolio management challenges. It also incorporates proprietary solvers developed by MSCI's optimization research team and additional solvers created by leading optimization experts.
- » **Continuous Innovation** — MSCI continues to support client needs as the investment landscape grows increasingly complex by delivering innovative white papers on optimization.
- » **Investable Optimal Portfolio** — Barra Optimizer moves beyond mean-variance optimization through support for advanced mandates and alternative portfolio construction techniques. Constraint-aware roundlotting ensures the portfolio rules are satisfied while creating round lots and include threshold constraints.
- » **Transparency in Optimization** — By providing constraint 'shadow costs' reports, solution introspection and frontier analysis, Barra Optimizer provides users with more transparency and intuition around optimization results.
- » **Industry Acceptance** — The Barra Optimizer engine powers Barra Aegis, BarraOne, Barra Portfolio Manager and FactSet's integrated portfolio management application, which are used by a wide range of institutional investors. Barra Optimizer is used in the construction of many MSCI Indexes, including the MSCI Global Minimum Volatility Indexes.



## Key features

- » Modern portfolio construction tools
- » Perform **conditional rebalance** across the time
- » Minimize small trades or positions with precise control on **thresholds**
- » Enforce trades to round lots either during or after optimization
- » Penalizes the residual alpha in optimization to **correct alpha and risk factor misalignment**
- » Limit the number of trades/longs/shorts/buys/sells
- » **Fixed transaction costs** per trade in addition to piecewise-linear and non-linear transaction costs, specific to each asset
- » Provides soft bounds and constraints on leverage, risk, roundlotting, turnover, and other settings
- » Create a flexible constraint hierarchy with the ability to set priority levels for factor constraints
- » **Enhance long/short optimization** with new leverage constraints, roundlotting, and non-convex risk constraints
- » Form efficient frontiers over tracking error, turnover, transaction costs or other constraints
- » Prioritizes soft bounds and constraints **to increase likelihood of feasibility**
- » Controls the optimality tolerance
- » **Maximizes the information ratio** and/or Sharpe ratio
- » Fully parameterized mean-variance utility function

## Index Tracking

- » Bounds on total or active risk at portfolio or sub-group level
- » Maximum limit on piecewise-linear transaction costs
- » Constraints on maximum and/or minimum number of assets, trades, and more

## Long-Short Hedging Basket Creation

- » Constraints on leverage for longs, shorts and turnover that can be defined independently by side
- » Limit on buy turnover or sell turnover
- » Paring constraints on holding or transaction levels on long or short side
- » Lower bounds on long or short groups even when the problem becomes non-convex

- » Targets and constraints on risk

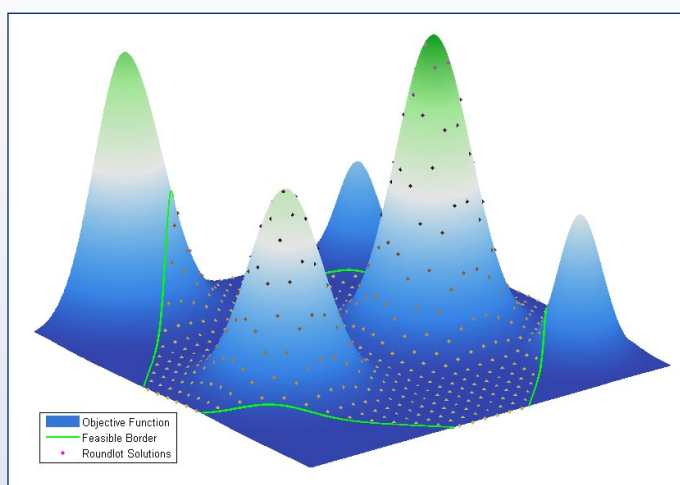
- » Modeling of short costs

## 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

## Asset Allocation

- » Utilizes an asset-by-asset covariance matrix
- » Includes futures, ETFs, currencies, and other alternative assets



Barra Optimizer can form portfolios under complex considerations. Here is a visualization of a potential optimization problem with risk aversion, maximum on the number of names, asset and factor constraints, and the requirement to trade round lots. The peaks represent local solutions, and the green lines demarcate the feasible region. Diamonds represent portfolios formed out of round lots.

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## About MSCI

MSCI Inc. is a leading provider of investment decision support tools to investors globally, including asset managers, banks, hedge funds and pension funds. MSCI products and services include indexes, portfolio risk and performance analytics, and ESG data and research.

The company's flagship product offerings are: the MSCI indexes with over USD 9 trillion estimated to be benchmarked to them on a worldwide basis<sup>1</sup>; Barra multi-asset class factor models, portfolio risk and performance analytics; RiskMetrics multi-asset class market and credit risk analytics; IPD real estate information, indexes and analytics; MSCI ESG (environmental, social and governance) Research screening, analysis and ratings; and FEA valuation models and risk management software for the energy and commodities markets. MSCI is headquartered in New York, with research and commercial offices around the world.

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<sup>1</sup>As of March 31, 2014, as reported on June 25, 2014, by eVestment, Lipper and Bloomberg