



Alpha Quantum Portfolio Optimiser

Alpha Quantum

Quantitative. Innovative. Robust. Researched.
Alpha.

The Alpha Quantum Way.



Our solutions

Portfolio Optimiser, Risk Management, Security Analyser, News Analytics

Alpha Quantum Portfolio Optimiser

- Alpha Quantum Portfolio Optimiser is a state of the art software solution for portfolio optimization and asset allocation.
- It can be used in a wide variety of companies: asset management firms, investment banks, hedge funds, pension funds, insurance companies and wealth managers.
- Applications of software:
 - asset allocation,
 - funds of funds allocation,
 - management of stock portfolios,
 - fixed income portfolios,
 - sophisticated quantitative strategies for hedge funds,
 - ALM for insurance companies (optimal for new Solvency II framework),
 - investment advisory tailored to individual risk profile of investors (for wealth managers, RIA and private investors),
 - engine for the new online robo-advisors,
 - solutions tailored for CTAs (trend following and others),
 - sophisticated quantitative investment products (constant volatility, momentum, smart beta and many others).

Features

Mean CVaR, Mean Variance optimisation

- Mean variance, mean cvar, mean cdar optimisation
- Different formulations: target risk, target return, risk aversion formulation
- Support for many different constraints: weights of securities, asset classes, tracking error, etc.
- Support for optimisation based on alpha returns

Efficient Frontier

- Efficient Frontiers for mean variance, mean cvar optimisations
- Interactive analysis of risk, return differences between current portfolio and portfolios on the Efficient Frontier
- Support for many types of constraints

Multiperiod portfolio optimisation and backtesting

- Powerful multiperiod portfolio optimization framework for backtesting and research of strategies
- Detailed statistics for backtesting results: NAV, drawdown, dynamic structure curves, many different performance and risk quantities (sharpe, sortino, etc.)
- Detailed return attribution for multiperiod investment strategies

Advanced methods

- Optimisation based on dynamic relative returns of securities and cointegrated prices
- Modelling expected returns with time series methods, discretionary expectations, quantitative models
- Use of correlation matrix based on Random Matrix Theory approach

Automation, integration with our other solutions

- Backtesting for a wide multidimensional grid of investment strategy parameters. Jobs can be defined and saved in bulk for processing in multithread environment
- Optimal weights of all active portfolios can be calculated with batch requests on intraday, daily basis or other periodic intervals
- Continuously optimized portfolios can be easily exported via API to broker solutions

Competitive advantages

- Powerful multiperiod portfolio optimization framework for backtesting and research of strategies.
- Various risk metrics: mean variance, mean cvar, mean cdar optimization
- Cleaned correlation matrix for Monte Carlo simulations (RMT approach).
- Portfolio optimization on cointegrated prices and alpha returns.
- Framework for management of practically unlimited number of different portfolios with different strategy settings with batch calculation of optimal portfolios on a daily or intraday basis (with possibility of API integration with brokers solutions).
- Powerful reporting and document generation capabilities including the automated generation of factsheets and marketing materials for investment products (drastically reducing the time from research to product).

Portfolio optimisation

Menu Value-at-Risk Efficient Frontier Optimization Dynamic asset allocation Portfolio Data Stress testing VaR for several portfolios Settings Display results by countries Risk metrics Options Various Reports Pre-trade RM

Mean Variance optimization Mean CVaR optimization Bayesian model Optimization results

Optimization parameters

Select optimization type: Risk aversion formulation Number of trading days: 1 First date of calculation: 01.01.2014

Risk aversion parameter: 0,1 Structure as a function of return: Last date of calculation: 01.01.2015

Choose calculation method: Classical method Model returns:

Choose type of weights: Saved constraints CVaR

Choose type of asset weight: Enter constraints Select confidence level: 95

Show on Efficient Frontier

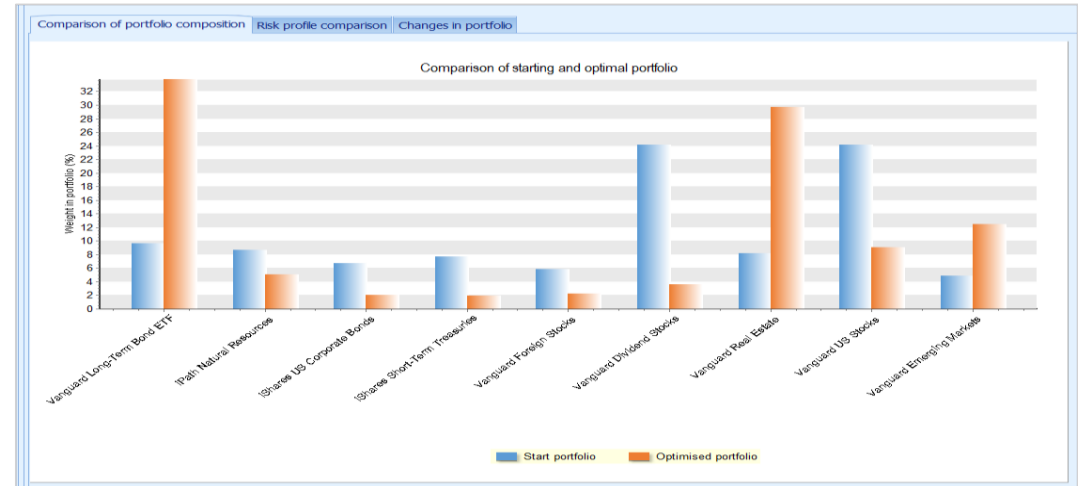
Perform optimization

Save security weights Save asset weights Save analytic returns Edit active strategy

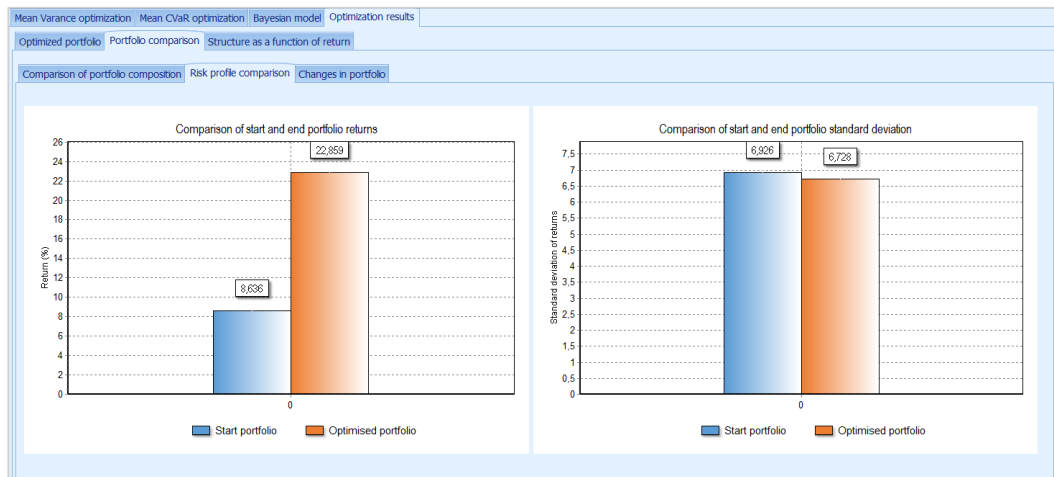
Select limit Upper limit Value Save values for limits Report

Lower limit	Upper limit	Lower limit	Upper limit		
BLV	0,000000	0,250000	stocks	0,000000	1,000000
DJP	0,000000	0,250000	bonds	0,000000	1,000000
LQD	0,000000	0,250000			
SHV	0,000000	0,250000			
VEA	0,000000	0,250000			
VIG	0,000000	0,250000			
VNQ	0,000000	0,250000			
VIT	0,000000	0,250000			
VWO	0,000000	0,250000			

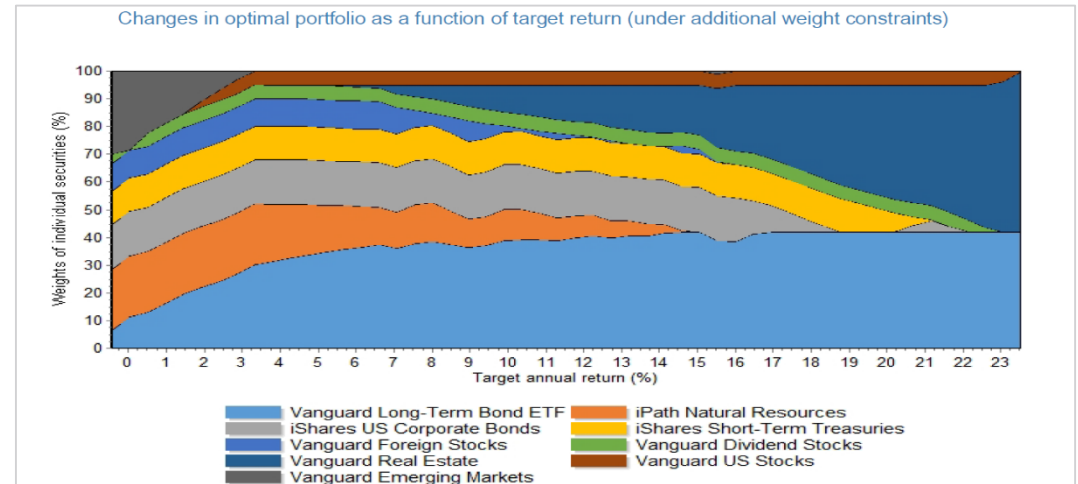
Example of portfolio optimisation input



Comparison of weights between current and optimal portfolio

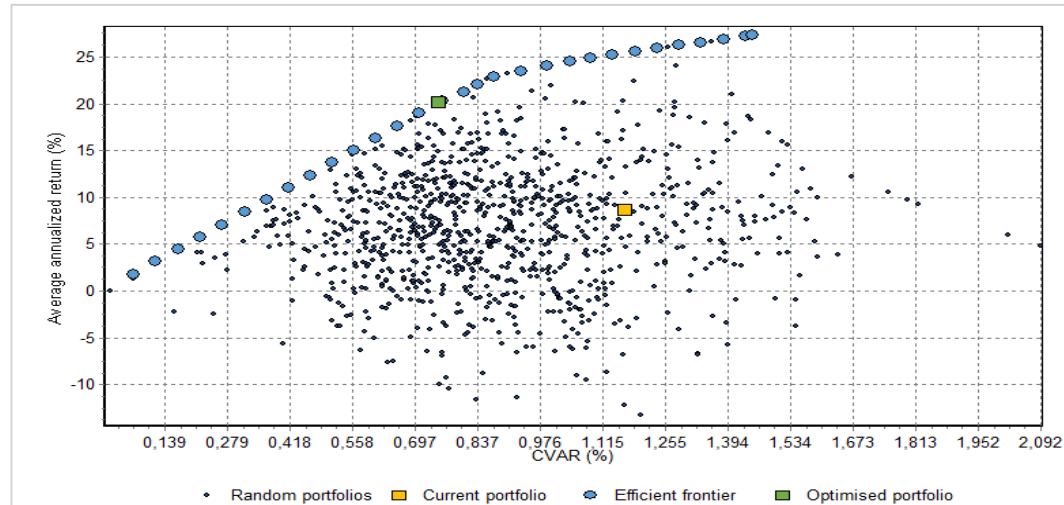


Comparison of historical returns and risk



Optimal portfolio as a function of target return

Efficient Frontier



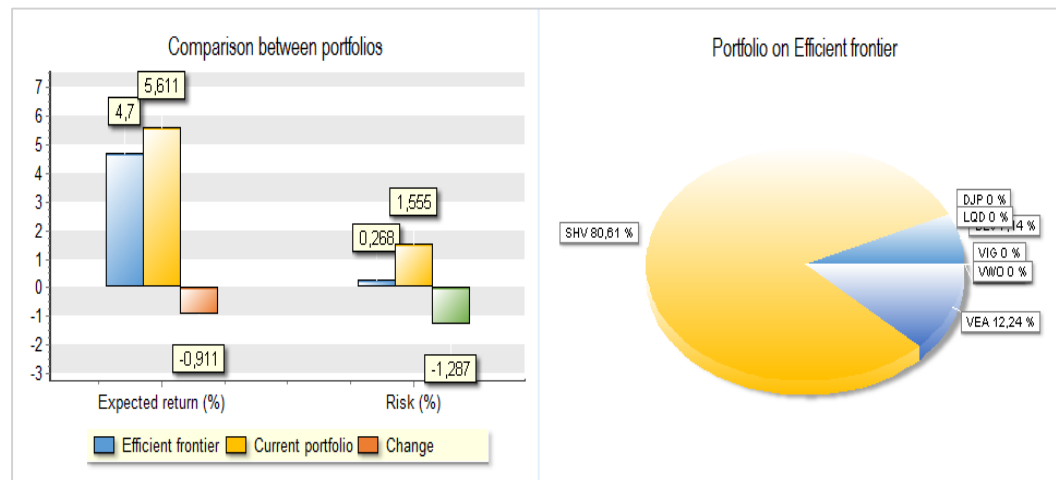
Efficient Frontier

Weights Comparisons

Select type of weights:

Ticker	Lower limit	Upper limit
BLV	0,050000	0,400000
DJP	0,050000	0,400000
LQD	0,050000	0,400000
SHV	0,050000	0,400000
VEA	0,050000	0,400000
VIG	0,050000	0,400000
VNQ	0,050000	0,400000
VTI	0,050000	0,400000
VWO	0,050000	0,400000

Efficient Frontier can be constructed under different constraints



Interactive comparison between current and Efficient Frontier portfolio

- Efficient Frontiers for mean variance, mean cvar optimisations,
- Interactive analysis of risk, return differences between current portfolio and portfolios on the Efficient Frontier,
- Support for many types of constraints.

Main features

Multiperiod optimisation

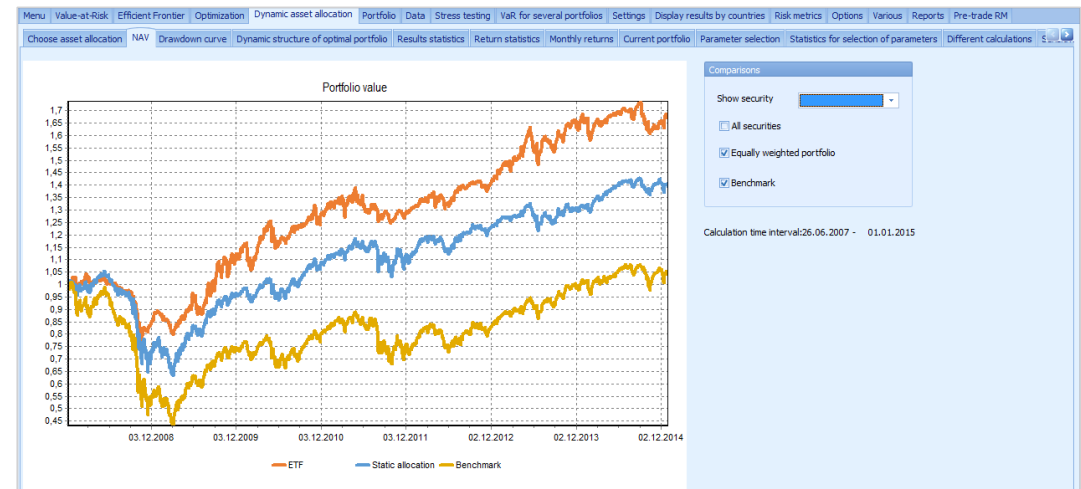
The screenshot shows the 'Rebalancing parameters' section of the software. Key inputs include:

- Asset allocation: AQ Myopic model
- Rebalancing period: 20
- Start date of calculation: 01.04.2014
- Myopic parameter: 20
- Choose type of weights: Saved constraints
- Last date of calculation: 1.4.2015
- Select optimization type: Risk aversion formulat
- Asset weights: Default values
- Leverage: 0
- Risk aversion parameter: 0,1
- Trading cost: 0,2 %
- Select benchmark: (empty)
- Risk metric: CVAR

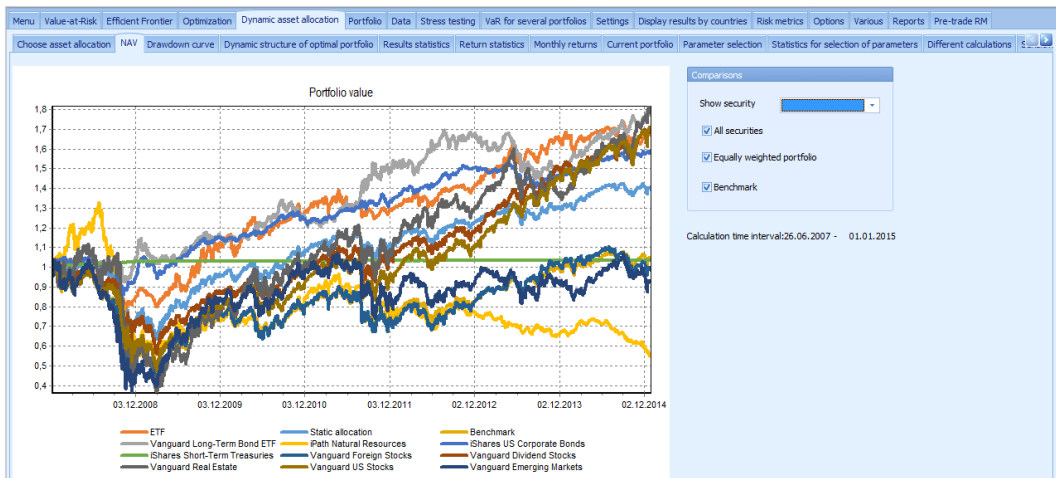
Below the parameters is a table of asset limits:

Ticker	Lower limit	Upper limit
RLV	0,050000	0,400000
DJP	0,050000	0,400000
LQD	0,050000	0,400000
SHV	0,050000	0,400000
VEA	0,050000	0,400000
VIG	0,050000	0,400000
VNQ	0,050000	0,400000
VTI	0,050000	0,400000
VWO	0,050000	0,400000

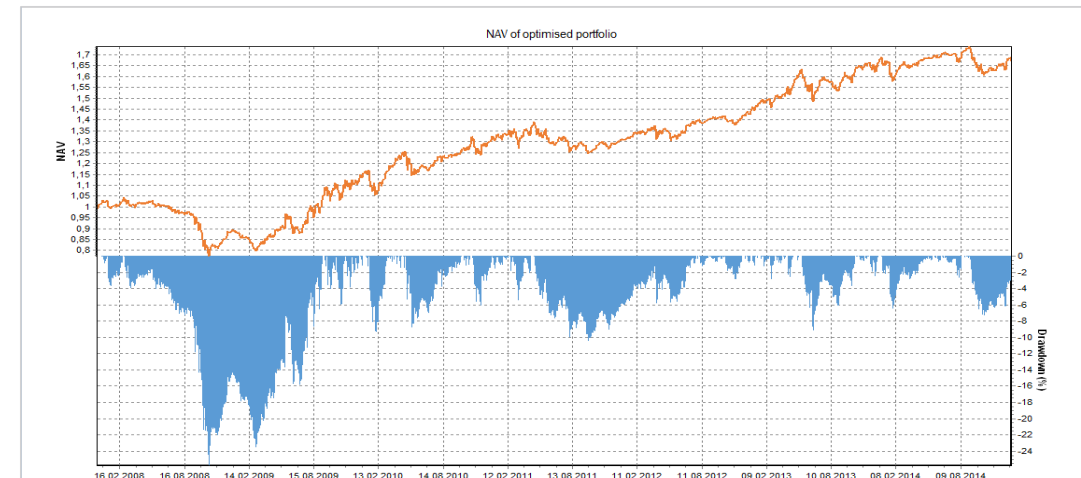
Example of multiperiod optimisation input



NAV comparison between optimal portfolio, benchmark and static allocation

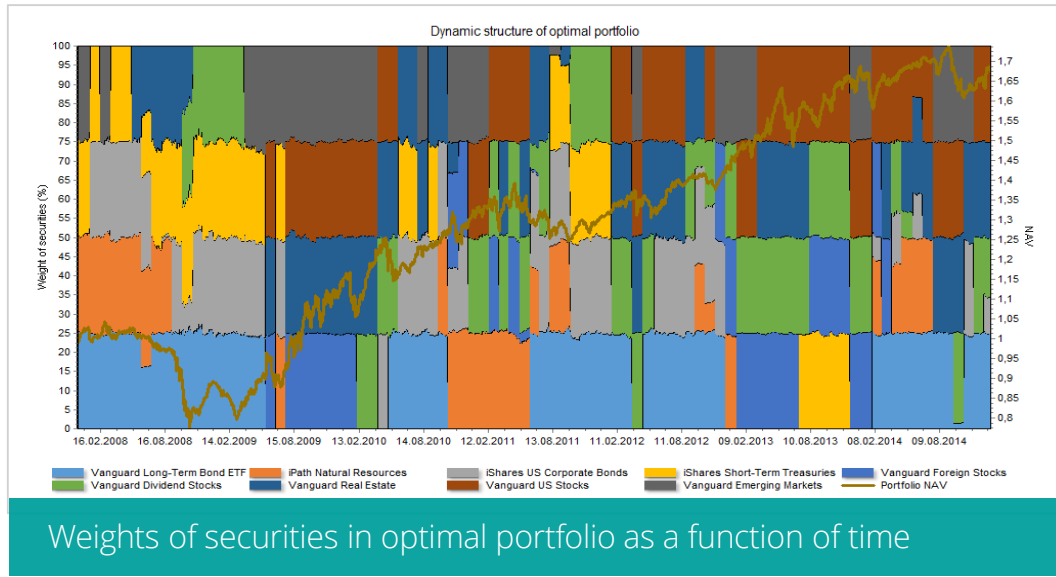


NAV comparison between optimal portfolio, benchmark and securities

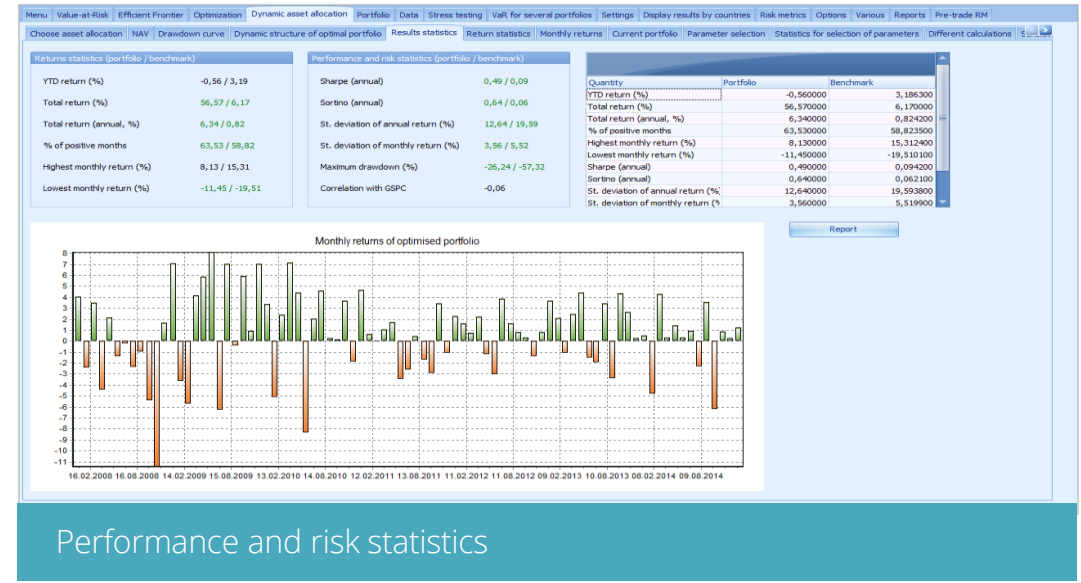


Drawdown curve

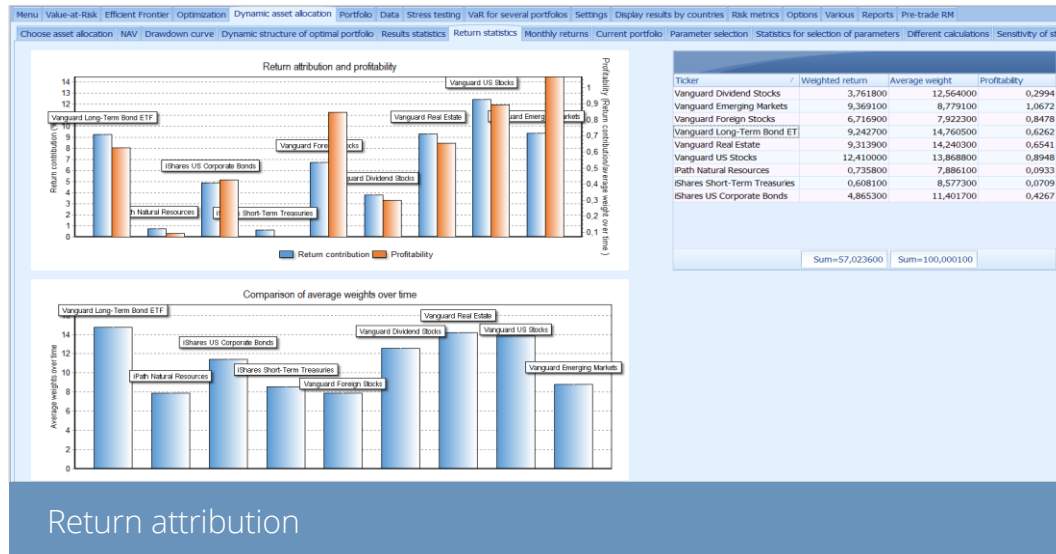
Multiperiod optimisation



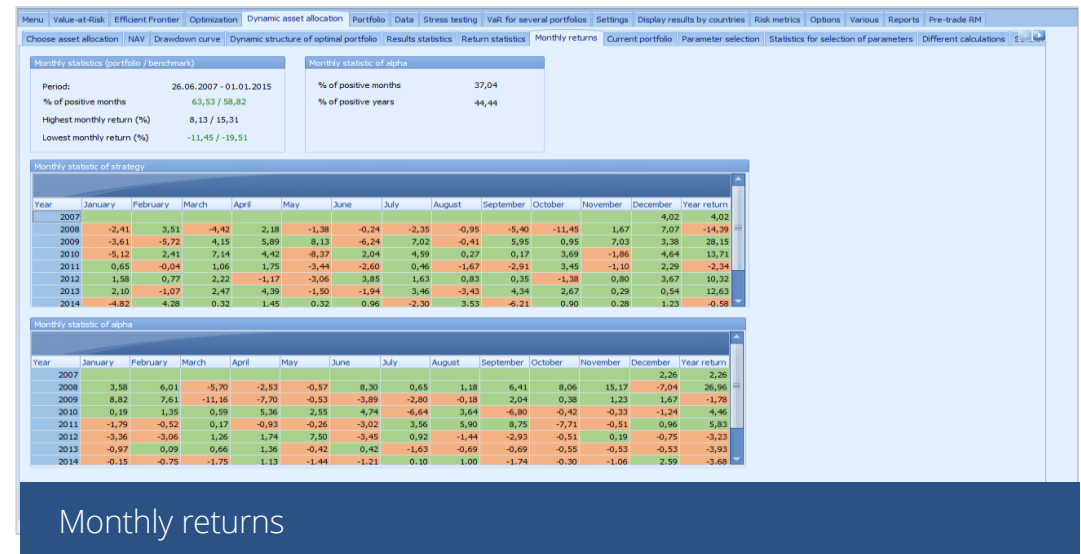
Weights of securities in optimal portfolio as a function of time



Performance and risk statistics



Return attribution



Monthly returns

Multiperiod optimisation

Menu Value-at-Risk Efficient Frontier Optimization Dynamic asset allocation Portfolio Data Stress testing VaR for several portfolios Settings Display results by countries Risk metrics Options Various Reports Pre-trade RM

Choose asset allocation NAV Drawdown curve Dynamic structure of optimal portfolio Results statistics Return statistics Monthly returns Current portfolio Parameter selection Statistics for selection of parameters Different calculations Sensitivity of start date

Select strategy

Select portfolio: AAsuperpreviden

Asset allocations model: AQ Myopic model

Optimization type: Risk aversion formulacija

Risk metric: CVAR

Benchmark:

Start date:

End date:

Quantity on x-axis: Rebalancing period, Myopic parameter, Optimization parameter

Quantity on y-axis: Rebalancing period, Myopic parameter, Optimization parameter

Quantity on z-axis: Select z-axis: Celotni_donos_letra

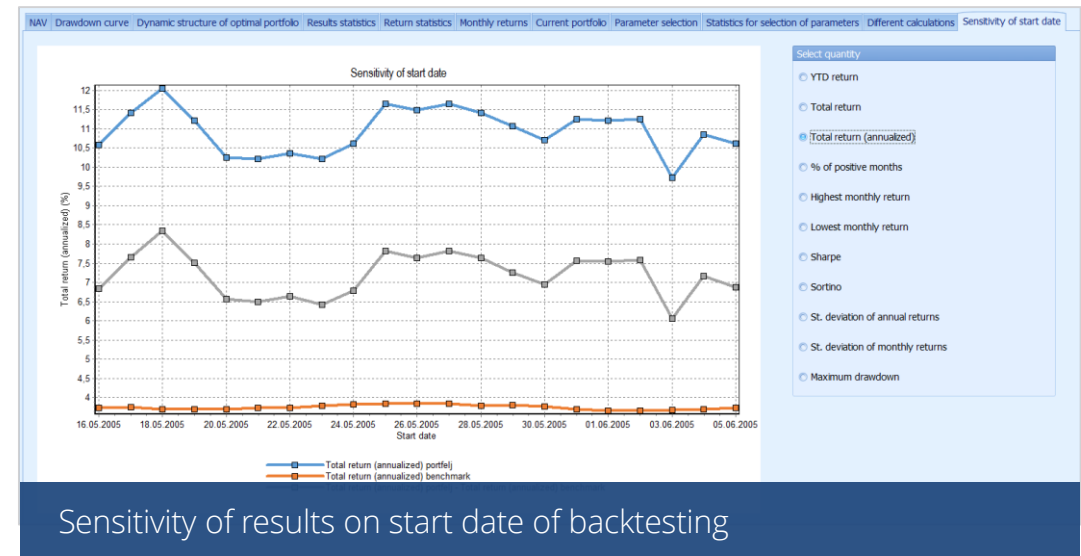
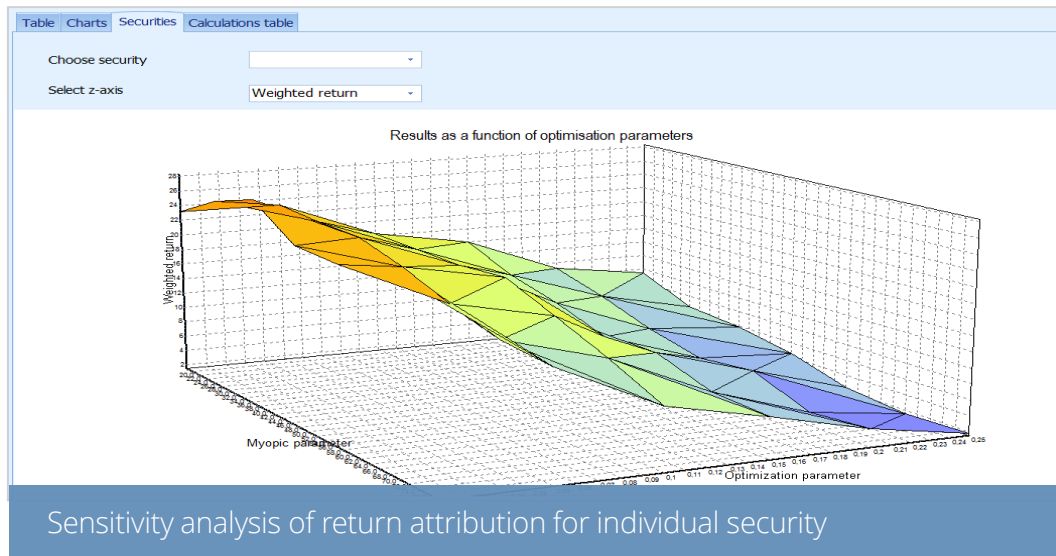
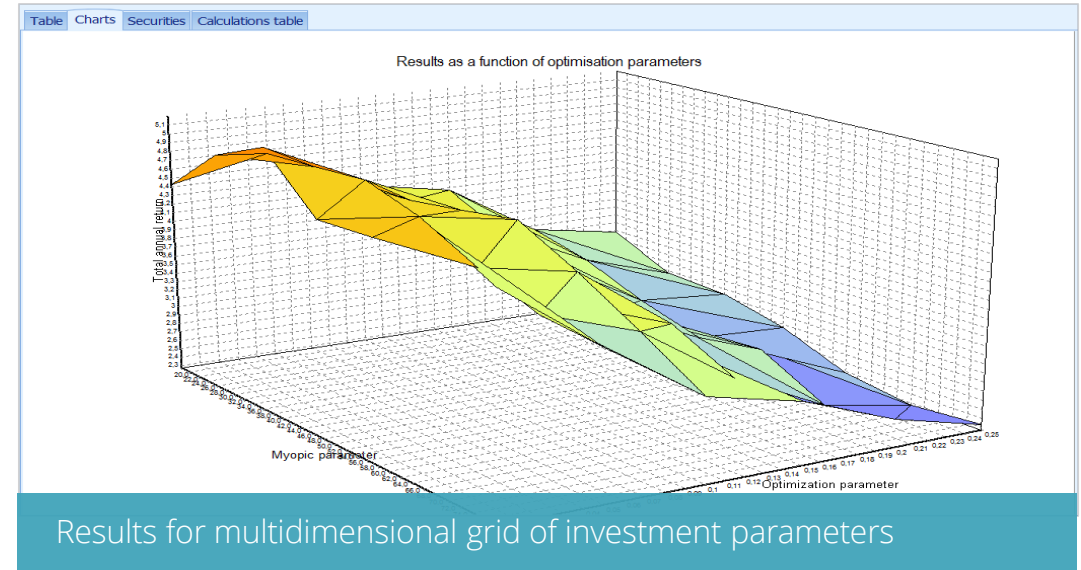
Show results

Table Charts Securities Calculations table

Refresh table

Portfolio	Start date	End date	Asset allocation model	Rebalancing	Myopic param	Optimization type	Optimization
AAsuperpreviden	08.01.2008	20.10.2014	AQ Myopic model	S	70	Risk aversion formulacija	0
AAsuperpreviden	08.01.2008	20.10.2014	AQ Myopic model	S	70	Risk aversion formulacija	0
AAsuperpreviden	29.12.2007	20.10.2014	AQ Myopic model	S	80	Risk aversion formulacija	0
AAsuperpreviden	29.12.2007	20.10.2014	AQ Myopic model	S	80	Risk aversion formulacija	0
AAsuperpreviden	29.12.2007	20.10.2014	AQ Myopic model	S	80	Risk aversion formulacija	0
AAsuperpreviden	29.12.2007	20.10.2014	AQ Myopic model	S	80	Risk aversion formulacija	0
AAsuperpreviden	29.12.2007	20.10.2014	AQ Myopic model	S	80	Risk aversion formulacija	0
AAsuperpreviden	29.12.2007	20.10.2014	AQ Myopic model	S	80	Risk aversion formulacija	0
AAsuperpreviden	29.12.2007	20.10.2014	AQ Myopic model	S	80	Risk aversion formulacija	0
AAsuperpreviden	29.12.2007	20.10.2014	AQ Myopic model	S	80	Risk aversion formulacija	0
AAsuperpreviden	27.02.2008	20.10.2014	AQ Myopic model	S	20	Risk aversion formulacija	0
AAsuperpreviden	27.02.2008	20.10.2014	AQ Myopic model	S	20	Risk aversion formulacija	0
AAsuperpreviden	17.02.2008	20.10.2014	AQ Myopic model	S	30	Risk aversion formulacija	0
AAsuperpreviden	17.02.2008	20.10.2014	AQ Myopic model	S	30	Risk aversion formulacija	0
AAsuperpreviden	17.02.2008	20.10.2014	AQ Myopic model	S	30	Risk aversion formulacija	0
AAsuperpreviden	17.02.2008	20.10.2014	AQ Myopic model	S	30	Risk aversion formulacija	0
AAsuperpreviden	07.02.2008	20.10.2014	AQ Myopic model	S	40	Risk aversion formulacija	0
AAsuperpreviden	07.02.2008	20.10.2014	AQ Myopic model	S	40	Risk aversion formulacija	0
AAsuperpreviden	07.02.2008	20.10.2014	AQ Myopic model	S	40	Risk aversion formulacija	0
AAsuperpreviden	07.02.2008	20.10.2014	AQ Myopic model	S	40	Risk aversion formulacija	0
AAsuperpreviden	07.02.2008	20.10.2014	AQ Myopic model	S	40	Risk aversion formulacija	0

Performance and risk statistics



Active portfolios

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Active portfolios and strategies report

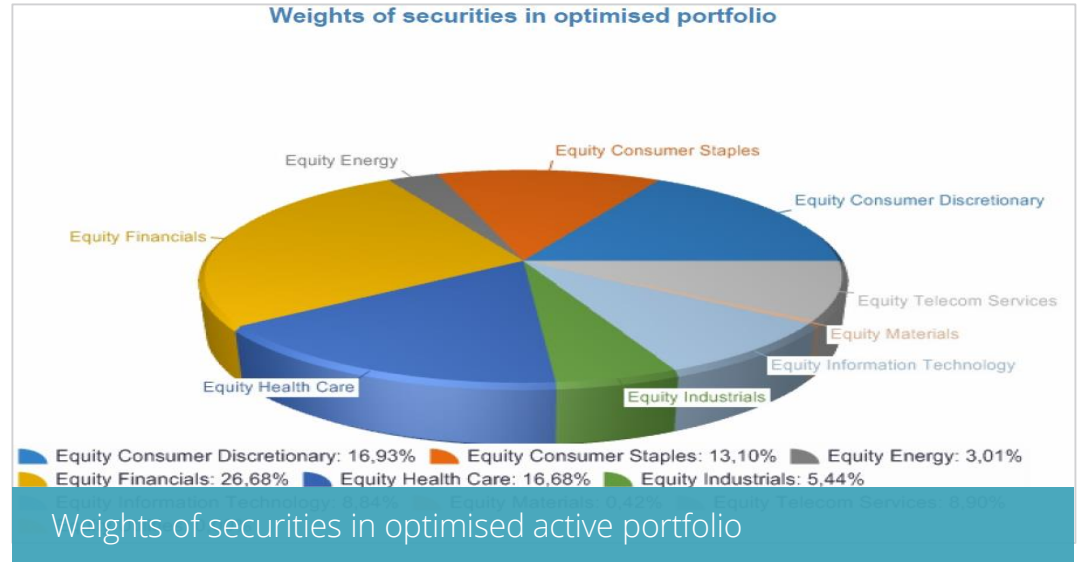


Strategy: **Dynamic Equities Sector Allocation**

Portfolio	Dynamic Equities Sector Allocation	Method type	Risk aversion formulation
Calculation method	Classical method	Strategy type	Mean CVaR
Time interval	3 months	Weight type	Saved constraints
Method parameter	0,01	Asset weight type	Default values
Type of returns	Model returns	Last date of history	16.07.2015

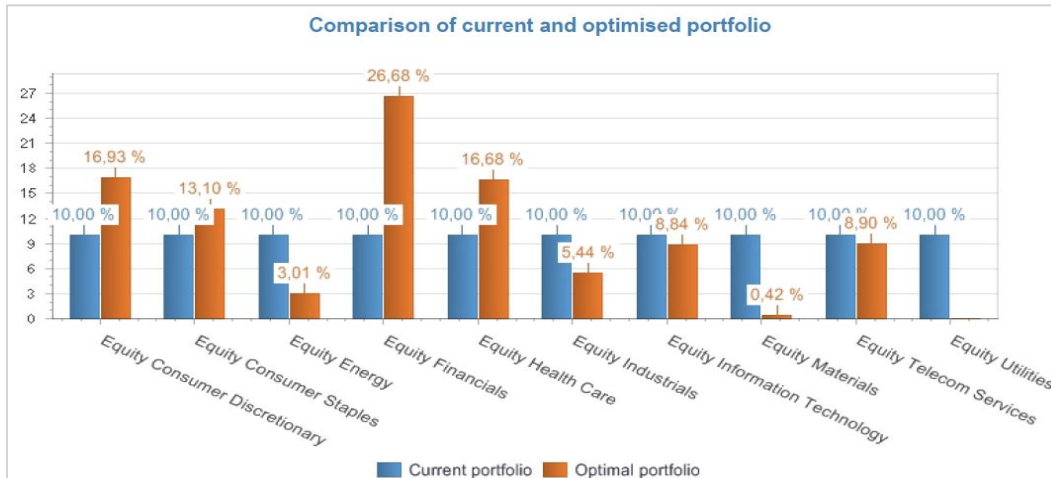
Active portfolios and strategies parameters

Weights of securities in optimised portfolio



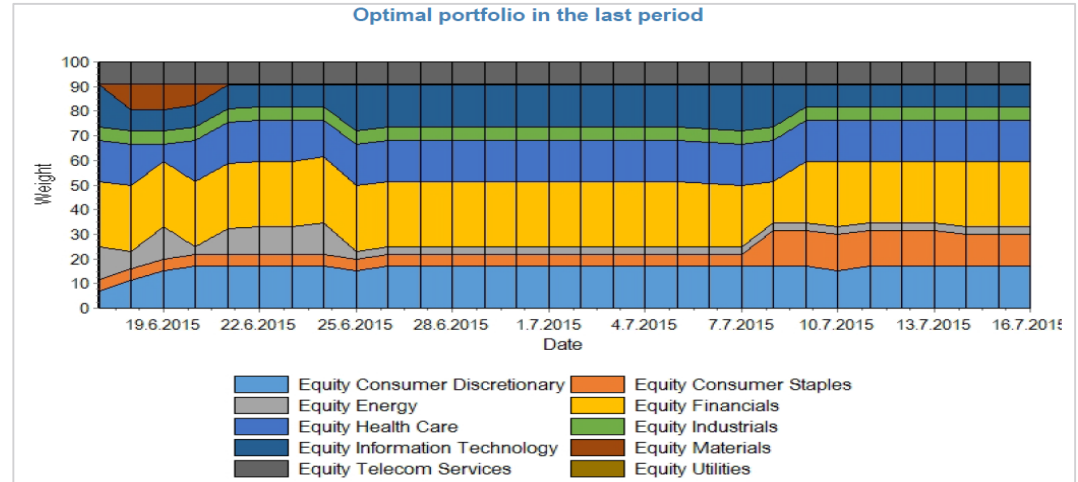
Weights of securities in optimised active portfolio

Comparison of current and optimised portfolio



Comparison of current and optimised active portfolio

Optimal portfolio in the last period



Active portfolio securities weights as a function of time

Automation

Our solution offers automation on many different levels.



Optimisation of portfolios

- Each portfolio can be defined as an active portfolio with one or more defined active strategies.
- Optimal weights of all active portfolios can be calculated with batch requests on intraday, daily basis or other periodic intervals.
- Continuously optimized portfolios can also be easily exported via API to broker solutions allowing automatic management of a vast set of portfolios with individual characteristics, e.g. time periods, constraints.
- Pre-trade risk management with VaR, CVaR and other limits is also integrated as an option forming a unified framework for automated quantitative asset management.




Backtesting

- Our solution allows backtesting for a wide multidimensional grid of investment strategy parameters.
- This feature is key for researching stability of quantitative strategies with respect to different parameters and time frames.
- Jobs can be defined and saved in bulk for processing in multithread environment.
- Backtesting results can be analysed in many different views and statistics.
- Automated generation of reports.

Powerful reporting capabilities

Example of portfolio optimization report

Portfolio optimisation - Alpha Quantum Portfolio Optimiser



Portfolio optimization report

Thursday, December 03, 2015

Alpha Quantum Portfolio Optimiser

Portfolio optimization report

Thursday, December 03, 2015

Portfolio: elf

Start date: 01.01.2014
End date: 01.01.2015

Parameters

Optimization type	Minimization of return	Weight type	Equal weights
Optimization parameter	8.7%	Asset weight type	Default values
Calculation method	Classical method	Risk quantity	CVAR
Type of returns	Model returns	Confidence level	95
Time unit (days)	1		

Results

Optimised portfolio composition

Vanguard Long-Term Bond ETF	42.00%
iShares US Corporate Bonds	5.10%
iShares Short-Term Treasuries	0.00%
Vanguard Dividend Stocks	12.00%
Vanguard Real Estate	30.89%
Vanguard US Stocks	5.00%
Vanguard Emerging Markets	0.00%

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Ticker	Weight (current portfolio)	Weight (optimal portfolio)
Vanguard Long-Term Bond ETF	9.85%	42.00%
iPath Natural Resources	0.89%	0.00%
iShares US Corporate Bonds	6.76%	5.10%
iShares Short-Term Treasuries	7.72%	0.00%
Vanguard Foreign Stocks	5.79%	0.00%
Vanguard Dividend Stocks	24.15%	5.00%
Vanguard Real Estate	8.21%	30.89%
Vanguard US Stocks	24.15%	5.00%
Vanguard Emerging Markets	4.82%	0.00%

Comparison of current and optimised portfolio

Portfolio changes

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Comparison of returns of starting and optimal portfolio

Comparison of standard deviation of starting and optimal portfolio

Efficient Frontier (under additional weight constraints)

Changes in optimal portfolio as a function of target return (under additional weight constraints)

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Powerful reporting capabilities

Example of multi-period backtesting report

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Multi-period backtesting report

3. December 2015



Parameters

Portfolio	ETF	Risk model	CIAR
Asset allocation model	AG Myopic model	Trading cost	0.1%
Rebalancing period	20	Leverage	0.0
Myopic parameter	1.0	Benchmark	S&P 500
Optimization year	Risk-neutral Simulation	Start date of analysis	28.02.2007
Optimization parameter	0.01	End date of analysis	01.01.2015

Results

NAV of optimised portfolio

Drawdown curve

Dynamic structure of optimal portfolio

Legend:

- Vanguard Long-Term Bond FFP
- Sharia Short-Term Treasuries
- Vanguard Real Estate
- Vanguard Portfolio NAV
- Push Natural Resources
- Vanguard Foreign Stocks
- Vanguard US Stocks
- iShares U.S. Corporate Bonds
- Vanguard Dividend Stocks
- Vanguard Emerging Markets

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	Portfolio	Benchmark
Return	6.19%	12.42%
Std. deviation	62.87%	42.46%
Volatility (annualised)	6.90%	4.97%
Percentage of positive months	63.53%	63.53%
Best monthly return	8.18%	15.77%
Worst monthly return	-11.61%	-10.77%
Ups (annual)	0.5	0.3
Down (annual)	0.7	0.4
Standard deviation of annual returns	12.68%	22.93%
Standard deviation of monthly returns	3.55%	4.46%
Return distribution	-28.91%	-54.79%

Monthly returns of dynamic optimised portfolio

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Attribution and profitability

Asset weights over time

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Ticker	Return contribution	Profitability	Average weight
BLV	12.04%	0.71	10.00%
DJP	-10.04%	-1.00	10.00%
LOD	1.76%	0.22	7.00%
SHV	0.95%	0.07	7.38%
VEA	10.18%	1.08	9.42%
VIG	7.28%	0.88	7.38%
VNI	5.72%	0.33	10.04%
VTI	10.22%	1.24	12.18%
VWO	18.16%	1.61	11.23%

Optimised portfolio at the end of time interval

Legend:

- BLV 10.00%
- DJP 10.00%
- LOD 7.00%
- SHV 7.38%
- VEA 9.42%
- VIG 7.38%
- VNI 10.04%
- VTI 12.18%
- VWO 11.23%

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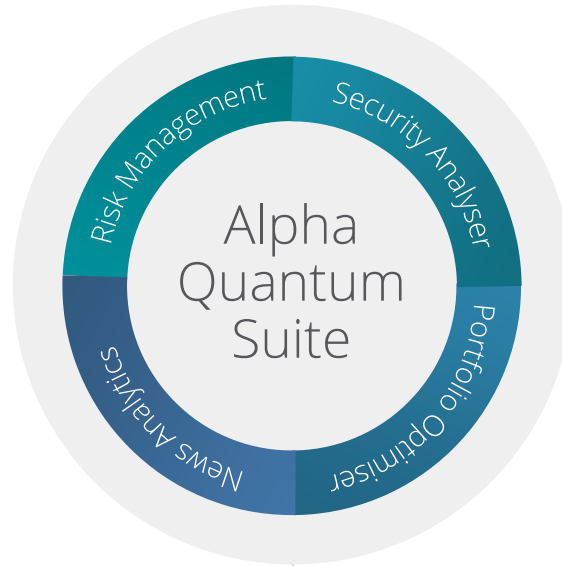
Powerful reporting capabilities

Example of active portfolios and strategies report



Vision

We offer a complete and integrated platform for asset management, ranging from risk management, analysis, valuation and ranking of companies, portfolio optimisation, asset allocation, versatile backtesting of strategies and analysis of news.



The Alpha Quantum Way

Quantitative.
The core of our philosophy.

Innovative.
The main source of alpha returns.

Robust. Researched.
The cornerstone of our solutions is stability.

Alpha.
The consequence.

Alpha Quantum Risk Management

Main features of risk management solution are VaR methods, stress testing, pre-trade risk management and risk attribution. They also include limits monitoring, regulatory compliance and performance measurement.

Alpha Quantum Security Analyser

Innovative solution for financial analysis, valuation and ranking of companies. Comprehensive and versatile platform for researching, backtesting and using quantitative strategies based on fundamental, pricing, news analytics and other data.

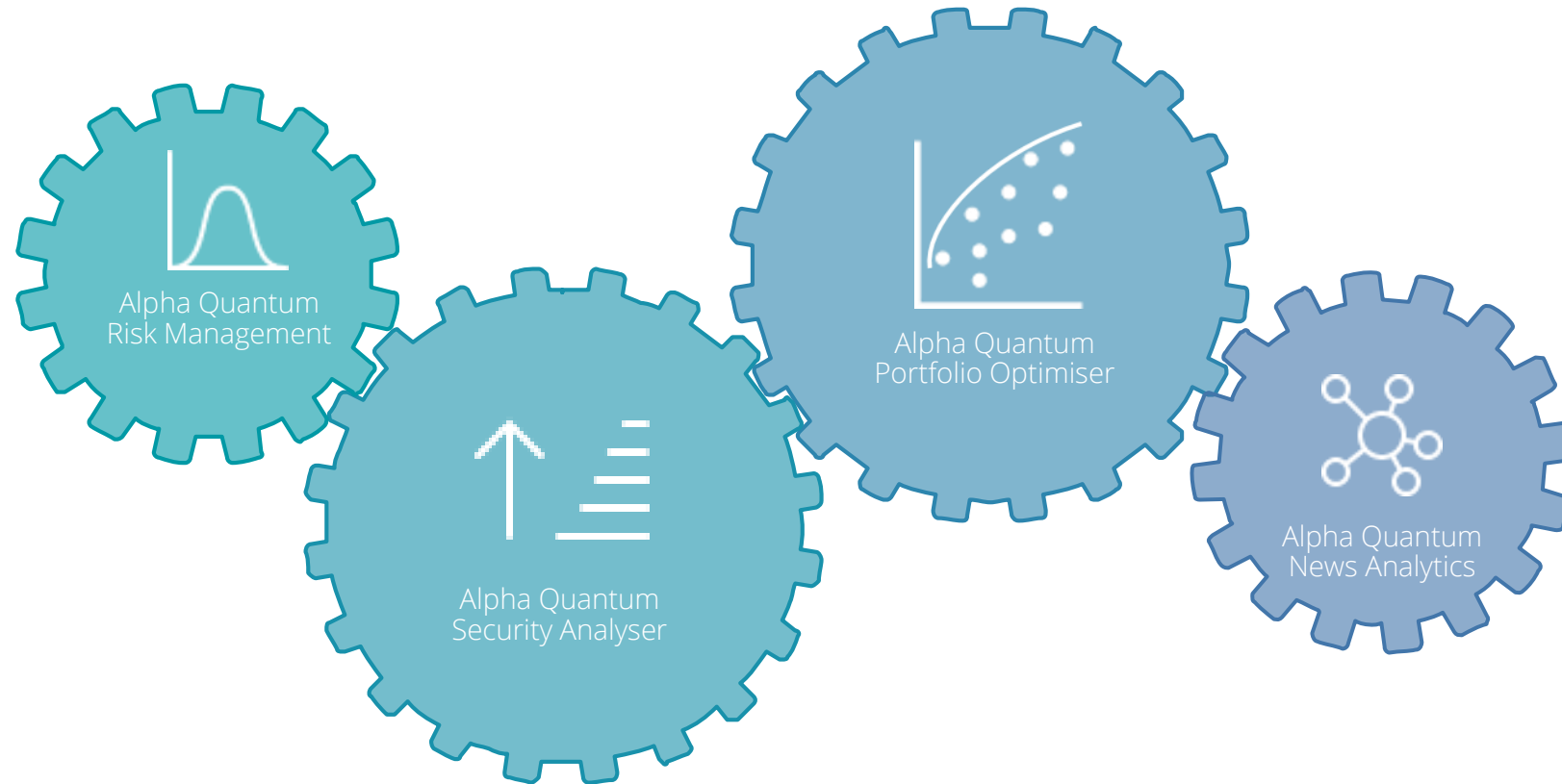
Alpha Quantum Portfolio Optimiser

Sophisticated solution for portfolio optimization and asset allocation with a wide array of features which support many different applications, investment products and form a platform for automated asset management services.

Alpha Quantum News Analytics

Platform for scanning, annotating, storing and analysing in real time data from news, blogs, social media and other sources. Tools for identifying and analysing macro and sector trends. Sentiment scoring methodology. News analytics signals for quantitative trading strategies.

High integration and interconnectedness of solutions in Alpha Quantum Suite



Alpha Quantum

Quantitative. Innovative. Robust. Researched.
Alpha.

The Alpha Quantum Way.



Our solutions

Portfolio Optimiser, Risk Management, Security Analyser, News Analytics

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