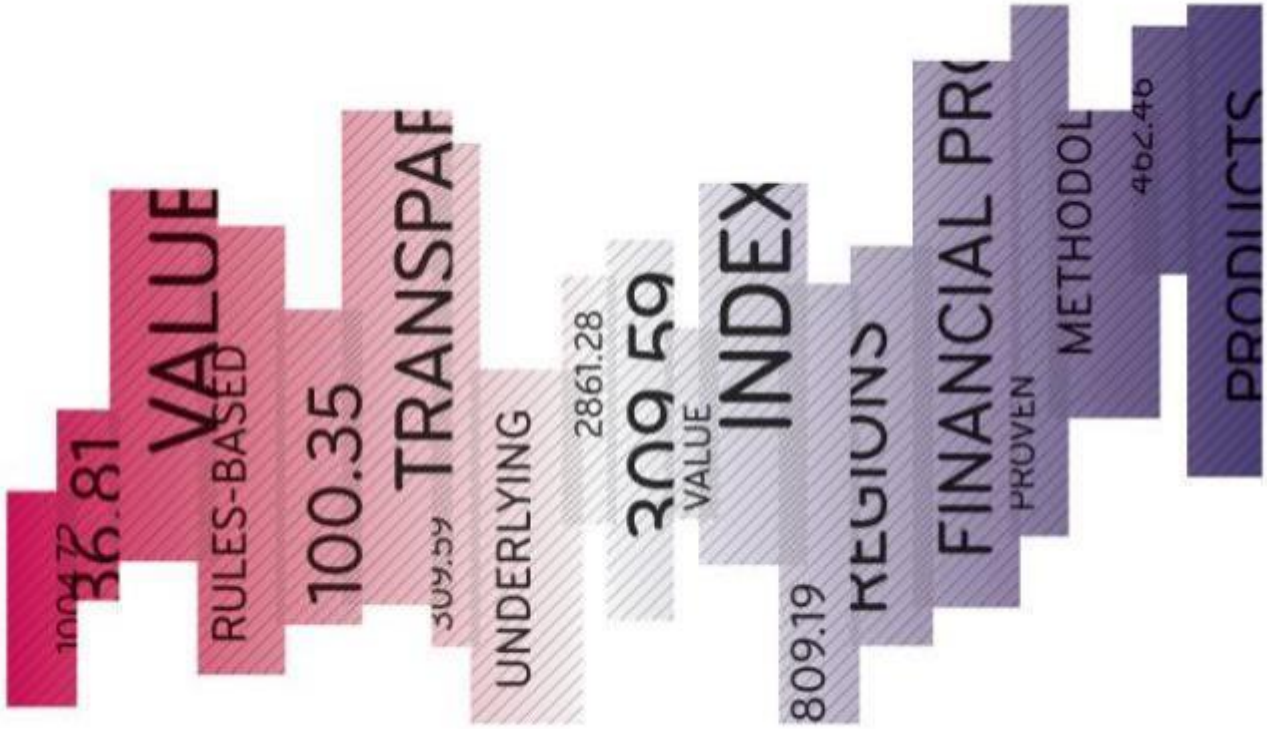
STOXX MINIMUM VARIANCE INDICES

September, 2016



STOXX

INNOVATIVE. GLOBAL. INDICES.

Agenda

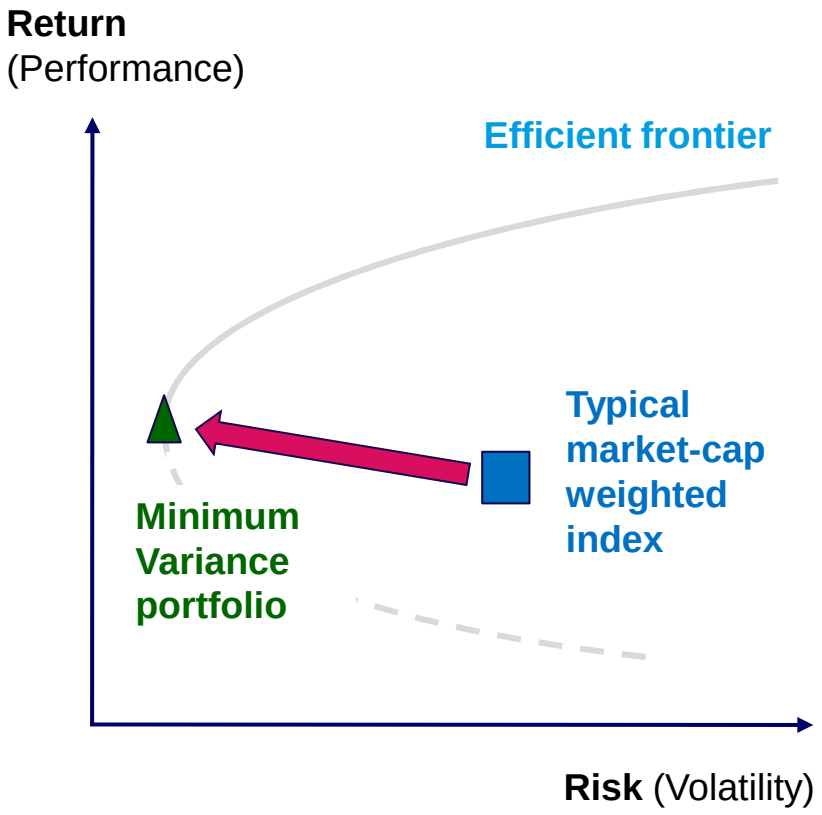
1. CONCEPT OVERVIEW MINIMUM VARIANCE

Minimum Variance is based on Markowitz's Nobel Prize winning Modern Portfolio Theory

Why Minimum Variance

- The Minimum Variance portfolio (MVP) is an efficient portfolio with minimal risk
- The MVP is the only portfolio on the efficient frontier that does not require a return estimation:
  - Unlike returns, risks can be forecasted relatively accurately and reduced without harming returns as non-remunerated market risks are diversified away
- Historically, MVP strategies were less impacted by market downturns
- MVPs use less risk budget available to investors, giving access to higher long term returns on a constant risk basis

Risk-return optimization



A robust factor based risk model reduces computational complexity and generates superior results

Two primary approaches used in the industry

- **Historical Covariance Approach** –
  - Mathematically cumbersome and inefficient
  - Spurious correlations
  - Universe often cut just to enable computation
- **Factor Model Approach** –
  - More robust, using more information
  - No spurious correlations
  - Enable full universe utilization

STOXX adopts AXIOMA's state-of-the-art factor model for its minimum variance indices

- Fundamental / technical factors that specify systematic risk drivers in regions and single countries. Models designed to forecast volatility "out of sample"

STOXX Minimum Variance Indices uses best of breed portfolio optimization algorithm

- Creates more efficient portfolios than competitors with more stable optimization results and constraining the results against relevant factors, leading to more investable indices

STOXX is the only provider of true Minimum Variance Indices using a Factor Model Approach

2. STOXX MINIMUM VARIANCE INDICES

STOXX innovative Minimum Variance concept extends its global smart-beta offering

1 Superior methodology

- Using Axioma's superior fundamental risk model to robustly and accurately forecast and minimize risk
- Overpriced securities are not over-weighted
- Weighting done by optimization, requires fewer components
- Reduced risk and draw downs, higher returns
- Superior methodology, superior output compared to low risk weighting

2 Flexible dual offering

- STOXX Minimum Variance Indices come in two versions: Constrained and Unconstrained
- The Constrained Version: Similar exposures to market-cap index with much lower risk
- The Unconstrained Version: first of its kind globally, with complete freedom to fulfill its Minimum Variance mandate

STOXX Minimum Variance

3 Highly liquid and low transaction costs

- Selection universe is a broad index
  - Only extremely liquid stocks considered
  - Model less constrained as a result
- Turnover and transaction costs are considered in optimization directly for a holistic optimization

4 Adapted to Portfolio Constraints

- Well-diversified and UCITs compliant
- Tradable and trackable
- Constrained version has very low active positions on countries/sectors/risk factors

STOXX Minimum Variance Indices come in two versions that cater to different investor needs

Version 1: STOXX Minimum Variance **Unconstrained** Index

Index Characteristics

Caters to investors trying to capture the full benefit of a minimum variance strategy

» Most optimal risk-adjusted return

» Full optimization to minimize risk

» With only very basic constraints, there is the freedom to provide increased optimality in the resulting portfolio

» May have relative biases towards certain factors, geographies etc.

» Expected to provide lowest risk

Index Constrains

» **Diversification**
- index constituent capping at 8%
- sum of index constituent with weight over 4.5% are capped at 35%

» **Turnover**
- monthly rebalancing
- one-way turnover constrained to a maximum of 5%

STOXX Minimum Variance indices come in two versions that cater to different investor needs

Version 2: STOXX Minimum Variance **Constrained** Index

Index Characteristics

Caters to investors with high benchmark sensitivity and tracking error constrains

» Optimization is constrained to limit biases of Minimum Variance index relative to the benchmark

» Most factors/attributes are constrained except for variance, resulting in a very similar index but with reduced risk

» Improves portfolio risk-return efficiency while tracking benchmark

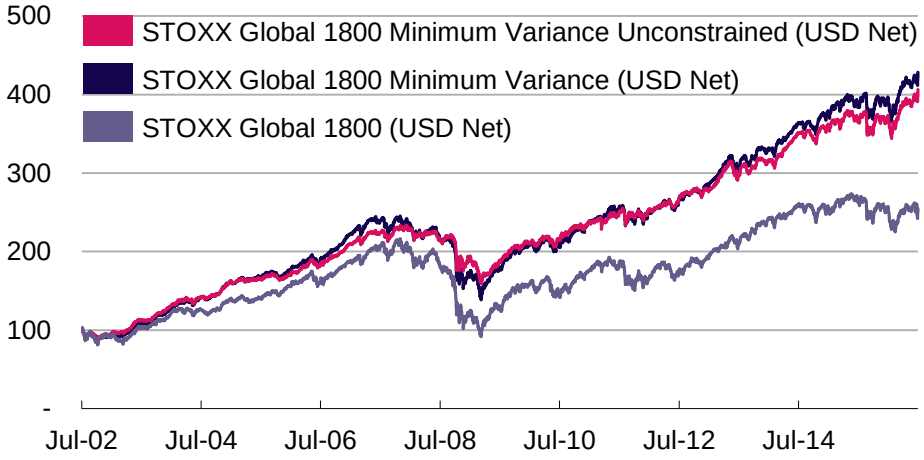
Index Constrains

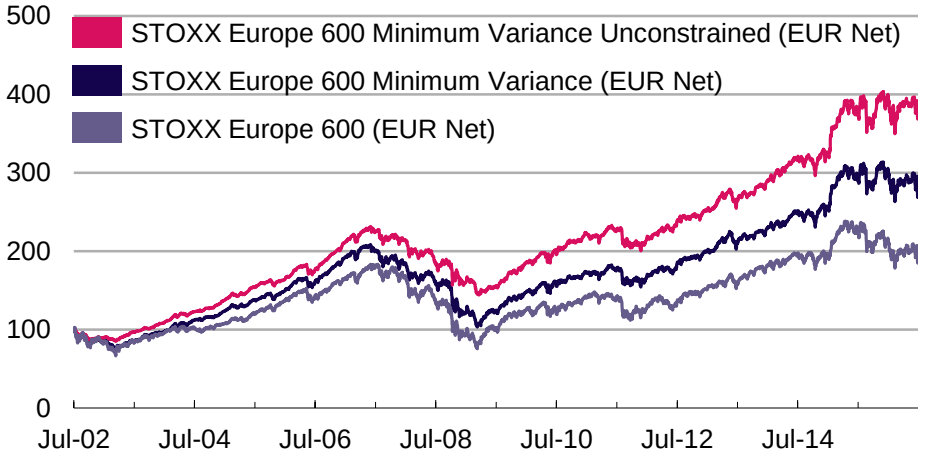
» **Diversification**
- index constituent capping at 8%
- sum of index constituent with weight over 4.5% are capped at 35%

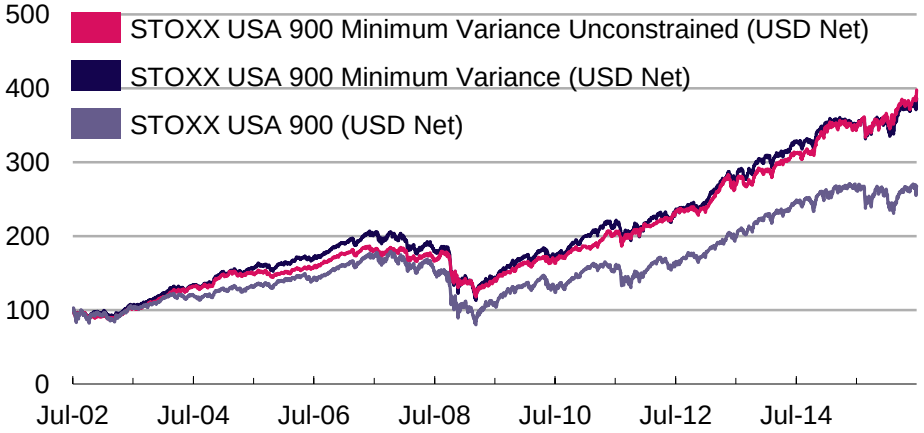
» **Turnover**
- quarterly rebalancing
- one-way turnover constrained to a maximum of 7.5%

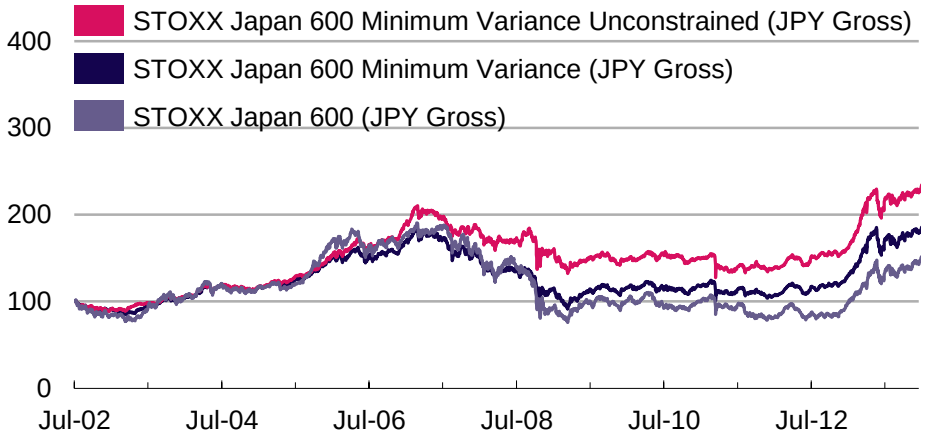
» **Benchmark Constraints**
- ICB sector and country weights constrained to +/-5% of the underlying benchmark index
- index is constrained within +/-0,25 standard deviations of the underlying benchmark index's factor exposure (excl. volatility, size)

... and empirically work in any geography









1) STOXX data from Jul. 2, 2002 to Jun. 30. 2016

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About STOXX

STOXX Ltd. is an established and leading index specialist, which started in Europe. The launch of the first STOXX® indices in 1998, including the EURO STOXX 50® Index, marked the beginning of a unique success story, based on the company's neutrality and independence. Since then, STOXX has been at the forefront of market developments and has continuously expanded its portfolio of innovative indices. STOXX now operates globally across all asset classes.
STOXX indices are licensed to more than 500 companies, which include the world's largest financial products issuers, capital owners and asset managers. STOXX indices are used not only as underlyings for financial products, such as ETFs, futures and options and structured products but also for risk and performance measurement. In addition, STOXX Ltd. is the marketing agent for DAX® and SMI® indices.

APPENDIX

Minimum Variance is based on Markowitz's Nobel Prize winning Modern Portfolio Theory

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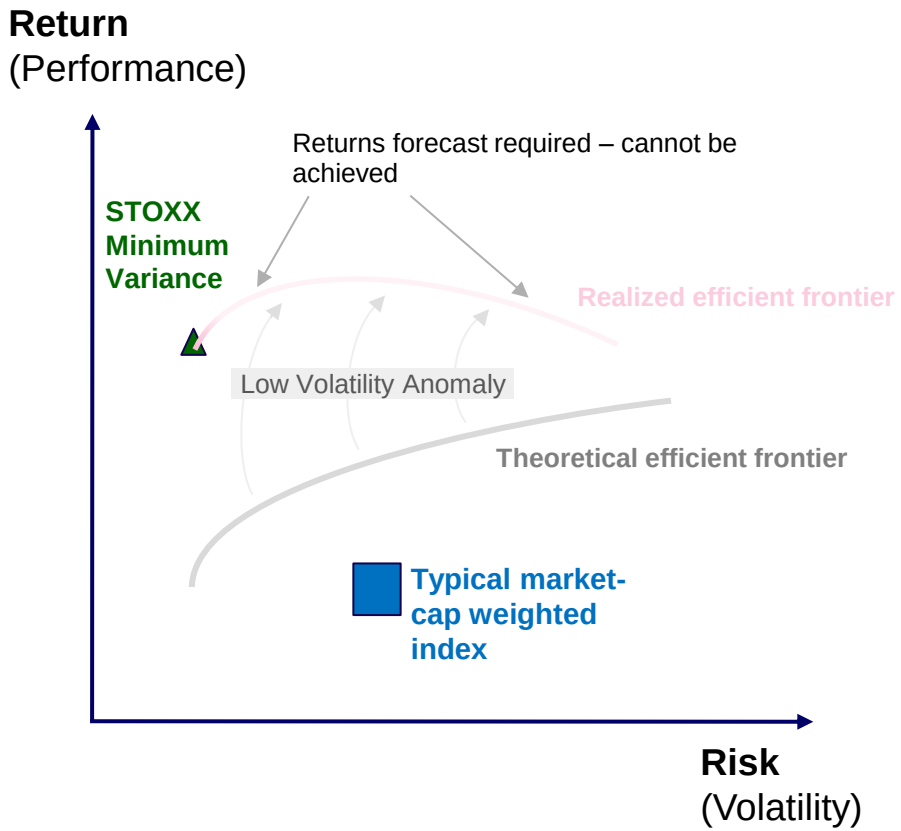
- MVPs use less risk budget available to investors, giving access to higher long term returns on a constant risk basis

Risk-return optimization



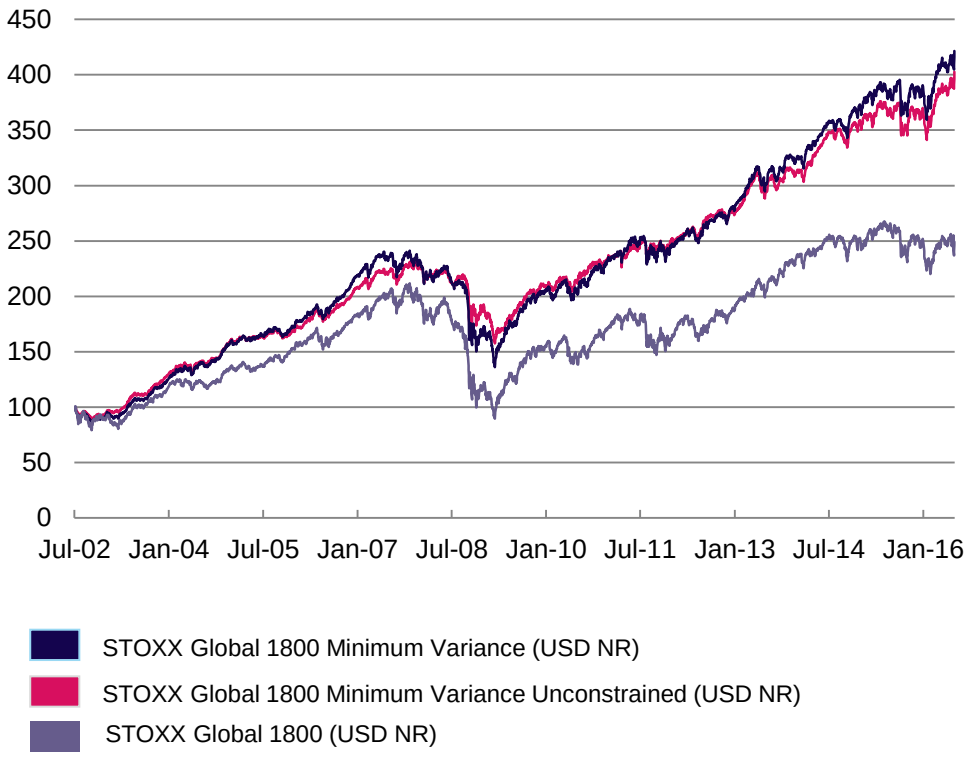
STOXX Global Minimum Variance Indices achieve higher returns than benchmark and have higher Risk-return ratio

Distinct offering

- The pattern is consistent showing the best performance and lowest realized risk from the unconstrained version
- The unconstrained version has risks associated with larger tracking error of the underlying benchmark that the constrained version reduces
- Constrained version still provides a far superior index

	STOXX Global 1800 Min. Var.	STOXX Global 1800 Min. Var. Unconstrained	STOXX Global 1800
Performance (annualized)	10.5%	10.2%	6.6%
Volatility (annualized)	11.8%	10.0%	16.5%
Risk-Return Ratio	0.89	1.01	0.40
Maximum drawdown	43.5%	32.0%	57.7%

Return[1)]



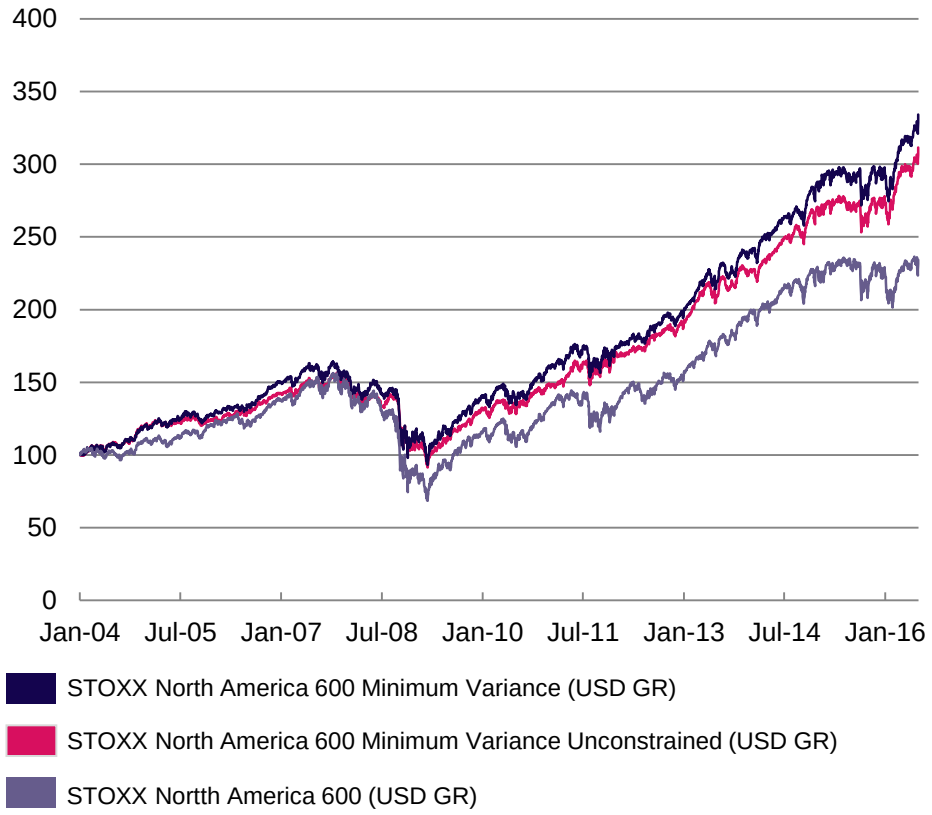
1) Source: STOXX data from Jul. 1, 2002 to Jun. 30 2016

STOXX North America Minimum Variance Indices achieve higher returns than benchmark

Key figures[1)]

	STOXX North America 600 Min. Var.	STOXX North America 600 Min. Var. Unconstrained	STOXX North America 600
Performance (annualized)	9.9%	9.3%	6.9%
Volatility (annualized)	15.6%	13.7%	18.9%
Maximum drawdown	43.4%	41.7%	56.3%
Sharpe ratio[2)]	0.59	0.61	0.37

Return[1)]



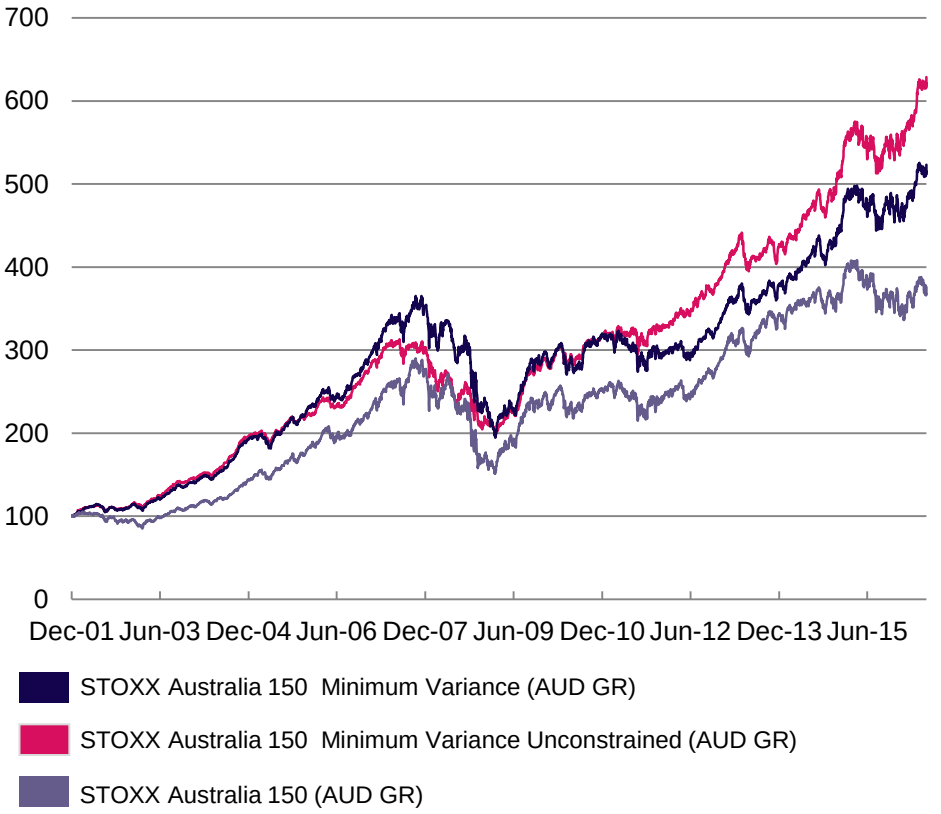
1) Source: STOXX daily data from Jan. 2, 2004 to Jun. 30, 2016

STOXX Australia Minimum Variance Indices achieve higher returns than benchmark

Key figures[1)]

	STOXX Australia 150 Min.Var.	STOXX Australia 150 Min. Var. Unconstrained	STOXX Australia 150
Performance (annualized)	11.8%	13.1%	9.3%
Volatility (annualized)	13.0%	10.7%	16.2%
Maximum drawdown	46.7%	36.9%	47.8%
Sharpe ratio[2)]	0.59	0.81	0.37

Return[1)]



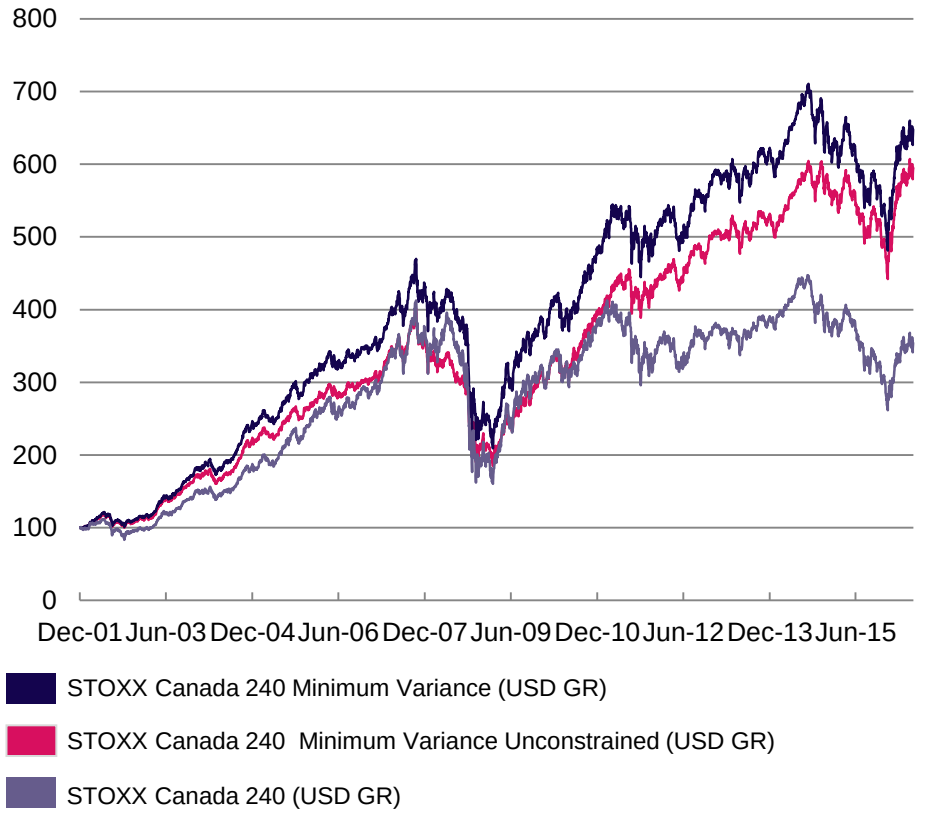
1) Source: STOXX daily data from Dec. 31, 2001 to Jun. 30, 2016

STOXX Canada Minimum Variance indices achieve higher returns than benchmark

Key figures[1)]

	STOXX Canada 240 Min.Var.	STOXX Canada 240 Min. Var. Unconstrained	STOXX Canada 240
Performance (annualized)	13.4%	12.7%	8.9%
Volatility (annualized)	17.6%	15.5%	21.2%
Maximum drawdown	55.5%	53.9%	61.1%
Sharpe ratio[2)]	0.72	0.76	0.44

Return[1)]



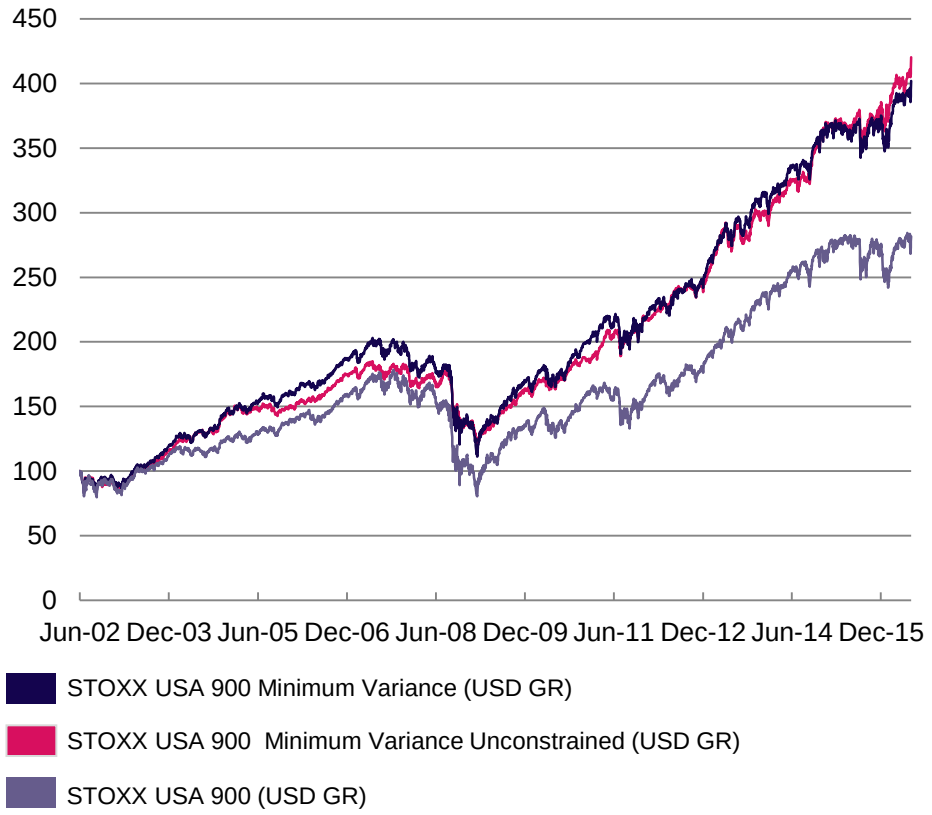
1) Source: STOXX daily data from Dec. 31, 2001 to Jun. 30, 2016

STOXX USA Minimum Variance indices achieve higher returns than benchmark

Key figures[1)]

	STOXX USA 900 Min.Var.	STOXX USA 900 Min. Var. Unconstrained	STOXX USA 900
Performance (annualized)	10.2%	10.5%	7.5%
Volatility (annualized)	15.1%	12.4%	19.4%
Maximum drawdown	45.2%	36.9%	54.8%
Sharpe ratio[2)]	0.62	0.75	0.40

Return[1)]



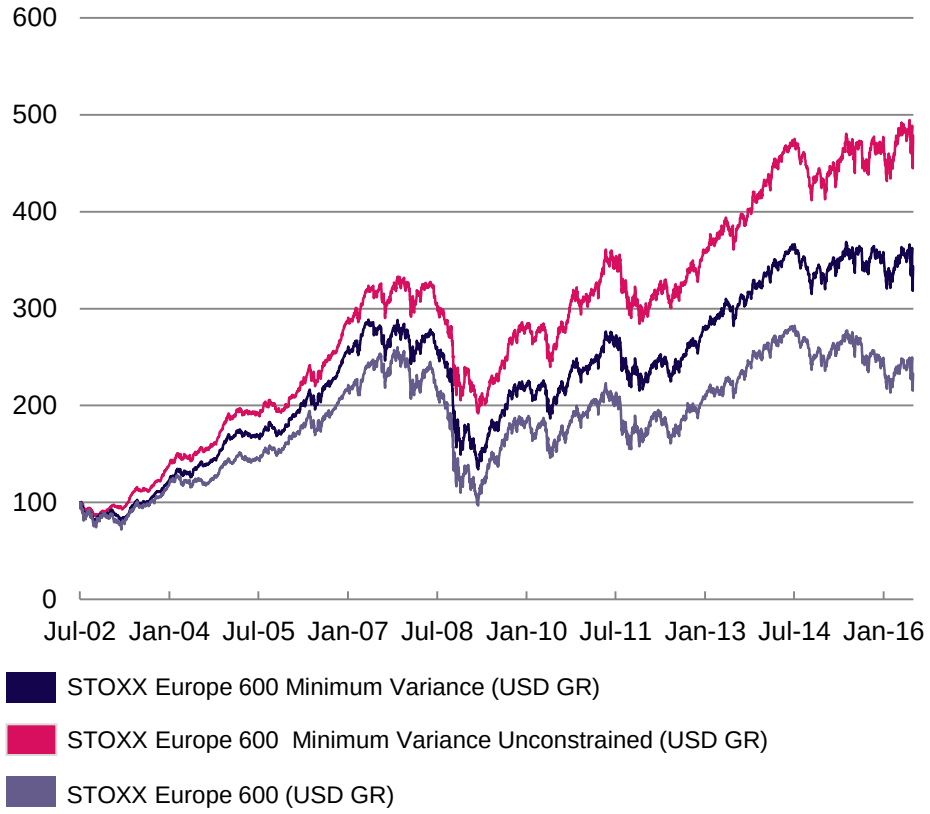
1) Source: STOXX daily data from Jun. 28, 2002 to Jun. 30, 2016

STOXX Europe Minimum Variance indices achieve higher returns than benchmark

Key figures[1)]

	STOXX Europe 600 Min.Var.	STOXX Europe 600 Min. Var. Unconstrained	STOXX Europe 600
Performance (annualized)	9.0%	11.5%	6.1%
Volatility (annualized)	17.1%	14.5%	22.8%
Maximum drawdown	53.5%	42.4%	62.8%
Sharpe ratio[2)]	0.50	0.73	0.31

Return[1)]



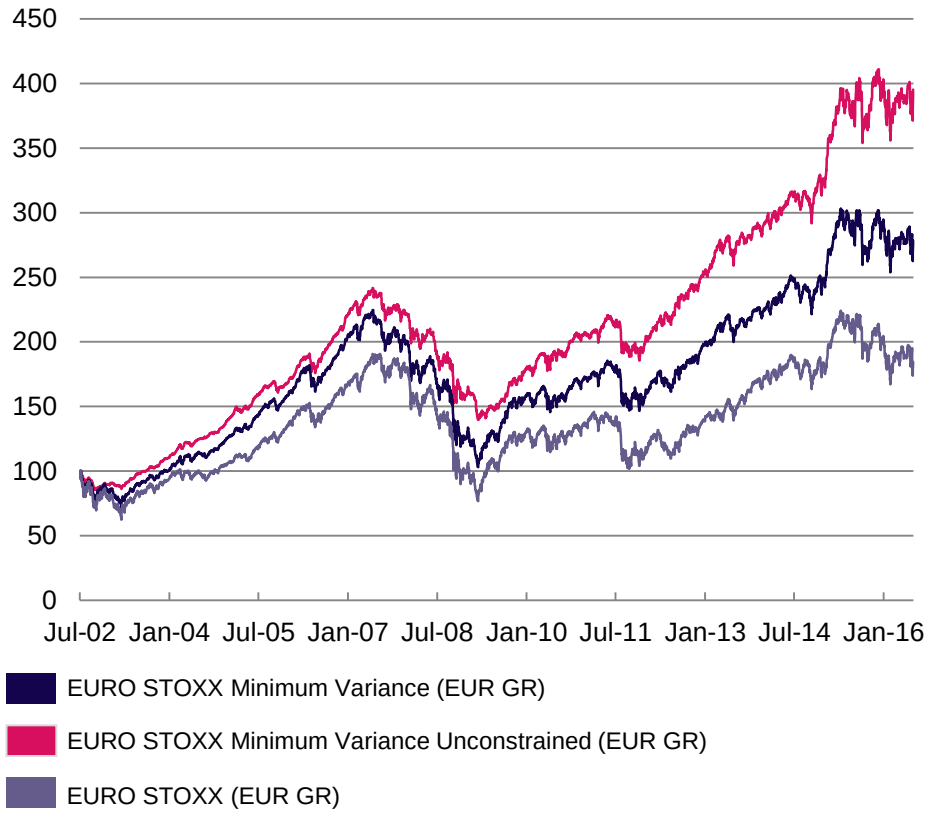
1) Source: STOXX daily data from Jul. 1, 2002 to Jun. 30, 2016

EURO STOXX Minimum Variance indices achieve higher returns than benchmark

Key figures[1)]

	EURO STOXX Min.Var.	EURO STOXX Min. Var. Unconstrained	EURO STOXX
Performance (annualized)	7.4%	10.0%	4.3%
Volatility (annualized)	15.9%	11.7%	22.0%
Maximum drawdown	54.2%	42.2%	59.7%
Sharpe ratio[2)]	0.44	0.75	0.24

Return[1)]



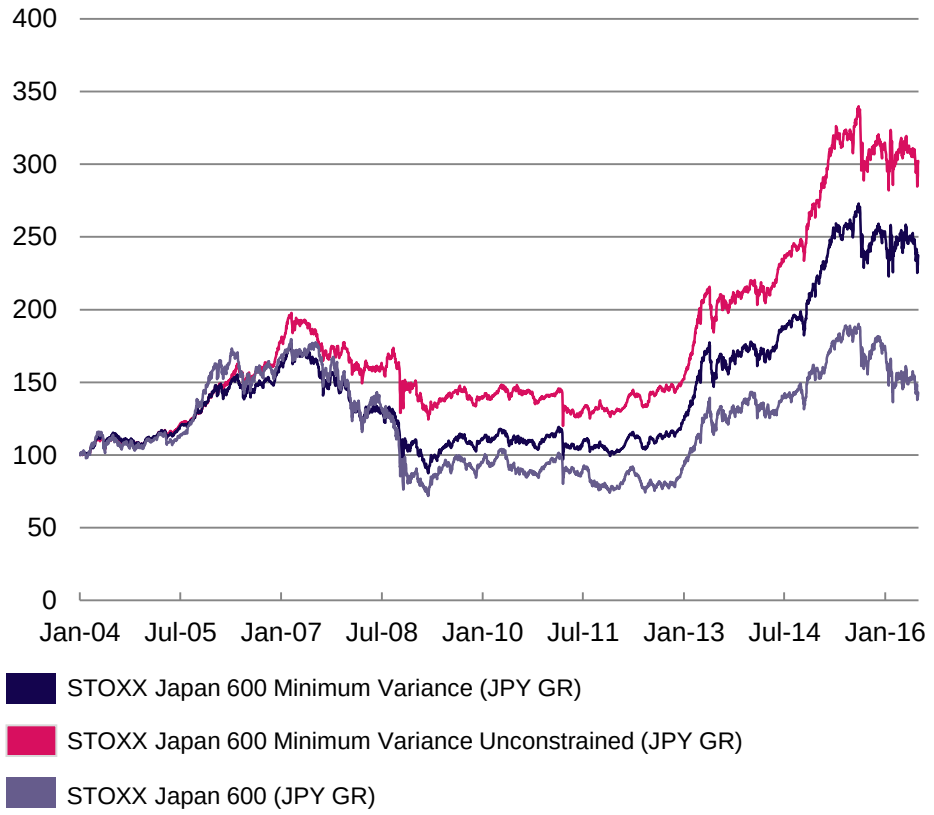
1) Source: STOXX daily data from Jul. 1, 2002 to Jun. 30, 2016

STOXX Japan Minimum Variance Indices achieve higher returns than benchmark

Key figures[1)]

	STOXX Japan 600 Min. Var.	STOXX Japan 600 Min. Var. Unconstrained	STOXX Japan 600
Performance (annualized)	7.0%	9.0%	2.8%
Volatility (annualized)	16.9%	14.9%	22.0%
Maximum drawdown	50.5%	39.3%	60.1%
Sharpe ratio[2)]	0.48	0.65	0.23

Return[1)]



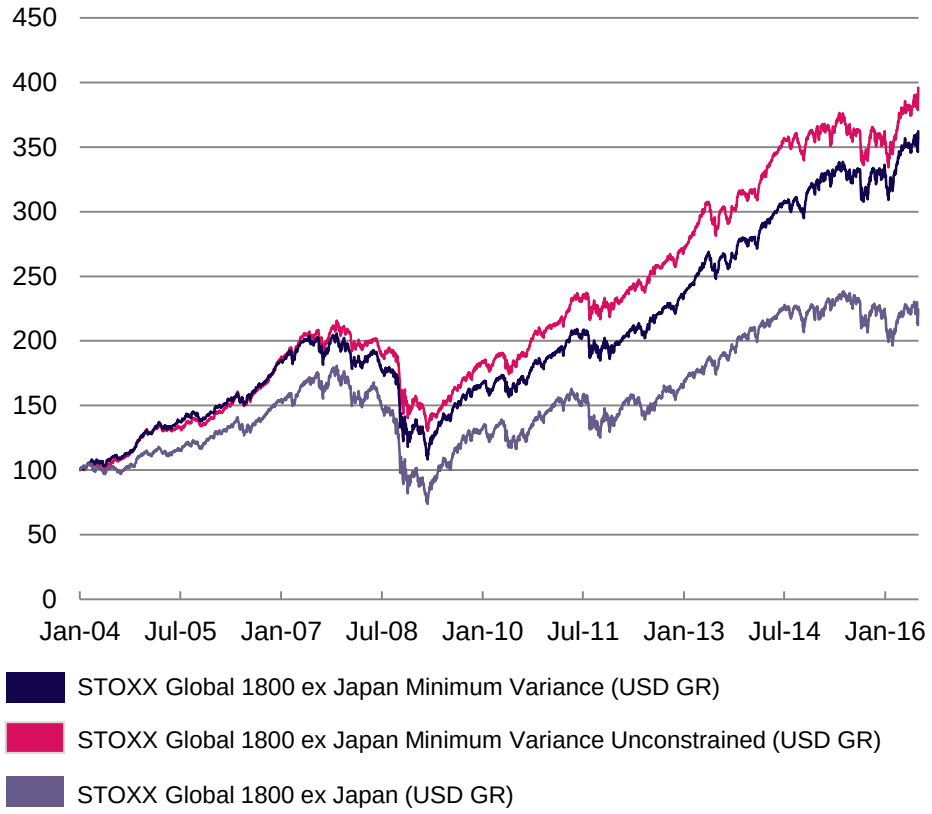
1) Source: STOXX daily data from Jan. 2, 2002 to Jun. 30, 2016

STOXX Global ex Japan Minimum Variance Indices achieve higher returns than benchmark

Key figures[1)]

	STOXX Global 1800 ex Japan Min. Var.	STOXX Global 1800 ex Japan Min. Var. Unconstrained	STOXX Global 1800 ex Japan
Performance (annualized)	10.5%	11.3%	6.5%
Volatility (annualized)	12.3%	10.6%	17.7%
Maximum drawdown	47.4%	39.6%	59.1%
Sharpe ratio[2)]	0.76	0.93	0.36

Return[1)]



1) Source: STOXX daily data from Jan. 2, 2004 to Jun. 30, 2016

STOXX Global ex Australia Minimum Variance Indices achieve higher returns than benchmark

Key figures[1)]

	STOXX Global 1800 ex Australia Min. Var.	STOXX Global 1800 ex Australia Min. Var. Unconstrained	STOXX Global 1800 ex Australia
Performance (annualized)	9.9%	9.8%	6.1%
Volatility (annualized)	11.9%	11.6%	16.3%
Maximum drawdown	46.8%	-43.0%	57.9%
Sharpe ratio[2)]	0.74	0.74	0.35

Return[1)]

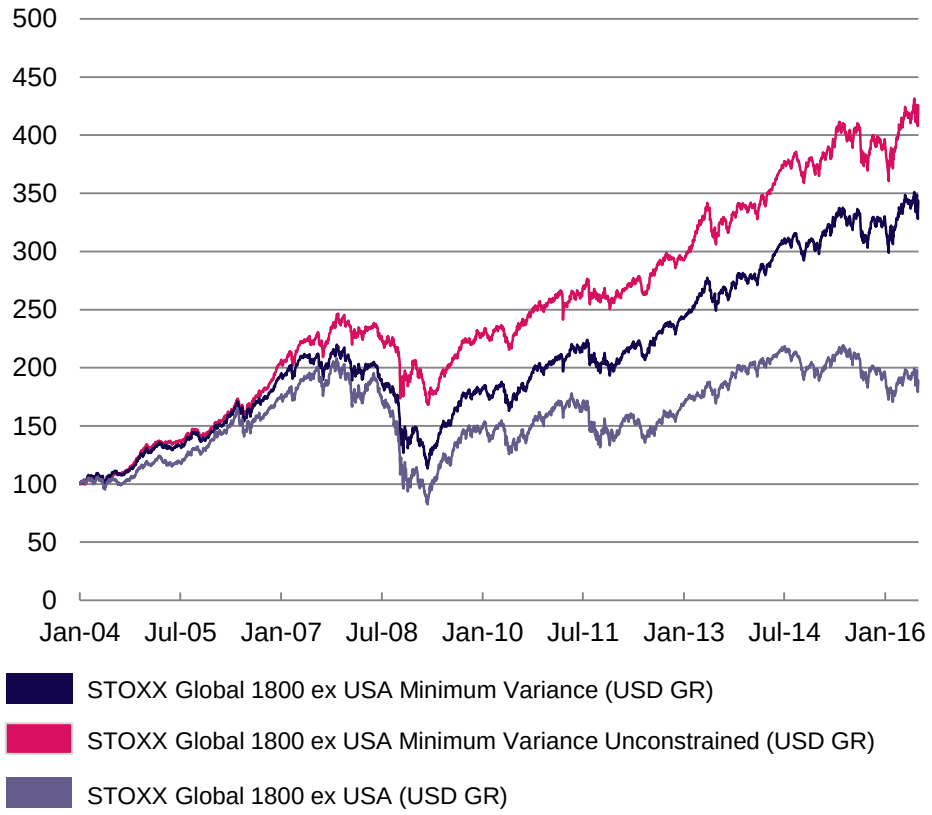
1) Source: STOXX daily data from Jan. 2, 2004 to Jun. 30, 2016

STOXX Global ex USA Minimum Variance Indices achieve higher returns than benchmark

Key figures[1)]

	STOXX Global 1800 ex USA Min. Var.	STOXX Global 1800 ex USA Min. Var. Unconstrained	STOXX Global 1800 ex USA
Performance (annualized)	10.1%	11.9%	5.1%
Volatility (annualized)	13.2%	11.3%	18.3%
Maximum drawdown	48.5%	31.8%	60.3%
Sharpe ratio[2)]	0.69	0.93	0.28

Return[1)]



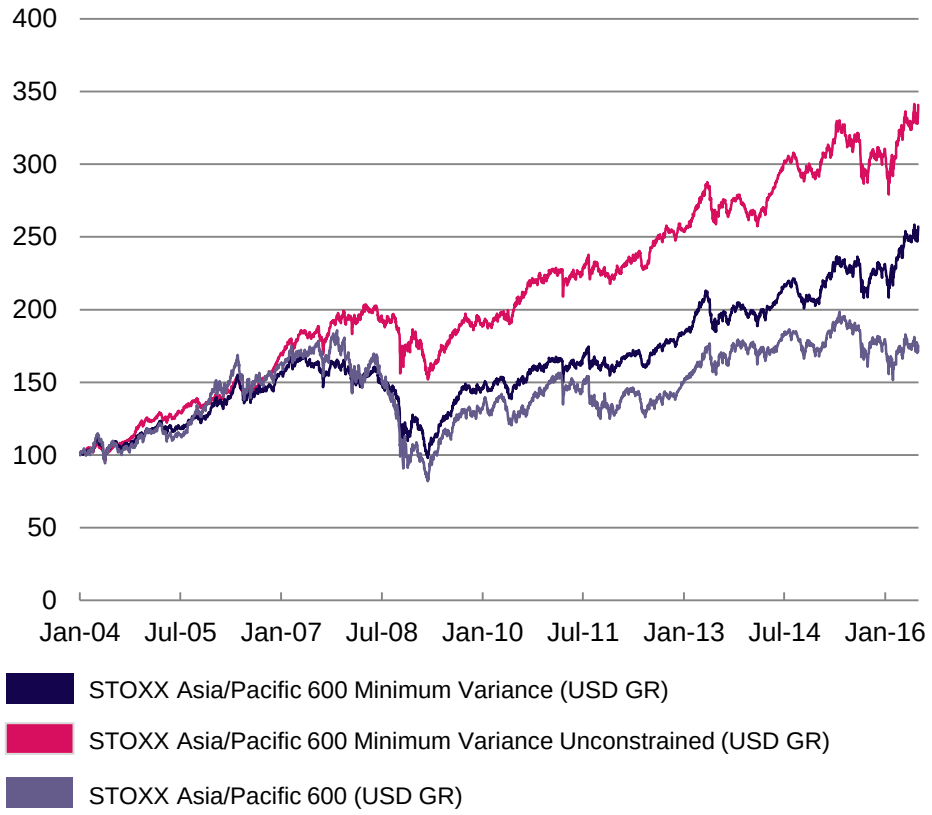
1) Source: STOXX daily data from Jan. 2, 2002 to Jun. 30, 2016

STOXX Asia/Pacific Minimum Variance Indices achieve higher returns than benchmark

Key figures[1)]

	STOXX Asia/Pacific 600 Min. Var.	STOXX Asia/Pacific 600 Min. Var. Unconstrained	STOXX Asia/Pacific 600
Performance (annualized)	7.6%	10.0%	4.5%
Volatility (annualized)	14.6%	12.1%	19.8%
Maximum drawdown	-41.9%	25.4%	55.9%
Sharpe ratio[2)]	0.48	0.73	0.25

Return[1)]



1) Source: STOXX daily data from Jan. 2, 2002 to Jun. 30, 2016

STOXX Minimum Variance Indices come in two versions…

	Unconstrained version	Constrained version
Capping	» UCITS compliant: individual components capped at 8%; all individual components with weights ≥4.5% jointly capped at 35%[1)]	
Effective portfolio size	» At least 30% of underlying broad index: $H_{Min\,Var} \geq H_{Base} * 30\%$ with w = component weight; H=effective number of assets, and $H = \frac{1}{\sum w^2}$	
Rebalancing and max. turnover	» Monthly rebalancing » 5% one way turnover constraint[2)]	» Quarterly rebalancing » 7.5% one way turnover constraint[2)]
Country and industry exposure	» Not applied to unconstrained version	» Constrained Minimum Variance Index's exposure by country and industry must remain within ±5% of exposure of base index by country and industry
Factor exposure	» Not applied to unconstrained version	» Constrained Minimum Variance Index must remain within a 0.25 standard deviation of the base index's exposure to each factor

1) Note that these "4.5/8/35" rule is slightly stricter than required by UCITS constraints which imply "5/10/40" rule
2) One-way turnover defines the portion of a portfolio that is sold in order to buy other components

Historical covariance method versus the factor model approach

Variance/covariance matrix is superior

Historical covariance

» Correlation model determines the correlation between the components by using historical data

Covariance matrix	Component A	Component B	Component C
Component A	1		
Component B		1	
Component C etc.			1

» Minimizing of variance using the covariance matrix is subject to certain constraints:
  - » Component capping
  - » Industry capping
  - » Diversification in terms of effective assets

Variance/covariance Matrix

» For each component, the exposure to each factor is determined, and factor covariances are calculated

Covariance matrix component A	Factor 1	Factor 2	Factor 3
Factor 1	1		
Factor 2		1	
Factor 3 etc			1

For the constrained version:

» Apply further constraints:
  - » Component capping
  - » Diversification in terms of effective assets
  - » Rebalancing and max turnover
  - » Country and industry exposure
  - » Factor exposure

For the unconstrained version:

» Apply further constraints:
  - » Component capping
  - » Diversification in terms of effective assets
  - » Rebalancing and max turnover

The Axioma optimization process

Technical methodology

Optimization

- Uses a Second Order Cone Optimization (SOCP)
- With Branch and Bound
  - SOCP to model any quadratic term (in objective or constraint)
  - Branch and Bound to solve combinatorial constraints

- Additional proprietary methods used to improve quality of solution and speed of optimization
  - Specialized heuristics
  - Fine tuned Branch and Bound algorithm
  - Proprietary reformulation techniques for combinatorial constrains

Factor constraints

- Except for the unconstrained versions, all STOXX Minimum Variance indices will be constrained to have factor exposure similar to its underlying index, with respect to the factors:
  - Value
  - Growth
  - Medium Term Momentum
  - Short Term Momentum
  - Leverage
  - Liquidity
  - Exchange rate Sensitivity

- Size is not used as the underlying index is a broad index and a size pre selection has already been made

Summary of Axioma's competitive positioning

Statistical risk model

	Axioma statistical	APT
Coverage	~11,000 + including ADRs	~8,000
Estimation universe	~3,000	~3,000
Model structure	15 single country 20 global and regional models	20 US 46 global
Forecast horizon	Multiple variations Medium horizon (3 6 mo) Short horizon (1 3) (MH) Exponential weighting of 125 days on variances and 250 on the correlations (SH) Exponential Weighting of 60 days on the variances and 125 days on the correlations	12+ months Exponential weighting of 3 years of weekly data observations

Summary of Axioma's competitive positioning

Statistical risk model

	Axioma Statistical	APT
Model variations	Fundamental and statistical Axioma uses asymptotic principal components	Statistical APT uses traditional principal component analysis
Estimation frequency	Daily on all risk model components	Monthly
Timing of release	Daily (in advance of US market open)	Typically 2nd business day of each month
Construction of covariance matrix	Exponential weighting + Dynamic volatility adjustment	Equal weighted weekly observations
Specific risk	Uses daily data with 125 day half life and updates are provided daily	Equal weighted weekly observations

STOXX Minimum Variance index family addresses challenges faced by industry

STOXX Axioma partnership

STOXX

- Provides transparent, consistent and rules-based indices as basis for optimization
- Offers high operational standards

Axioma

- Offers state-of-the-art factor model that:
  - Creates superior and more efficient variance/covariance matrix as basis for optimization
    - Optimization results are more stable
    - Constraining of results against relevant factors is possible and leads to more investable indices
- Offers risk management products globally. The company was started in 1998 and is headquartered in New York

Addressing current concerns

- Improve on current methodologies
  - Factor model approach is superior to existing methods
  - Axioma's factor model uses a broad index as the universe, enabling diversified investments while removing illiquid components
  - Axioma's factor model allows to less strictly constrain the optimization
- Two versions for a broad investor base
  - Stand alone Minimum Variance strategy index family (unconstrained version)
  - Minimum Variance improvement on market cap weighted benchmarks (constrained version)

Summary of Minimum Variance offerings in the industry

	STOXX	MSCI	S&P	FTSE
Risk model	» Axioma	» MSCI Barra	» Northfield	» Historical
Updates	» Daily	» Monthly	» Monthly	» n/a
Offering	» Constrained & Unconstrained » Countries, regions, global	» Constrained only » Countries, regions, global	» Constrained only » USA only	» Constrained only
Component capping	» 4.5%/8%/35% » Effective number of assets » +/- 5% around benchmark ICB industry weights	» Lower of 1.5% or 20 times the weight in the benchmark	» Lower of 2% or 20 times the weight in the benchmark	» 20 times the weight in the benchmark » Diversification target: $\sum_{i=1}^{N} w_i^2 = 1/H$
Industry Capping*	» +/- 5% around benchmark country weights	» +/- 5% around benchmark GICS sector weights	» +/ 5% around benchmark GICS sector weights	» Max 20% per ICB industry weight
Country Capping*	» +/- 0.25σ of the benchmark's exposure to: all factors except Volatility and Size	» +/- 5% around benchmark country weights if that is greater than or equal to 2.5%, else 3 times the benchmark country weight	» n/a	» Min: 90% of benchmark's weight -5% » Max: 110% of benchmark's weight +5%
Factor Capping*	» Quarterly (monthly for Unconstrained)	» +/- 0.25σ of the benchmark's exposure to: all factors except Volatility	» +/- 0.25σ of the benchmark's exposure to: all factors except Volatility	» None
Rebalancing	» 7.5% (5%) one-way per rebalancing	» Semi-annual	» Semi-annual	» Semi-annual
Turnover		» 10% one-way per rebalancing	» 10% one-way per rebalancing	» None

*Not comparing the STOXX Minimum Variance Unconstrained version as others do not have a competing offering
1) Source: MSCI. http://www.msci.com/products/indices/strategy/risk_premia/minimum_volatility/
http://www.msci.com/resources/factsheets/index_fact_sheet/msci_kokusai_minimum_volatility_index_jpy_gross.pdf
(2) Northfield: http://www.northinfo.com/documents/8.pdf (3) S&P: http://us.spindices.com/indices/strategy/sp-500-minimum-volatility-index
(4) FTSE: http://www.ftse.com/Indices/FTSE_Global_Minimum_Variance_Index_Series/Downloads/FTSE_Global_Minimum_Variance_Index_Series_Ground_Rules.pdf

STOXX outperforms through superior construction

Main advantages of STOXX compared to other providers

	MSCI	S&P	FTSE
Risk model	» Barra and Northfield Model and updates monthly, hence the data could be stale when used » Axioma rebalances daily		» FTSE uses a historical covariance approach. This is a theoretically poor approach with provably inferior results
Factor constraining	» MSCI and S&P cap exposure to the Size factor, unlike STOXX » Market cap. is an active strategy on size, to cap Size exposure undermines massively the effectiveness of Minimum Variance		» Unable to cap on factors since there is no risk model
Component level capping	» All but STOXX use a very basic component capping which prohibits much of the required variance minimization » We suspect competing optimizers could not handle second-order cone programming which is required for the STOXX constraint of effective number of assets		

» Rebalancing on a semi-annual basis, as opposed to quarterly, increases average risk by an extra 10% (12.2% vs. 11.0% risk). STOXX rebalances its comparable Constrained version quarterly, while all competitors rebalance semi-annually

» STOXX is the only provider offering an Unconstrained index that is not tied to a market-cap index. The Constrained indices are not Minimum Variance portfolios

Differences in Minimum Variance Offerings in the Market