

## INDEX METHODOLOGY

### INTRODUCTION

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This document sets forth the methodology for the Northern Trust Real Assets Allocation Index.

The Index is calculated and disseminated by Refinitiv, and had an inception date of October 30, 2015 at a base index value of 1000.

### OVERVIEW

#### Northern Trust Real Assets Allocation Index

Northern Trust Real Assets Allocation Index is designed to reflect the performance of a universe of inflation sensitive securities operating in the following sectors: global infrastructure, global real estate and global natural resources. The index is intended to reflect an exposure to “real”<sup>i</sup> assets, and is constructed using a proprietary optimization in an effort to reduce volatility of returns, while maintaining diversification amongst the eligible securities.

### INDEX ELIGIBILITY

The following securities are eligible for inclusion in the Northern Trust Real Assets Allocation Index:

- FlexShares® STOXX® Global Broad Infrastructure Index Fund<sup>ii</sup> - representing the index’s allocation to the global infrastructure sector of real assets
- FlexShares® Global Quality Real Estate Index Fund<sup>iii</sup> - representing the index’s allocation to the global real estate sector of real assets
- FlexShares® Morningstar® Global Upstream Natural Resources Index Fund<sup>iv</sup> - representing the index’s allocation to the global natural resources sector of real assets

### DETAILED METHODOLOGY

The construction of the index begins with a universe of eligible securities (defined in “Index Eligibility” section). Eligible securities are then optimized, with a main objective of lowering the absolute total risk of the index, as measured by volatility of returns, while maintaining diversification amongst the eligible securities. In order to obtain robust estimates of expected portfolio volatility, standard risk models<sup>v</sup> are incorporated into our process to isolate both common factor and idiosyncratic risk<sup>vi</sup> at the underlying asset level<sup>vii</sup>. In addition to solving for

the main objective, constituent level weight constraints<sup>viii</sup> are utilized to maintain diversification within the index during each optimization.

For illustrative purposes, the optimization can be represented using the following equation:

$$\begin{aligned} \min: & w^T C_A^T \Sigma C_A w \\ \text{subject to: } & \sum w = 100\%, w \geq 10\%, w \leq 50\% \\ & \Sigma = F^T Q F + \Delta^2 \end{aligned}$$

In this equation,  $w$  refers to the weights of the eligible securities,  $C$  refers to the weight of the individual asset held in the eligible security,  $\Sigma$  refers to the covariance matrix<sup>ix</sup> of individual asset's returns derived from standard risk models,  $F$  refers to the individual asset's exposure to the risk factors represented in the standard risk model,  $Q$  refers to the variance-covariance matrix of all risk factor returns,  $\Delta^2$  refers to individual asset's matrix of idiosyncratic variances and  $\sum w$  refers to the sum of all optimized weights in the index.

All of the systematic risk constraints are placed in a constraint hierarchy so when a solution is not feasible due to hard constraints, a relaxed solution can be found.

Any changes to this methodology will be announced to clients at least sixty (60) days in advance prior to becoming effective.

## REBALANCING

The Northern Trust Real Assets Allocation Index is rebalanced annually (i.e. April) at minimum and semi-annually (i.e. April and October) if the relative volatility estimates at the security level have breached an established threshold<sup>x</sup>. In addition, the index may be adjusted intra-period in connection with errors, securities' eligibility, exchange connectivity, and corporate actions.

The index's scheduled rebalancing occurs on the last business day of the month on which the U.S. equity markets are open for a full day of trading<sup>xi</sup>, and becomes effective immediately after the close. The Northern Trust Real Assets Allocation Index reserves the right to postpone each rebalance date for up to one week with prior client notification of such a postponement.

All changes to constituents and weightings will be announced to clients at least two (2) days prior to rebalancing and with definitive weights after the close of the rebalancing date and before the following day's market opening.

## INDEX MAINTENANCE / CORPORATE ACTION-DRIVEN CHANGES

The Northern Trust Real Assets Allocation Index will adopt all corporate action related policies and procedures used by Refinitiv. A complete list of Refinitiv's methodology is available by request at [NT\\_Index\\_Services@ntrs.com](mailto:NT_Index_Services@ntrs.com)



<sup>i</sup> Real Assets are physical or tangible assets. Examples of real assets include but are not limited to commodities, precious metals, oil, and real estate.

<sup>ii</sup> The Fund seeks investment results that correspond generally to the price and yield performance, before fees and expenses, of the STOXX® Global Broad Infrastructure Index (the “Underlying Index”). The Underlying Index reflects the performance of a selection of equity securities of infrastructure-related companies that are domiciled or traded in developed and emerging markets around the world (including the U.S.). The companies included in the Underlying Index derive at least 50% of their revenues from the ownership, development, construction, financing or operation of infrastructure assets, as determined by STOXX (the “Index Provider”) pursuant to its index methodology. Infrastructure assets are defined by the Index Provider as the physical structures and networks upon which the operation, growth and development of a community depends, and include: (a) communication (cable and satellite, data centers, wireless, wireless towers and wireline); (b) energy (energy utilities and midstream energy); (c) government outsourcing/social (correctional facilities, hospitals and postal services); (d) transportation (air transportation, passenger transportation, rail transportation, road transportation and water transportation; and (e) utilities (waste management and water utilities). Constituents of the Underlying Index may include common and preferred stocks, publicly-traded units of master limited partnerships (“MLPs”), and real estate investment trusts (“REITs”). For more information regarding this Fund, please visit [www.flexshares.com](http://www.flexshares.com)

<sup>iii</sup> The Fund seeks investment results that correspond generally to the price and yield performance, before fees and expenses, of the Northern Trust Global Quality Real Estate Index<sup>SM</sup> (the “Underlying Index”). The Underlying Index is designed to measure the performance of companies that exhibit certain quality, valuation and momentum characteristics within a universe of publicly-traded equity securities of U.S. and non-U.S. real estate investment trusts (REITs) and real estate companies. Eligible securities are selected for inclusion in the Underlying Index to maximize fundamental or “quality” factors, such as strength in profitability, management expertise, cash flow and other factors, as well as value and momentum factors, as determined by Northern Trust Investments, Inc. (in its capacity as the index provider (the “Index Provider”)), pursuant to its index methodology. A company must meet the following criteria to be eligible for inclusion in the Underlying Index: (a) it must be an equity owner or operator of real estate; (b) it must be classified under the business sector of “Real Estate” by Thompson Reuters Business Classifications or have registered as a real estate investment trust under its applicable local tax code; and (c) the liquidity of the company’s stock must be commensurate with that of other institutionally held real estate securities, as determined by the Index Provider pursuant to its index methodology. The following types of securities are not included in the Underlying Index: mortgage REITs, real estate finance companies, mortgage brokers and bankers, commercial and residential real estate brokers and real estate agents and home builders, as well as companies that have more than 50% of their assets in direct mortgage investments. For more information regarding this Fund, please visit [www.flexshares.com](http://www.flexshares.com)

<sup>iv</sup> The Fund seeks investment results that correspond generally to the price and yield performance, before fees and expenses, of the Morningstar® Global Upstream Natural Resources Index<sup>SM</sup> (the “Underlying Index”). The Underlying Index reflects the performance of a selection of equity securities that are traded in or are issued by companies domiciled in global developed or emerging markets (including the U.S.), as determined by the Index Provider pursuant to its index methodology. The companies included in the Underlying Index have significant business operations in the ownership, management and/or production of natural resources in energy, agriculture, precious or industrial metals, timber and water resources sectors,



as determined by Morningstar, Inc. (the “Index Provider”) pursuant to its index methodology. For more information regarding this Fund, please visit [www.flexshares.com](http://www.flexshares.com)

<sup>v</sup> Risk models are statistical applications which help provide predictive risk estimates, by quantitatively de-constructing individual equity price movements and attributing those movements to common investment categories or factors (e.g. sector, industry, style, etc.). The use of standard risk models in our process provides an additional layer of constraints on our optimization outcome, and assists in reducing the index’s overall active risk exposure to any one single factor.

<sup>vi</sup> For the purpose of our index’s construction, an asset’s risk is defined by evaluating the volatility in returns, a figure which can be estimated through the use of standard risk models.

<sup>vii</sup> Eligible securities are de-constructed to the asset level to more precisely evaluate risk utilizing the underlying asset level exposures

<sup>viii</sup> The maximum absolute constituent weight permitted during the optimization is 50%, while the minimum absolute constituent weight permitted during the optimization is 10%.

<sup>ix</sup> The variance-covariance matrix is a table that contains the variances and covariances associated with asset level returns, with the diagonal elements representing the variances and the off-diagonal elements representing the covariances between pairs of assets.

<sup>x</sup> Cross asset volatility z-scores for each eligible security are tracked by Northern Trust. If the absolute change of z-scores is greater than 0.25 standard deviations – our established threshold – as evaluated on the second Friday of the month of October, a rebalance will be effected on the index effective as of the end of the month.

<sup>xi</sup> Per the holiday calendar located at [nyse.com](http://nyse.com)

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