
Construction Rules for the Morningstar® Diversified Alternatives IndexSM

Morningstar Indexes

April 2020

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Overview

The Morningstar® Diversified Alternatives IndexSM is designed to provide diversified exposure to alternative asset classes in order to enhance risk-adjusted portfolio returns when combined with a range of traditional investments. The index consists of a diversified set of ProShares alternative exchange-traded funds that employ alternative and nontraditional strategies such as long/short, market neutral, managed futures, hedge fund replication, private equity, infrastructure, or inflation-related investments.

The index allocates weights to the underlying ETFs based on a proprietary optimization model run by Ibbotson Associates, Inc., a division of Morningstar Investment Management Group, which annually calculates the allocation to each underlying ETF based on the improvement in portfolio risk/return characteristics each underlying ETF provides to a traditional stock and bond portfolio. In addition, the index applies a tactical momentum signal designed to increase the allocations toward asset classes that exhibit positive relative trends over the prior six months.

This index does not incorporate Environmental, Social, or Governance (ESG) criteria.

Index Inception Date and Performance Inception Date

The inception date of the index is September 30, 2014, and the performance inception date of the index is February 6, 2004, when the first back-tested index value was calculated.

Index Construction

Assigning ETFs to the Index

Selection Universe

At each reconstitution, securities for the Morningstar Diversified Alternatives Index are derived from U.S.-listed ETFs sponsored by ProShares that track one of the following alternative asset classes:

- ▶ Global infrastructure
- ▶ Hedge funds
- ▶ Inflation
- ▶ Listed private equity
- ▶ Long-short equities
- ▶ Managed futures
- ▶ Merger arbitrage

ETF must have an open-ended investment fund structure.

The following ETF categories are not eligible:

- ▶ Pure inverse debt or equity
- ▶ Leveraged debt or equity

Number of ETFs

The number of ETFs in the index is subject to the selection and eligibility criteria at the time of reconstitution.

Index Weighting

At each annual reconstitution in April, index base weights are determined for all constituent alternative asset classes. To maintain broad exposure and diversification, the index will maintain a maximum weight allocation at each reconstitution of 30% for all of the underlying asset classes.

Portfolio Weight Calculation

Securities that meet the investable universe standards are selected and assigned a weight according to a proprietary Morningstar variant of the mean variance optimization routine. This is done at the annual reconstitution in April, and the base weights are subsequently adjusted at each monthly rebalancing by the momentum signal, defined below:

Base Weight

The weight of each individual constituent of the portfolio is obtained by maximizing portfolio expected return y_p , such that the expected portfolio risk σ_p is less than or equal to the expected aggregate risk σ_m of a standard portfolio composed of 60%-75% equities and 25%-40% bonds. Furthermore, the per-constituent minimum allocation constraint of 0% and maximum allocation constraint of 30% must be satisfied. The constrained optimization problem is:

$$\max y_p(w): \sigma_p(w) \leq \sigma_m$$

Where:

$$y_p = w'y = \sum_{i=1}^n (w_i y_i) \text{ and } \sigma_p = \sqrt{w'Vw}$$

w	=	vector of constituents' weights
y	=	vector of constituents' expected returns
V	=	variance-covariance matrix of last 36 months of total market returns
σ_m	=	trailing 36-month volatility of a standard portfolio composed of 60%-75% equities and 25%-40% bonds
n	=	number of eligible constituents

Momentum Overlay

At each monthly rebalancing, momentum signals are calculated to tilt the index toward asset classes that exhibit trends in their return distributions. At the end of each month, we rank the six-month trailing returns of the underlying ETFs from highest to lowest. The top two asset classes are awarded a weighting adjustment score of 2%, and the bottom two asset classes are penalized with a weighting adjustment score of negative 2%. All other index members are assigned a weighting adjustment score of 0%. These scores are aggregated over the trailing six periods to arrive at the aggregate weighting adjustment score. The aggregate weighting adjustment score is then applied to the base weights determined at the annual reconstitution. The final weights are subject to the following three additional constraints:

- ▶ Adjusted constituent weight ≥ 0
- ▶ Base weight * .25 \leq adjusted constituent weight \leq base weight * 1.75
- ▶ Annualized tracking error of the final weights are constrained to a maximum of 4%

Index Maintenance and Calculation

Scheduled Maintenance

The index is reconstituted annually and is implemented after the close of business on the fifth business day of April and is effective the following business day¹. The market data used for reconstitution is from previous year's end.

The index is rebalanced monthly and is implemented after the close of business on the fifth business day of each month and is effective the following business day. The market data used for rebalance is from previous month's end.

Refer to Appendix 1 for details on reconstitution and rebalancing.

1. The Index did not undergo reconstitution in April 2020. Instead the usual monthly rebalancing was implemented.

Index Calculation and Price Data

Index calculation

Basic Formula

The value (price) and total return of the index is calculated using Laspeyres' formula. The only difference is that the divisor D_t is different for the two (total return and price return) indexes:

$$Index(t) = \left(\frac{M(t)}{B(t)} \right) * BaseIndexValue$$

$$M(t) = \sum_{i=1}^n (p_{i(t)} * q_{i(t)})$$

$$B(t) = C(t) \sum_{i=1}^n (p_{i(0)} * q_{i(0)})$$

The above formula can be simplified as: $Index(t) = \frac{M(t)}{D(t)}$

Where:

D(t)	=	divisor at time (t)=B(t)/Base Index Value
n	=	number of constituents in the index
pi(0)	=	closing price of constituent i at the base date
qi(0)	=	number of shares held in index of constituent i at the base
pi(t)	=	price of constituent i at time (t)
qi(t)	=	number of shares in index of constituent i at time (t)
C(t)	=	adjustment factor for the base date market capitalization
t	=	time the index is calculated
M(t)	=	market capitalization of the index at time (t)
B(t)	=	adjusted base date market capitalization of the index at time (t)

Divisor Adjustments

To avoid distortions caused by corporate actions that affect the share capital of index constituents, the divisor of the index is adjusted accordingly. The following formula will be used for divisor adjustments due to corporate action. Note: No divisor adjustments are necessary for constituent splits, since market capitalization does not change and the share number and share price are adjusted prior to the opening of trading on the split's ex-date.

$$D(t+1) = D(t) * \frac{(\sum_i^n P_i(t) * Q_i(t)) \mp \Delta MV(t+1)}{(\sum_i^n P_i(t) * Q_i(t))}$$

Where:

D(t)	=	divisor at time (t)
D(t+1)	=	divisor at time (t+1)

$P_i(t)$	=	price of constituent i at time (t)
$q_i(t)$	=	number of shares of constituent i at time (t)
$\Delta MC(t+1)$	=	add new components' market capitalization and adjusted market capitalization

(calculated with adjusted closing prices and shares effective at time $t+1$ and/or minus market capitalization of constituents to be deleted)

Note: If the current trading price of a constituent is unavailable, the previous trading session's closing price is used. However, if the constituent is affected by any corporate action that requires an adjustment, then the adjusted price is used.

Distribution Reinvestment

Distributions are reinvested proportionally into the index sample on the ex-date. The ex-date rather than the pay date is used because the marketplace price adjustment for the distribution occurs on the ex-date. A divisor adjustment for the total-return index variant is performed to reflect distribution reinvestment. The total distributions paid by all constituents in the index on the ex-date are considered a market value change and the divisor is adjusted accordingly.

Price Data

This index is priced based on the average of the market close bid/ask of the underlying constituents. Distributions are reinvested proportionally in the index sample of the total return index.

Methodology Review and Index Cessation Policy

The index methodology is continually reviewed to ensure it achieves all stated objectives. These reviews take into account corporate action treatment, selection, and maintenance procedures. Subscribers to the index will be notified before any methodology changes are made. For more details, refer to the [Morningstar Index Methodology Change Process](#).

Morningstar also notifies all subscribers and stakeholders of the index that circumstances might arise that require a material change to the index, or a possible cessation of the index. Circumstances that could lead to an index cessation include, but are not limited to, market structure change, product definition change, inadequate supply of data, insufficient revenue associated with the index, insufficient number of clients using the index, and/or other external factors beyond the control of the Morningstar Index Committee.

Because the cessation of the index or benchmark index could disrupt subscriber products that reference this index, all subscribers are encouraged to have robust fallback procedures if an index is terminated. For more details, refer to the [Morningstar Index Cessation Process](#).

Data Correction and Precision

Intraday Index Data Corrections

Commercially reasonable efforts are made to ensure the accuracy of data used in real-time index calculations. If incorrect price or corporate action data affect index daily highs or lows, they are corrected retroactively as soon as is feasible.

Index-Related Data and Divisor Corrections

Incorrect pricing and corporate action data for individual issues in the database will be corrected upon detection. In addition, an incorrect divisor of an index, if discovered within five days of its occurrence, will always be fixed retroactively on the day it is discovered to prevent an error from being carried forward. Commercially reasonable efforts are made to correct an older error subject to its significance and feasibility.

For more details, refer to the [Recalculation Guidelines](#).

Computational and Reporting Precision

For reporting purposes, index values are rounded to two decimal places and divisors are rounded to appropriate decimal places.

Appendixes

Appendix 1: Glossary

Terms	Description
Reconstitution	During each reconstitution, the steps mentioned in the index construction process are performed, resulting in membership reset, and base weights are recalculated.
Rebalance	During each rebalance, the base weights are adjusted by a momentum signal.

Appendix 2: Morningstar Diversified Alternatives Index Constituents

Name	Ticker
ProShares Inflation Expectations ETF	RINF
ProShares DJ Brookfield Global Direct Infrastructure ETF	TOLZ
ProShares Global Listed Private Equity ETF	PEX
ProShares Hedge Replication ETF	HDG
ProShares RAFI Long/Short	RALS
ProShares Managed Futures Strategy ETF	FUT
ProShares Merger ETF	MRGR

Appendix 3: Modification to Rulebook

Section	Description	Update Date
Appendix 2	Replaced ProShares Managed Futures Strategy (ALTS: FUTS) with ProShares Managed Futures Strategy ETF (BATS: FUT)	March 2016
Appendix 2	Renamed ProShares 30 Year TIPS/TSY Spread as ProShares Inflation Expectations ETF	April 2016
Scheduled Maintenance	Added a footnote detailing the maintenance conducted in April 2020	April 2020

About Morningstar, Inc.

Morningstar, Inc. is a leading provider of independent investment research in North America, Europe, Australia, and Asia. Morningstar offers an extensive line of products and services for individual investors, financial advisors, asset managers, and retirement plan providers and sponsors. Morningstar provides data on approximately 510,000 investment offerings, including stocks, mutual funds, and similar vehicles, along with real-time global market data on more than 17 million equities, indexes, futures, options, commodities, and precious metals, in addition to foreign exchange and Treasury markets. Morningstar also offers investment management services through its investment advisory subsidiaries.

About Morningstar Indexes

Morningstar® Indexes combine the science and art of indexing to give investors a clearer view into the world's financial markets. Our indexes are based on transparent, rules-based methodologies that are thoroughly back-tested and supported by original research. Covering all major asset classes, our indexes originate from the Morningstar Investment Research Ecosystem—our network of accomplished analysts and researchers working to interpret and improve the investment landscape. Clients such as exchange-traded fund providers and other asset management firms work with our team of experts to create distinct, investor-focused products based on our indexes. Morningstar Indexes also serve as a precise benchmarking resource.

Morningstar Index Product Committee

The Morningstar Index Product Committee is comprised of members who possess a wide array of knowledge in relation to Indexes. The Product Committee is responsible for the governance over the creation and maintenance of all Morningstar branded Indexes, ensuring the highest standards are continuously met. Any matters arising from exceptional or undocumented events will be resolved at the discretion of the Morningstar Index Product Committee.

Morningstar Index Oversight Committee

The Morningstar Index Oversight Committee is comprised of informed and qualified professionals who are responsible for the process governance of Morningstar branded Indexes. The Oversight Committee assesses and where appropriate challenges the decisions of Morningstar Indexes with regards to benchmark decisions.

For More Information

For any queries, reach out to us via our [communication page](#).



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