

INDEX METHODOLOGY

Northern Trust
50 South La Salle Street
Chicago, Illinois 60603
Nt_index_services@ntrs.com
northerntrust.com

INTRODUCTION

This document sets forth the methodology for the Northern Trust US Long Corporate Bond Quality Value Index.

The index is calculated and disseminated by Intercontinental Exchange Data Services (ICE), and had an inception date of January 31, 2020 at a base index value of 1000.

OVERVIEW

Northern Trust US Long Corporate Bond Quality Value Index

The Northern Trust US Long Corporate Bond Quality Value Index is designed to measure the performance of a diversified universe of longer term¹ maturity, US-dollar denominated bonds of companies with investment grade credit quality, favorable valuations, and enhanced short-term and long-term solvency.

INDEX ELIGIBILITY

In order to be eligible for inclusion in the Northern Trust US Long Corporate Bond Quality Value Index, each bond issue must meet the following criteria at each reconstitution:

- **Currency:** Each security must be issued in United States Dollars
- **Market of Issue:** Each security must be publicly issued in the U.S. and SEC registered or eligible for resale under 144A of the Securities Act of 1933
- **Security Types:** Each security must be one of the following types unless noted otherwise below:
 - **Inclusions:** Fixed rate debentures, Medium Term Notes (MTN), callable and puttable bonds, original issue zero-coupon bonds, 144A securities with registration rights, convertible, warrant-bearing and contingent capital securities, Fixed to floating capital securities (hybrids) which convert within ten years or more of the reconstitution date, Payment in Kind (PIK) bonds, step-up coupons and those that change according to a predetermined schedule.



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- **Exclusions:** Illiquid securities with no external pricing per our calculation source ICE
- **Debt Seniority:** Each security must be either senior or subordinated debt, but covered bonds are to be excluded.
- **Ratings:** Each security must have a minimum credit rating of Baa3/BBB-/BBB-ⁱⁱ
- **Maturity:** Each security must have a final maturity of ten years or greater, at the time of each reconstitution.
- **Size:** Each security must have \$250 million or more in outstanding principal at the time of each reconstitution.

DETAILED METHODOLOGY

The construction of the index begins with a securities screen to determine eligible securities (defined in “Index Eligibility” section). Once all eligible securities have been identified, the securities’ are then optimized based on their exposure to quantitative factors such as:

- Composite Alphaⁱⁱⁱ: produced by combining each issue’s Value Score^{iv} and Quality Score^v, as determined by Northern Trust Investments’ Quantitative Research Team
- Effective Duration^{vi}

The primary objective of the optimization is to maximize our exposure to the Composite Alpha, and maintain a similar Effective Duration profile relative to our eligible universe. In addition to that main objective, systematic risk is managed during the optimization utilizing several constraints. These constraints are listed below (bounds show as relative weightings unless otherwise noted):

- Security level constraint: to limit an index constituent’s maximum or minimum weight versus the eligible universe to either full underweight or five times (5.0x) the weight in the eligible universe
- Sector^{vii} constraint: to limit the index’s maximum or minimum sector weight exposure to +/-10% versus the eligible universe
- Issuer level constraint: to limit each issuer’s absolute weight to 3.0% or less
- Composite Alpha constraint: to flag bonds ranking in the lowest quintile of non-financial sectors of the Composite Score as ineligible
- Turnover constraint: to limit turnover at each index reconstitution to 10% or less

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



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

RECONSTITUTION & REBALANCING

The Northern Trust US Long Corporate Bond Quality Value Index is reconstituted monthly^{viii} on the last business day of the month in which U.S. bond markets are open for trading^{ix}, and becomes effective immediately after the market close. Intra-period adjustments may be made at the discretion of the index provider in connection with errors, changes in eligibility, and corporate actions.

The Northern Trust US Long Corporate Bond Quality Value Index reserves the right to postpone each reconstitution 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 the reconstitution or rebalancing date, and again with definitive weights after the close of the reconstitution or rebalancing date, before the following business day's market open.

Disclaimer: Returns of the indexes do not typically reflect the deduction of investment management fees, trading costs or other expenses. It is not possible to invest directly in an index. Indexes are the property of their respective owners, all rights reserved

ⁱ Longer maturity is defined as 10 years or longer to maturity date at the time of each reconstitution

ⁱⁱ Ratings: The minimum credit rating for inclusion in the index is Baa3/BBB-/BBB-. For issues rated by all three ratings agencies, a composite rating is created by using the average of the three ratings. When two ratings are present, the lower of the two ratings are used to determine eligibility. At minimum, a single investment grade rating is required for a security to be eligible for the index. Bonds that are downgraded below investment grade or that enter into default post-reconstitution are removed at the next scheduled reconstitution.

ⁱⁱⁱ The Composite Alpha is formed by taking the Quality Score and Value Score, and their respective weights in the Composite Alpha calculations

^{iv} The core components of the proprietary Value scoring model are based on quantitative ranking of various metrics obtained from company filings with the SEC, as well as recent price activity. The scores have multiple components, and include but are not limited to the following: Valuation (e.g. to assess the relative value of the security versus other similar securities), Spread Analysis (e.g. to assess the risk/return trade-off associated with each security versus other similar securities) and Solvency (e.g. to assess the corporation's short term and long term solvency and also its risk of default).

^v The core components of the proprietary Quality scoring model are based on quantitative ranking of various metrics obtained from company filings and recent price activity. These scores have three components: Management Efficiency (e.g. corporate finance activities), Profitability (e.g. assess the reliability and sustainability of financial performance) and Solvency (short and long term).



^{vi} A measure of the sensitivity of the price of a bond to a change in interest rates, adjusted for embedded options, and commonly utilized to evaluate a bond's theoretical change in value given a shift in the yield curve.

^{vii} Northern Trust Asset Management categorizes all issues available in our database into the following sectors: Consumer, Energy, Financials, Industrials, and Telecom, Technology & Media (TTM).

^{viii} Data used to strike the forward index is locked down for construction purposes eight business days prior to month end.

^{ix} Per the US holiday schedule posted at www.sifma.org/services/holiday-schedule/

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