Bloomberg MSCI US High Yield Very Liquid ESG Select Index

The Bloomberg MSCI US High Yield Very Liquid ESG Select Index measures high yield, fixed-rate, U.S. dollar-denominated bonds, and is optimized to maximize exposure to positive environmental, social, and governance (ESG) factors. Based on the Bloomberg US High Yield Very Liquid Index, the ESG Select Index selects securities eligible for US High Yield Very Liquid Index and weights them using an optimization process, while controlling for active total risk. The index was launched in September 2019, with history backfilled to April 2019.

Fixed Income Rules for Inclusion

Sector	Corporate (industrial, utility and financial institutions) issuers only, except for the following industrial sectors: ● All issuers classified as Independent or Integrated Energy. ● All issuers classified as Metals and Mining.
Eligible Currencies	Principal and interest must be denominated in USD.
Quality	Securities must be rated high yield (Ba1/BB+/BB+ or below) using the middle rating of Moody's, S&P and Fitch; when a rating from only two agencies is available, the lower is used; when only one agency rates a bond, that rating is used. In cases where explicit bond level ratings may not be available, other sources may be used to classify securities by credit quality: ● Expected ratings at issuance may be used to ensure timely index inclusion or to properly classify split-rated issuers. ● Unrated securities may use an issuer rating for index classification purposes if available. Unrated subordinated securities are included if a subordinated issuer rating is available.
Amount Outstanding	USD500mn minimum par amount outstanding.
Coupon	● Fixed-rate coupon. ● Original zero coupon bonds are included. ● Callable fixed-to-floating rate bonds are eligible during their fixed-rate term only. ● Bonds with a step-up coupon that changes according to a predetermined schedule are eligible.
Issue Date	Eligible bonds must have been issued within the past five years.
Seniority of Debt	Senior and subordinated issues are included.
Maturity	● Remaining years to maturity must be at least one year and less than fifteen years, regardless of optionality. ● Bonds that convert from fixed to floating rate, including fixed-to-float perpetual, will exit the index one year prior to conversion to floating-rate. Fixed-rate perpetual bonds are not included.
Taxability	● Only fully taxable issues are eligible. ● Dividend Received Deduction (DRD) and Qualified Dividend Income (QDI) eligible securities are excluded.

Market of Issue	• SEC-registered bonds, bonds exempt from registration at the time of issuance and SEC Rule 144A securities (with or without registration rights) are eligible. • A security with both SEC Regulation-S (Reg-S) and SEC 144A tranches is treated as one security for index purposes. The 144A tranche is used to prevent double-counting and represents the combined amount outstanding of the 144A and Reg-S tranches.
Security Types	• Included • Corporate bonds • Fixed-rate bullet, putable, sinkable/amortizing and callable bonds • Original issue zero coupon bonds • Fixed-rate and fixed-to-float (including fixed-to-variable) capital securities • Excluded • Debt issued by emerging markets corporate issuers • Defaulted bonds • Contingent capital securities, including traditional CoCos and contingent write-down securities with explicit capital ratio or solvency/balance sheet–based triggers • Bonds with equity type features (e.g., warrants, convertibles, preferreds, DRD/QDI-eligible issues) • Inflation-linked bonds, floating-rate issues • Fixed-rate perpetuals • Taxable and tax-exempt municipal securities • Private placements, retail bonds • USD25/USD50 par bonds • Structured notes, pass-through certificates • Illiquid securities with no available internal or third-party pricing source • Partial pay-in-kind (PIK) bonds • Pay-in-kind (PIK) bonds • Toggle notes in PIK status

Environment, Social and Governance (ESG) Rules

MSCI ESG Rating	• Securities must have an MSCI ESG Rating of B or higher. • Unrated issuers are excluded. • MSCI ESG Ratings are generally updated annually, but may be reviewed more frequently as needed.
MSCI ESG Controversy	Securities must meet at least one of the conditions below: • Issuer has an ESG Controversy Score of 2 or higher; or • Issuer has an ESG Controversy Score of 1 and an ESG Rating of A or higher; or • Issuer has an ESG Controversy Score of 1 and an ESG Rating between BBB and B with a positive ESG Rating Momentum.
MSCI Business Involvement Screening Research (BISR)	The index excludes issuers involved in the following business lines/activities: • All companies classified as an "Alcohol Producer" that earn either 10% or more revenue or more than $1bn in revenue from alcohol-related activities.

- All companies classified as a "Tobacco Producer" that earn either 10% or more revenue from tobacco-related activities.
- All companies classified as "Gambling Operations" or "Gambling Support" that earn either 10% or more revenue or more than $1bn in revenue from gambling-related activities.
- All companies classified as "Nuclear Power Utility" that earn 10% or more revenue from nuclear power-related activities or involved in at least one of the following:

  - enrichment of fuel for nuclear reactors

  - uranium mining

  - designing nuclear reactors.
- All companies involved in manufacturing "Conventional Weapon Systems" or "Conventional Weapon Components" that earn 10% or more revenue from these activities.
- All companies classified as a "Cluster Bomb Manufacturer".
- All companies classified as a "Landmine Manufacturer".
- All companies classified as a manufacturer of "Depleted Uranium Weapons".
- All companies involved in manufacturing "Nuclear Weapons", or "Nuclear Weapons Components".
- All companies involved in manufacturing "Chemical and Biological Weapons" or "Chemical and Biological Weapons Components".
- All companies classified as a "Civilian Firearm Producer" that earn more than 0% revenue from civilian firearms.

Methodology and Weight Calculations

Overview

- The Bloomberg PORT Optimizer is used to select and weight 21 subcomponents of this index.
  - Securities are grouped into 21 tradeable buckets based on their ESG Score and Index Rating.
  - The optimizer runs once per month, calculating composite weights.
  - This process will not impact bond prices and other security-level analytics.
- The optimizer's objective is to maximize the ESG Score of the index.
- By default, only securities eligible for the Bloomberg US High Yield Very Liquid Index that meet the aforementioned ESG inclusion rules are included.
- Index turnover is calculated using two-way turnover (buys and sells).

Optimization Constraints

For soft constraints, the optimizer will consider solutions outside of these bounds, provided that the trade-off is sufficient.

- Active Total Risk must be less than 50 bps per month with respect to the parent index.
- Yield to worst must be within 25bps of the parent index.
- Bloomberg Fixed Income Class 2 sector (industrial, utility and financial institutions) weights must be within 5, 3, and 2 percentage points, respectively, from the parent index.
- The total weight of individual, or groups of, tradeable buckets are capped at various levels.
- Only long positions are allowed.
- All cash that enters the index midmonth is completely reinvested into next month's index at the next rebalancing date.

	○ On each rebalancing date, cash has a 0% weight.
Turnover	Unlike standard rules-based indices, past index holdings will directly impact which securities are chosen for index inclusion in the present and future. This is because one of the constraints and objectives of the optimization process is to limit monthly index turnover. The optimizer sets a 5% turnover soft constraint each month.

Tracking Error Volatility Calculations

Determination of TEV

The forecasted tracking error volatility (TEV) of the Bloomberg MSCI US High Yield Very Liquid ESG Select Index is calculated using PORT's MAC2 Fixed Income Fundamental Factor model. The TEV is a function of the net exposure of each bond in the index to the model factors and the variance-covariance matrix (VCV) of the factors. The net exposure of each bond is the product of the weight difference of the bond in the index vs. the benchmark (Δw_i) and the factor loading of the bond (L_{if}). The TEV is given by the formula below (expressed in matrix notation):

$$TEV = (\Delta w \times L)^T \times VCV \times \Delta w \times L$$

where Δw is the vector of net weights of all bonds
and L is the matrix of loadings of each bond to each model factor.

The MAC2 Fixed Income Fundamental Factor model has over 500 risk factors representing market variables such as interest rates as well as country, sector and issuer specific characteristics such as credit spreads. The forecasted covariance matrix of the factor returns is constructed from exponentially-weighted moving averages of the volatilities and correlations of the factor historical returns. Volatilities and correlations are forecasted separately to allow for different responsiveness. Volatilities are estimated from exponentially-weighted moving averages that use weekly observations and a 26-week half-life. Correlation estimation, on the other hand, uses weekly factor returns with a 52-week half-life. For correlation estimation, we blend the empirical covariance matrix with a Principal Component Analysis based covariance to strike a balance between risk forecast accuracy and optimization robustness. (Further detail on the Risk Model can be found in Appendix A).

Rebalancing Rules

Issuer Capping Methodology	Issuers that exceed 3% of the market value of the uncapped Bloomberg MSCI US High Yield Very Liquid ESG Select Index are limited at 3%. The excess market value over the 3% cap is redistributed on a pro rata basis to all other issuers' bonds in the index that are under the 3% cap. The process is repeated until no issuer exceeds the 3% limit. For example, an issuer that represents 4% of the uncapped index will have 1% of the index's market value redistributed to each bond from all issuers under the 3% cap on a pro rata basis. The 3% issuer cap is applied each month as the index is rebalanced.
Frequency	The weights of the components in the Bloomberg MSCI US High Yield Very Liquid ESG Select Index are rebalanced on a monthly basis using data 3 business days prior to the month-end date (T-3). This allows for 3 business days advance notice for any weighting changes among buckets. The new weights will be applied to the Projected (Forward) Universe on a T-2 basis. Within the components themselves, Bloomberg maintains two universes of securities: the Returns (Backward) and the Projected (Forward) Universes. The composition of the Returns Universe is rebalanced at each month-end and represents the fixed set of bonds on which index returns are calculated. The Projected Universe is a forward-looking projection that changes daily to reflect issues dropping out of and entering the index but is not used for return calculations. On the last business day of the month (the rebalancing date), the composition of the latest Projected Universe becomes the Returns Universe for the following month.

Index Changes	During the month, indicative changes to securities (credit rating change, sector reclassification, amount outstanding changes, corporate actions, and ticker changes) are reflected daily. These changes will affect the composition of the index at month-end only – when the index is next rebalanced.
Reinvestment of Cash Flows	Intra-month cash flows from interest and principal payments contribute to monthly index returns but are not reinvested at a short-term reinvestment rate between rebalance dates. At each rebalancing, cash is effectively reinvested into the returns universe for the following month, thus index results over two or more months reflect monthly compounding.
New Issues	Qualifying securities issued, but not necessarily settled on or before the month-end rebalancing date, qualify for inclusion in the following month's index if the required security reference information and pricing are readily available.

Pricing and Related Issues

Sources & Frequency	Bonds are priced on a daily basis by Bloomberg's evaluated pricing service, BVAL.
Pricing Quotes	Bonds are quoted as a percentage of par.
Timing	Prior to January 14, 2021, bonds are priced at 3 p.m. (New York time). On early market closes, prices are taken as of 1 p.m. (New York time), unless otherwise noted. From January 14, 2021 and onwards, bonds are priced at 4 p.m. (New York time). On early market closes, prices are taken as of 2 p.m. (New York time), unless otherwise noted. If the last business day of the month is a US holiday, prices from the previous day are used.
Bid or Offer Side	Bonds in the index are priced on the bid side. The initial price for new corporate issues entering the index is the offer side; after the first month, the bid price is used.
Settlement Assumptions	T+1 calendar day settlement basis. At month-end, settlement is assumed to be the first calendar day of the following month, even if the last business day is not the last day of the month, to allow for one full month of accrued interest to be calculated.
Verification	Daily price moves for each security are analyzed by the index pricing team to identify outliers. Index users may also challenge price levels, which are then reviewed and updated as needed.
Calendar	The Bloomberg MSCI US High Yield Very Liquid ESG Select Index follows the U.S. bond market holiday schedule.

Accessing Index Data

Bloomberg Terminal®

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- INDE<GO> - The Bloomberg Indices dashboard page, which contains daily, monthly, and year-to-date index returns for key indices from each index family as well as a link to index publications.
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Index Ticker

I35213US: Bloomberg MSCI US High Yield Very Liquid ESG Select Index

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- Custom Index Solutions
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- Mutual Funds
- Separately Managed Accounts (SMAs)

Appendix A: Determination of TEV

The forecasted tracking error volatility (TEV) of the Bloomberg MSCI US High Yield Very Liquid ESG Select Index is calculated using PORT's MAC2 Fixed Income Fundamental Factor model. The TEV is the combination of systematic (factor-based) TEV (TEV_{sys}) and idiosyncratic (issue-specific) TEV (TEV_{idio}).

$$TEV = \sqrt{{TEV_{sys}}^2 + {TEV_{idio}}^2}$$

The systematic TEV is a function of the net exposure of each bond in the index to the model factors and the variance-covariance matrix (Σ_F) of the factors. The net exposure of each bond is the product of the weight difference of the bond in the index vs. the benchmark (Δw_i) and the factor loading of the bond (l_{if}). The TEV is given by the formula:

$${TEV_{sys}}^2 = (\Delta w \times \mathcal{L}) \times \Sigma_F \times (\Delta w \times \mathcal{L})^T$$

or if we expand the matrices:

$${TEV_{sys}}^2 = [\Delta w_1 \quad \cdots \quad \Delta w_N] \begin{bmatrix} l_{11} & \cdots & l_{1F} \\ \vdots & \ddots & \vdots \\ l_{N1} & \cdots & l_{NF} \end{bmatrix} \begin{bmatrix} {\sigma_1}^2 & \cdots & cov_{1F} \\ \vdots & \ddots & \vdots \\ cov_{F1} & \cdots & {\sigma_N}^2 \end{bmatrix} \begin{bmatrix} l_{11} & \cdots & l_{N1} \\ \vdots & \ddots & \vdots \\ l_{1F} & \cdots & l_{NF} \end{bmatrix} \begin{bmatrix} \Delta w_1 \\ \cdots \\ \Delta w_N \end{bmatrix}$$

Where *N* is the number of bonds in the union of the index and its benchmark, and *F* is the number of systematic factors in the MAC2 model.

The idiosyncratic TEV is a function of the net weight of each bond in the index and the idiosyncratic variance-covariance matrix (Σ_I) of the bonds.

$${TEV_{idio}}^2 = (\Delta w) \times \Sigma_I \times (\Delta w)^T$$

or if we expand the matrices:

$${TEV_{idio}}^2 = [\Delta w_1 \quad \cdots \quad \Delta w_N] \begin{bmatrix} {\sigma_{idio_1}}^2 & \cdots & 0^* \\ \vdots & \ddots & \vdots \\ 0^* & \cdots & {\sigma_{idio_N}}^2 \end{bmatrix} \begin{bmatrix} \Delta w_1 \\ \cdots \\ \Delta w_N \end{bmatrix}$$

The idiosyncratic covariance matrix is block-diagonal, i.e. the off-diagonal elements are zero unless they correspond to two bonds of the same issuer in which case the level of the covariance element is a function of the riskiness of the issuer and the difference of the spread duration of the two bonds.

The MAC2 Fixed Income Fundamental Factor model has over 500 risk factors representing market variables such as interest rates as well as country, sector and issuer specific characteristics such as credit spreads. The forecasted covariance matrix of the factor returns is constructed from exponentially-weighted moving averages of the volatilities and correlations of the factor historical returns. Volatilities and correlations are forecasted separately to allow for different responsiveness. Volatilities are estimated from exponentially-weighted moving averages that use weekly observations and a 26-week half-life. Correlation estimation, on the other hand, uses weekly factor returns with a 52-week half-life. For correlation estimation, we blend the empirical covariance matrix with a principal-component analysis based covariance to strike a balance between risk forecast accuracy and optimization robustness.

Interest-rate risk is calculated using the historical volatility of interest rate changes multiplied by the key-rate durations of bonds. Credit risk volatility is primarily driven by the volatility of the proportional change of spreads multiplied by the product of spread duration and spread level (DTS). This measure incorporates current market information (spreads) and, thus, is more responsive to changes in market environments and risk than historical estimates.

The security level idiosyncratic risk is calculated as the product of security level idiosyncratic exposure (in general option adjusted spread duration for government and government related bonds and the product of spread duration and spread level for corporate bonds) and idiosyncratic volatilities estimated using exponentially-weighted moving averages with a 26-week half-life.

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